FeynRules Implementation of 3-Site Model

N. Christensen *

Michigan State University

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Abstract

We describe the implementation of the 3-Site Model model using the FeynRules package.

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*email: neil@pa.msu.edu

1 Introduction

We describe the implementation of the 3-Site Model model using the FeynRules [3] package. More information about this model can be found in [1]-[2].

2 Gauge Symmetries

The gauge group of this model is

$$SU20 \; \times \; SU21 \; \times \; U12 \; \times \; SU3C. \tag{1}$$

Details of these gauge groups can be found in Table 1.

Group	Abelian	Gauge Boson	Coupling Constant	Charge	Structure Constant	Symmetric Tensor	Reps	Defs
SU20	F	W0	g		ep0			ep0 → Eps
SU21	F	W1	gt		ep1			ep1 → Eps
U12	T	W23	gp	Y				
SU3C	F	G	gs		f		$T_{i,i}$	

Table 1: Details of gauge groups.

The definitions of the indices can be found in Table 2.

Index	Symbol	Range
Gluon	a	1-8
SU20	s	1-3
SU21	t	1-3
Generation	f	1-3
Colour	i	1-3

Table 2: Definition of the indices.

3 Fields

In this section, we describe the field content of our model implementation.

3.1 Vector Fields

In this subsection, we describe the vector fields of our model. The details of the physical vectors can be found in Table 3.

Class	SC	I	FI	QN	Mem	M	W	PDG
A	T				A	0	0	22
Z	T				Z	MZ= 91.1876	WZ= 2.4952	23
W	F			$Q = 1$	W	MW= 80.398	WW= 2.141	24
ZP	T				ZP	MZP= Internal	WZP= 5	6000023
WP	F			$Q = 1$	WP	MWP= 500	WWP= 5	6000024
G	T	a			G	0	0	21

Table 3: Details of physical vector fields. The headers are as follows: SC = self conjugate, I = indices, FI = flavor index, QN = quantum numbers, Mem = members, M = mass, W = width, and PDG = particle data group number.

The details of the unphysical vectors can be found in Table 4.

Class	SC	I	FI	QN	Mem	Definitions
W0p	F				W0p	$\text{W0p}_\mu \to \text{v0W}W_\mu + \text{v0WP}WP_\mu$
W1p	F				W1p	$\text{W1p}_\mu \to \text{v1W}W_\mu + \text{v1WP}WP_\mu$
W0	T	s	s		W0	$\text{W0}_{\mu,1} \to \frac{\text{W0p}_\mu + \text{W0p}_\mu^\dagger}{\sqrt{2}}$
						$\text{W0}_{\mu,2} \to -\frac{i\left(-\text{W0p}_\mu + \text{W0p}_\mu^\dagger\right)}{\sqrt{2}}$
						$\text{W0}_{\mu,3} \to \text{v0g}A_\mu + \text{v0Z}Z_\mu + \text{v0ZP}ZP_\mu$
W1	T	t	t		W1	$\text{W1}_{\mu,1} \to \frac{\text{W1p}_\mu + \text{W1p}_\mu^\dagger}{\sqrt{2}}$
						$\text{W1}_{\mu,2} \to -\frac{i\left(-\text{W1p}_\mu + \text{W1p}_\mu^\dagger\right)}{\sqrt{2}}$
						$\text{W1}_{\mu,3} \to \text{v1g}A_\mu + \text{v1Z}Z_\mu + \text{v1ZP}ZP_\mu$
W23	T				W23	$\text{W23}_\mu \to \text{v2g}A_\mu + \text{v2Z}Z_\mu + \text{v2ZP}ZP_\mu$

Table 4: Details of unphysical vector fields. The headers are as follows: SC = self conjugate, I = indices, FI = flavor index, QN = quantum numbers, and Mem = members.

3.2 Fermion Fields

In this subsection, we describe the fermion fields of our model. The details of the physical fermions can be found in Table 5. The details of the unphysical fermions can be found in Tables 6, 7.

3.3 Scalar Fields

In this subsection, we describe the scalar fields of our model. The details of the physical scalars can be found in Table 8. The details of the unphysical scalars can be found in Table 9.

3.4 Ghost Fields

In this subsection, we describe the ghost fields of our model. The details of the physical ghosts can be found in Table 10. The details of the unphysical ghosts can be found in Table 11.

Class	SC	I	FI	QN	Mem	M	W	PDG
n	F	f	f	$LeptonNumber = 1$				
					n1			12
					n2			14
					n3			16
l	F	f	f	$Q = -1$		Ml		
				$LeptonNumber = 1$	e1	me= 0		11
					e2	mmu= 0.1057		13
					e3	mta= 1.777		15
u	F	f, i	f	$Q = 2/3$		Mu		
					u1	mup= 0	0	2
					u2	mch= 1.27	0	4
					u3	mto= 171.2	wto= 1.50834	6
d	F	f, i	f	$Q = -1/3$		Md		
					d1	mdo= 0		1
					d2	mst= 0.104		3
					d3	mbo= 4.2		5
hn	F	f	f	$LeptonNumber = 1$		MhNu= Internal	WhNu	
					hn1		WhNu1= 1	6000012
					hn2		WhNu2= 1	6000014
					hn3		WhNu3= 1	6000016
hl	F	f	f	$Q = -1$		Mhl	Whl	
				$LeptonNumber = 1$	he1	MhEl= Internal	WhEl= 1	6000011
					he2	MhMu= Internal	WhMu= 1	6000013
					he3	MhTa= Internal	WhTa= 1	6000015
hu	F	f, i	f	$Q = 2/3$		MhU		
					hu1	MhUp= Internal	WhUp= 1	6000002
					hu2	MhCh= Internal	WhCh= 1	6000004
					hu3	MhTo= Internal	WhTo= 1	6000006
hd	F	f, i	f	$Q = -1/3$		MhD		
					hd1	MhDo= Internal	WhDo= 1	6000001
					hd2	MhSt= Internal	WhSt= 1	6000003
					hd3	MhBo= Internal	WhBo= 1	6000005

Table 5: Details of physical fermion fields. The headers are as follows: SC = self conjugate, I = indices, FI = flavor index, QN = quantum numbers, Mem = members, M = mass, W = width, and PDG = particle data group number.

Class	SC	I	FI	QN	Mem	Definitions
nL0	F	f	f			
					n1L0	$n1L0_s \rightarrow vL0hNuhn1_s + vL0nun1_s$
					n2L0	$n2L0_s \rightarrow vL0hNuhn2_s + vL0nun2_s$
					n3L0	$n3L0_s \rightarrow vL0hNuhn3_s + vL0nun3_s$
eL0	F	f	f	$Q = -1$		
					elL0	$elL0_s \rightarrow vL0ele1_s + vL0hElhe1_s$
					muL0	$muL0_s \rightarrow vL0mue2_s + vL0hMuhe2_s$
					taL0	$taL0_s \rightarrow vL0tae3_s + vL0hTahe3_s$
uL0	F	f, i	f	$Q = 2/3$		
					upL0	$upL0_{s,c} \rightarrow vL0hUphu1_{s,c} + vL0upu1_{s,c}$
					chL0	$chL0_{s,c} \rightarrow vL0hChhu2_{s,c} + vL0chu2_{s,c}$
					toL0	$toL0_{s,c} \rightarrow vL0hTohu3_{s,c} + vL0tou3_{s,c}$
dL0	F	f, i	f	$Q = -1/3$		
					doL0	$doL0_{s,c} \rightarrow vL0dod1_{s,c} + vL0hDohd1_{s,c}$
					stL0	$stL0_{s,c} \rightarrow vL0std2_{s,c} + vL0hSthd2_{s,c}$
					boL0	$boL0_{s,c} \rightarrow vL0bod3_{s,c} + vL0hBohd3_{s,c}$
nL1	F	f	f			
					n1L1	$n1L1_s \rightarrow vL1hNuhn1_s + vL1nun1_s$
					n2L1	$n2L1_s \rightarrow vL1hNuhn2_s + vL1nun2_s$
					n3L1	$n3L1_s \rightarrow vL1hNuhn3_s + vL1nun3_s$
eL1	F	f	f	$Q = -1$		
					elL1	$elL1_s \rightarrow vL1ele1_s + vL1hElhe1_s$
					muL1	$muL1_s \rightarrow vL1mue2_s + vL1hMuhe2_s$
					taL1	$taL1_s \rightarrow vL1tae3_s + vL1hTahe3_s$
uL1	F	f, i	f	$Q = 2/3$		
					upL1	$upL1_{s,c} \rightarrow vL1hUphu1_{s,c} + vL1upu1_{s,c}$
					chL1	$chL1_{s,c} \rightarrow vL1hChhu2_{s,c} + vL1chu2_{s,c}$
					toL1	$toL1_{s,c} \rightarrow vL1hTohu3_{s,c} + vL1tou3_{s,c}$
dL1	F	f, i	f	$Q = -1/3$		
					doL1	$doL1_{s,c} \rightarrow vL1dod1_{s,c} + vL1hDohd1_{s,c}$
					stL1	$stL1_{s,c} \rightarrow vL1std2_{s,c} + vL1hSthd2_{s,c}$
					boL1	$boL1_{s,c} \rightarrow vL1bod3_{s,c} + vL1hBohd3_{s,c}$
nR1	F	f	f			
					n1R1	$n1R1_s \rightarrow vR1hNuhn1_s + vR1nun1_s$
					n2R1	$n2R1_s \rightarrow vR1hNuhn2_s + vR1nun2_s$
					n3R1	$n3R1_s \rightarrow vR1hNuhn3_s + vR1nun3_s$

Table 6: Details of unphysical fermion fields. The headers are as follows: SC = self conjugate, I = indices, FI = flavor index, QN = quantum numbers, and Mem = members.

Class	SC	I	FI	QN	Mem	Definitions
eR1	F	f	f	$Q = -1$		
					elR1	$\text{elR1}_s \rightarrow \text{vR1ele1}_s + \text{vR1hElhe1}_s$
					muR1	$\text{muR1}_s \rightarrow \text{vR1mue2}_s + \text{vR1hMuhe2}_s$
					taR1	$\text{taR1}_s \rightarrow \text{vR1tae3}_s + \text{vR1hTahe3}_s$
uR1	F	f, i	f	$Q = 2/3$		
					upR1	$\text{upR1}_{s,c} \rightarrow \text{vR1hUphu1}_{s,c} + \text{vR1upu1}_{s,c}$
					chR1	$\text{chR1}_{s,c} \rightarrow \text{vR1hChhu2}_{s,c} + \text{vR1chu2}_{s,c}$
					toR1	$\text{toR1}_{s,c} \rightarrow \text{vR1hTohu3}_{s,c} + \text{vR1tou3}_{s,c}$
dR1	F	f, i	f	$Q = -1/3$		
					doR1	$\text{doR1}_{s,c} \rightarrow \text{vR1dod1}_{s,c} + \text{vR1hDohd1}_{s,c}$
					stR1	$\text{stR1}_{s,c} \rightarrow \text{vR1std2}_{s,c} + \text{vR1hSthd2}_{s,c}$
					boR1	$\text{boR1}_{s,c} \rightarrow \text{vR1bod3}_{s,c} + \text{vR1hBohd3}_{s,c}$
nR2	F	f	f			
					n1R2	$\text{n1R2}_s \rightarrow \text{vR2hNuhn1}_s + \text{vR2nun1}_s$
					n2R2	$\text{n2R2}_s \rightarrow \text{vR2hNuhn2}_s + \text{vR2nun2}_s$
					n3R2	$\text{n3R2}_s \rightarrow \text{vR2hNuhn3}_s + \text{vR2nun3}_s$
eR2	F	f	f	$Q = -1$		
					elR2	$\text{elR2}_s \rightarrow \text{vR2ele1}_s + \text{vR2hElhe1}_s$
					muR2	$\text{muR2}_s \rightarrow \text{vR2mue2}_s + \text{vR2hMuhe2}_s$
					taR2	$\text{taR2}_s \rightarrow \text{vR2tae3}_s + \text{vR2hTahe3}_s$
uR2	F	f, i	f	$Q = 2/3$		
					upR2	$\text{upR2}_{s,c} \rightarrow \text{vR2hUphu1}_{s,c} + \text{vR2upu1}_{s,c}$
					chR2	$\text{chR2}_{s,c} \rightarrow \text{vR2hChhu2}_{s,c} + \text{vR2chu2}_{s,c}$
					toR2	$\text{toR2}_{s,c} \rightarrow \text{vR2hTohu3}_{s,c} + \text{vR2tou3}_{s,c}$
dR2	F	f, i	f	$Q = -1/3$		
					doR2	$\text{doR2}_{s,c} \rightarrow \text{vR2dod1}_{s,c} + \text{vR2hDohd1}_{s,c}$
					stR2	$\text{stR2}_{s,c} \rightarrow \text{vR2std2}_{s,c} + \text{vR2hSthd2}_{s,c}$
					boR2	$\text{boR2}_{s,c} \rightarrow \text{vR2bod3}_{s,c} + \text{vR2hBohd3}_{s,c}$

Table 7: Details of unphysical fermion fields. The headers are as follows: SC = self conjugate, I = indices, FI = flavor index, QN = quantum numbers, and Mem = members.

Class	SC	I	FI	QN	Mem	M	W	PDG
piZ	T				piZ			
piW	F			$Q = 1$	piW			
piZP	T				piZP			
piWP	F			$Q = 1$	piWP			

Table 8: Details of physical scalar fields. The headers are as follows: SC = self conjugate, I = indices, FI = flavor index, QN = quantum numbers, Mem = members, M = mass, W = width, and PDG = particle data group number.

Class	SC	I	FI	QN	Mem	Definitions
p0	T				p0	p0 → piZv0pi0 + piZPv0pi0P
p0p	F				p0p	p0p → piWv0pi + piWPv0piP
p1	T				p1	p1 → piZv1pi0 + piZPv1pi0P
p1p	F				p1p	p1p → piWv1pi + piWPv1piP

Table 9: Details of unphysical scalar fields. The headers are as follows: SC = self conjugate, I = indices, FI = flavor index, QN = quantum numbers, and Mem = members.

Class	SC	I	FI	QN	Mem	M	W	PDG
ghA	F				ghA			
ghZ	F				ghZ			
ghWp	F			$Q = 1$	ghWp			
ghWm	F			$Q = -1$	ghWm			
ghZP	F				ghZP			
ghWPp	F			$Q = 1$	ghWPp			
ghWPm	F			$Q = -1$	ghWPm			
ghG	F	a			ghG			

Table 10: Details of physical ghost fields. The headers are as follows: SC = self conjugate, I = indices, FI = flavor index, QN = quantum numbers, Mem = members, M = mass, W = width, and PDG = particle data group number.

Class	SC	I	FI	QN	Mem	Definitions
ghostW0p	F				ghostW0p	ghostW0p $\rightarrow$ ghWpv0W + ghWPpv0WP
ghostW0m	F				ghostW0m	ghostW0m $\rightarrow$ ghWmv0W + ghWPmv0WP
ghostW1p	F				ghostW1p	ghostW1p $\rightarrow$ ghWpv1W + ghWPpv1WP
ghostW1m	F				ghostW1m	ghostW1m $\rightarrow$ ghWmv1W + ghWPmv1WP
ghostW03	F				ghostW03	ghostW03 $\rightarrow$ ghAv0g + ghZv0Z + ghZPv0ZP
ghostW13	F				ghostW13	ghostW13 $\rightarrow$ ghAv1g + ghZv1Z + ghZPv1ZP
ghostW23	F				ghostW23	ghostW23 $\rightarrow$ ghAv2g + ghZv2Z + ghZPv2ZP
ccghostW0p	F				ccghostW0p	ccghostW0p $\rightarrow$ ghWp†v0W + ghWPp†v0WP
ccghostW0m	F				ccghostW0m	ccghostW0m $\rightarrow$ ghWm†v0W + ghWPm†v0WP
ccghostW1p	F				ccghostW1p	ccghostW1p $\rightarrow$ ghWp†v1W + ghWPp†v1WP
ccghostW1m	F				ccghostW1m	ccghostW1m $\rightarrow$ ghWm†v1W + ghWPm†v1WP
ccghostW03	F				ccghostW03	ccghostW03 $\rightarrow$ ghA†v0g + ghZ†v0Z + ghZP†v0ZP
ccghostW13	F				ccghostW13	ccghostW13 $\rightarrow$ ghA†v1g + ghZ†v1Z + ghZP†v1ZP
ccghostW23	F				ccghostW23	ccghostW23 $\rightarrow$ ghA†v2g + ghZ†v2Z + ghZP†v2ZP
ghW0	F	s	s		ghW0	$\text{ghW0}_1 \rightarrow \frac{\text{ghostW0m}+\text{ghostW0p}}{\sqrt{2}}$ $\text{ghW0}_2 \rightarrow -\frac{i(\text{ghostW0m}-\text{ghostW0p})}{\sqrt{2}}$ $\text{ghW0}_3 \rightarrow$ ghAv0g + ghZv0Z + ghZPv0ZP
ghW1	F	t	t		ghW1	$\text{ghW1}_1 \rightarrow \frac{\text{ghostW1m}+\text{ghostW1p}}{\sqrt{2}}$ $\text{ghW1}_2 \rightarrow -\frac{i(\text{ghostW1m}-\text{ghostW1p})}{\sqrt{2}}$ $\text{ghW1}_3 \rightarrow$ ghAv1g + ghZv1Z + ghZPv1ZP
ghW23	F				ghW23	ghW23 $\rightarrow$ ghAv2g + ghZv2Z + ghZPv2ZP

Table 11: Details of unphysical ghost fields. The headers are as follows: SC = self conjugate, I = indices, FI = flavor index, QN = quantum numbers, and Mem = members.

4 Lagrangian

In this section, we describe the Lagrangian of our model implementation.

4.1 L_{Gauge}

$-\frac{1}{4}\partial_\nu\left[G_{\mu,a}\right]^2 + \frac{1}{2}\partial_\nu\left[G_{\mu,a}\right]\partial_\mu\left[G_{\nu,a}\right] - \frac{1}{4}\partial_\mu\left[G_{\nu,a}\right]^2 - \frac{1}{4}\partial_\nu\left[W0_{\mu,a}\right]^2 + \frac{1}{2}\partial_\nu\left[W0_{\mu,a}\right]\partial_\mu\left[W0_{\nu,a}\right] - \frac{1}{4}\partial_\mu\left[W0_{\nu,a}\right]^2 - \frac{1}{4}\partial_\nu\left[W1_{\mu,a}\right]^2 + \frac{1}{2}\partial_\nu\left[W1_{\mu,a}\right]\partial_\mu\left[W1_{\nu,a}\right] - \frac{1}{4}\partial_\mu\left[W1_{\nu,a}\right]^2 - \frac{1}{4}\partial_\nu\left[W23_\mu\right]^2 + \frac{1}{2}\partial_\nu\left[W23_\mu\right]\partial_\mu\left[W23_\nu\right] - \frac{1}{4}\partial_\mu\left[W23_\nu\right]^2 - \frac{1}{4}\text{gs}\partial_\nu\left[G_{\mu,a}\right]f_{a,\text{b\$5986,c\$5986}}G_{\mu,\text{b\$5986}}G_{\nu,\text{c\$5986}} + \frac{1}{4}\text{gs}\partial_\mu\left[G_{\nu,a}\right]f_{a,\text{b\$5986,c\$5986}}G_{\mu,\text{b\$5986}}G_{\nu,\text{c\$5986}} - \frac{1}{4}\text{gs}\partial_\nu\left[G_{\mu,a}\right]f_{a,\text{b\$5987,c\$5987}}G_{\mu,\text{b\$5987}}G_{\nu,\text{c\$5987}} + \frac{1}{4}\text{gs}\partial_\mu\left[G_{\nu,a}\right]f_{a,\text{b\$5987,c\$5987}}G_{\mu,\text{b\$5987}}G_{\nu,\text{c\$5987}} - \frac{1}{4}\text{gs}^2 f_{a,\text{b\$5986,c\$5986}}f_{a,\text{b\$5987,c\$5987}}G_{\mu,\text{b\$5986}}G_{\mu,\text{b\$5987}}G_{\nu,\text{c\$5986}}G_{\nu,\text{c\$5987}} - \frac{1}{4}g\partial_\nu\left[W0_{\mu,a}\right]\text{ep0}_{a,\text{b\$5988,c\$5988}}W0_{\mu,\text{b\$5988}}W0_{\nu,\text{c\$5988}} + \frac{1}{4}g\partial_\mu\left[W0_{\nu,a}\right]\text{ep0}_{a,\text{b\$5988,c\$5988}}W0_{\mu,\text{b\$5988}}W0_{\nu,\text{c\$5988}} - \frac{1}{4}g\partial_\nu\left[W0_{\mu,a}\right]\text{ep0}_{a,\text{b\$5989,c\$5989}}W0_{\mu,\text{b\$5989}}W0_{\nu,\text{c\$5989}} + \frac{1}{4}g\partial_\mu\left[W0_{\nu,a}\right]\text{ep0}_{a,\text{b\$5989,c\$5989}}W0_{\mu,\text{b\$5989}}W0_{\nu,\text{c\$5989}} - \frac{1}{4}g^2\text{ep0}_{a,\text{b\$5988,c\$5988}}\text{ep0}_{a,\text{b\$5989,c\$5989}}W0_{\mu,\text{b\$5988}}W0_{\mu,\text{b\$5989}}W0_{\nu,\text{c\$5988}}W0_{\nu,\text{c\$5989}} - \frac{1}{4}\text{gt}\partial_\nu\left[W1_{\mu,a}\right]\text{ep1}_{a,\text{b\$5990,c\$5990}}W1_{\mu,\text{b\$5990}}W1_{\nu,\text{c\$5990}} + \frac{1}{4}\text{gt}\partial_\mu\left[W1_{\nu,a}\right]\text{ep1}_{a,\text{b\$5990,c\$5990}}W1_{\mu,\text{b\$5990}}W1_{\nu,\text{c\$5990}} - \frac{1}{4}\text{gt}\partial_\nu\left[W1_{\mu,a}\right]\text{ep1}_{a,\text{b\$5991,c\$5991}}W1_{\mu,\text{b\$5991}}W1_{\nu,\text{c\$5991}} + \frac{1}{4}\text{gt}\partial_\mu\left[W1_{\nu,a}\right]\text{ep1}_{a,\text{b\$5991,c\$5991}}W1_{\mu,\text{b\$5991}}W1_{\nu,\text{c\$5991}} - \frac{1}{4}\text{gt}^2\text{ep1}_{a,\text{b\$5990,c\$5990}}\text{ep1}_{a,\text{b\$5991,c\$5991}}W1_{\mu,\text{b\$5990}}W1_{\mu,\text{b\$5991}}W1_{\nu,\text{c\$5990}}W1_{\nu,\text{c\$5991}}$

4.2 L_{Fermion}

$id^\dagger.\gamma^\mu.\partial_\mu[d] - \text{dL0}^\dagger.\gamma^\mu.\left(\frac{gP_-.\text{uL0W0p}_\mu^\dagger}{\sqrt{2}} + P_-.\text{dL0}\left(-\frac{1}{2}gW0_{\mu,3} + \frac{\text{gpW23}_\mu}{6}\right)\right) - $

$\text{dL1}^\dagger.\gamma^\mu.\left(\frac{\text{gt}P_-.\text{uL1W1p}_\mu^\dagger}{\sqrt{2}} + P_-.\text{dL1}\left(-\frac{1}{2}\text{gtW1}_{\mu,3} + \frac{\text{gpW23}_\mu}{6}\right)\right) - $

$\text{dR1}^\dagger.\gamma^\mu.\left(\frac{\text{gt}P_+.\text{uR1W1p}_\mu^\dagger}{\sqrt{2}} + P_+.\text{dR1}\left(-\frac{1}{2}\text{gtW1}_{\mu,3} + \frac{\text{gpW23}_\mu}{6}\right)\right) - \text{eL0}^\dagger.\gamma^\mu.\left(\frac{gP_-.\text{nL0W0p}_\mu^\dagger}{\sqrt{2}} + P_-.\text{eL0}\left(-\frac{1}{2}gW0_{\mu,3} - \frac{\text{gpW23}_\mu}{2}\right)\right) - $

$\text{eL1}^\dagger.\gamma^\mu.\left(\frac{\text{gt}P_-.\text{nL1W1p}_\mu^\dagger}{\sqrt{2}} + P_-.\text{eL1}\left(-\frac{1}{2}\text{gtW1}_{\mu,3} - \frac{\text{gpW23}_\mu}{2}\right)\right) - \text{eR1}^\dagger.\gamma^\mu.\left(\frac{\text{gt}P_+.\text{nR1W1p}_\mu^\dagger}{\sqrt{2}} + P_+.\text{eR1}\left(-\frac{1}{2}\text{gtW1}_{\mu,3} - \frac{\text{gpW23}_\mu}{2}\right)\right) + $

$i\text{hd}^\dagger.\gamma^\mu.\partial_\mu[\text{hd}] + i\text{hl}^\dagger.\gamma^\mu.\partial_\mu[\text{hl}] + i\text{hn}^\dagger.\gamma^\mu.\partial_\mu[\text{hn}] + i\text{hu}^\dagger.\gamma^\mu.\partial_\mu[\text{hu}] + i l^\dagger.\gamma^\mu.\partial_\mu[l] + in^\dagger.\gamma^\mu.\partial_\mu[n] - $

$\text{nL0}^\dagger.\gamma^\mu.\left(\frac{gP_-.\text{eL0W0p}_\mu}{\sqrt{2}} + P_-.\text{nL0}\left(\frac{1}{2}gW0_{\mu,3} - \frac{\text{gpW23}_\mu}{2}\right)\right) - \text{nL1}^\dagger.\gamma^\mu.\left(\frac{\text{gt}P_-.\text{eL1W1p}_\mu}{\sqrt{2}} + P_-.\text{nL1}\left(\frac{1}{2}\text{gtW1}_{\mu,3} - \frac{\text{gpW23}_\mu}{2}\right)\right) - $

$\text{nR1}^\dagger.\gamma^\mu.\left(\frac{\text{gt}P_+.\text{eR1W1p}_\mu}{\sqrt{2}} + P_+.\text{nR1}\left(\frac{1}{2}\text{gtW1}_{\mu,3} - \frac{\text{gpW23}_\mu}{2}\right)\right) + iu^\dagger.\gamma^\mu.\partial_\mu[u] - $

$\text{uL0}^\dagger.\gamma^\mu.\left(\frac{gP_-.\text{dL0W0p}_\mu}{\sqrt{2}} + P_-.\text{uL0}\left(\frac{1}{2}gW0_{\mu,3} + \frac{\text{gpW23}_\mu}{6}\right)\right) - \text{uL1}^\dagger.\gamma^\mu.\left(\frac{\text{gt}P_-.\text{dL1W1p}_\mu}{\sqrt{2}} + P_-.\text{uL1}\left(\frac{1}{2}\text{gtW1}_{\mu,3} + \frac{\text{gpW23}_\mu}{6}\right)\right) - $

$\text{uR1}^\dagger.\gamma^\mu.\left(\frac{\text{gt}P_+.\text{dR1W1p}_\mu}{\sqrt{2}} + P_+.\text{uR1}\left(\frac{1}{2}\text{gtW1}_{\mu,3} + \frac{\text{gpW23}_\mu}{6}\right)\right) - \text{dR2}^\dagger.\gamma^\mu.\left(-\frac{\text{gpW23}_\mu}{3}\right).P_+.\text{dR2} - \text{eR2}^\dagger.\gamma^\mu.\left(-\text{gpW23}_\mu\right).P_+.\text{eR2} - $

$\text{uR2}^\dagger.\gamma^\mu.\frac{2\text{gpW23}_\mu}{3}.P_+.\text{uR2} - \text{gs}d^\dagger.\gamma^\mu.T^a.dG_{\mu,a} - \text{gshd}^\dagger.\gamma^\mu.T^a.\text{hd}G_{\mu,a} - \text{gshu}^\dagger.\gamma^\mu.T^a.\text{hu}G_{\mu,a} - \text{gs}u^\dagger.\gamma^\mu.T^a.uG_{\mu,a}$

4.3 L_{Gold}

$\frac{1}{2}\partial_\mu[\text{p0}]^2 + \frac{\text{p0}^4\partial_\mu[\text{p0}]^2}{8\text{fpi}^4} - \frac{\text{p0pp0p}^\dagger\partial_\mu[\text{p0}]^2}{3\text{fpi}^2} + \frac{5\text{p0}^2\text{p0pp0p}^\dagger\partial_\mu[\text{p0}]^2}{18\text{fpi}^4} + \frac{\text{p0p}^2\left(\text{p0p}^\dagger\right)^2\partial_\mu[\text{p0}]^2}{18\text{fpi}^4} + \frac{\text{p0p0p}^\dagger\partial_\mu[\text{p0}]\partial_\mu[\text{p0p}]}{3\text{fpi}^2} + \frac{2\text{p0}^3\text{p0p}^\dagger\partial_\mu[\text{p0}]\partial_\mu[\text{p0p}]}{9\text{fpi}^4} + $

$\frac{4\text{p0p0p}\left(\text{p0p}^\dagger\right)^2\partial_\mu[\text{p0}]\partial_\mu[\text{p0p}]}{9\text{fpi}^4} + \frac{\left(\text{p0p}^\dagger\right)^2\partial_\mu[\text{p0p}]^2}{6\text{fpi}^2} + \frac{\text{p0}^2\left(\text{p0p}^\dagger\right)^2\partial_\mu[\text{p0p}]^2}{9\text{fpi}^4} + \frac{2\text{p0p}\left(\text{p0p}^\dagger\right)^3\partial_\mu[\text{p0p}]^2}{9\text{fpi}^4} + \frac{\text{p0p0p}\partial_\mu[\text{p0}]\partial_\mu\left[\text{p0p}^\dagger\right]}{3\text{fpi}^2} + \frac{2\text{p0}^3\text{p0p}\partial_\mu[\text{p0}]\partial_\mu\left[\text{p0p}^\dagger\right]}{9\text{fpi}^4} + $

$\frac{4\text{p0p0p}^2\text{p0p}^\dagger\partial_\mu[\text{p0}]\partial_\mu\left[\text{p0p}^\dagger\right]}{9\text{fpi}^4} + \partial_\mu[\text{p0p}]\partial_\mu\left[\text{p0p}^\dagger\right] - \frac{\text{p0}^2\partial_\mu[\text{p0p}]\partial_\mu\left[\text{p0p}^\dagger\right]}{3\text{fpi}^2} + \frac{\text{p0}^4\partial_\mu[\text{p0p}]\partial_\mu\left[\text{p0p}^\dagger\right]}{36\text{fpi}^4} - \frac{\text{p0pp0p}^\dagger\partial_\mu[\text{p0p}]\partial_\mu\left[\text{p0p}^\dagger\right]}{3\text{fpi}^2} + $

$\frac{\text{p0}^2\text{p0pp0p}^\dagger\partial_\mu[\text{p0p}]\partial_\mu\left[\text{p0p}^\dagger\right]}{3\text{fpi}^4} + \frac{5\text{p0p}^2\left(\text{p0p}^\dagger\right)^2\partial_\mu[\text{p0p}]\partial_\mu\left[\text{p0p}^\dagger\right]}{9\text{fpi}^4} + \frac{\text{p0p}^2\partial_\mu\left[\text{p0p}^\dagger\right]^2}{6\text{fpi}^2} + \frac{\text{p0}^2\text{p0p}^2\partial_\mu\left[\text{p0p}^\dagger\right]^2}{9\text{fpi}^4} + \frac{2\text{p0p}^3\text{p0p}^\dagger\partial_\mu\left[\text{p0p}^\dagger\right]^2}{9\text{fpi}^4} + \frac{1}{2}\partial_\mu[\text{p1}]^2 + \frac{\text{p1}^4\partial_\mu[\text{p1}]^2}{8\text{fpi}^4} - $

$\frac{\text{p1pp1p}^\dagger\partial_\mu[\text{p1}]^2}{3\text{fpi}^2} + \frac{5\text{p1}^2\text{p1pp1p}^\dagger\partial_\mu[\text{p1}]^2}{18\text{fpi}^4} + \frac{\text{p1p}^2\left(\text{p1p}^\dagger\right)^2\partial_\mu[\text{p1}]^2}{18\text{fpi}^4} + \frac{\text{p1p1p}^\dagger\partial_\mu[\text{p1}]\partial_\mu[\text{p1p}]}{3\text{fpi}^2} + \frac{2\text{p1}^3\text{p1p}^\dagger\partial_\mu[\text{p1}]\partial_\mu[\text{p1p}]}{9\text{fpi}^4} + \frac{4\text{p1p1p}\left(\text{p1p}^\dagger\right)^2\partial_\mu[\text{p1}]\partial_\mu[\text{p1p}]}{9\text{fpi}^4} + $

$\frac{\left(\text{p1p}^\dagger\right)^2\partial_\mu[\text{p1p}]^2}{6\text{fpi}^2} + \frac{\text{p1}^2\left(\text{p1p}^\dagger\right)^2\partial_\mu[\text{p1p}]^2}{9\text{fpi}^4} + \frac{2\text{p1p}\left(\text{p1p}^\dagger\right)^3\partial_\mu[\text{p1p}]^2}{9\text{fpi}^4} + \frac{\text{p1p1p}\partial_\mu[\text{p1}]\partial_\mu\left[\text{p1p}^\dagger\right]}{3\text{fpi}^2} + \frac{2\text{p1}^3\text{p1p}\partial_\mu[\text{p1}]\partial_\mu\left[\text{p1p}^\dagger\right]}{9\text{fpi}^4} + \frac{4\text{p1p1p}^2\text{p1p}^\dagger\partial_\mu[\text{p1}]\partial_\mu\left[\text{p1p}^\dagger\right]}{9\text{fpi}^4} + $

$\partial_\mu[\text{p1p}]\partial_\mu\left[\text{p1p}^\dagger\right] - \frac{\text{p1}^2\partial_\mu[\text{p1p}]\partial_\mu\left[\text{p1p}^\dagger\right]}{3\text{fpi}^2} + \frac{\text{p1}^4\partial_\mu[\text{p1p}]\partial_\mu\left[\text{p1p}^\dagger\right]}{36\text{fpi}^4} - \frac{\text{p1pp1p}^\dagger\partial_\mu[\text{p1p}]\partial_\mu\left[\text{p1p}^\dagger\right]}{3\text{fpi}^2} + \frac{\text{p1}^2\text{p1pp1p}^\dagger\partial_\mu[\text{p1p}]\partial_\mu\left[\text{p1p}^\dagger\right]}{3\text{fpi}^4} + $

$\frac{5\text{p1p}^2\left(\text{p1p}^\dagger\right)^2\partial_\mu[\text{p1p}]\partial_\mu\left[\text{p1p}^\dagger\right]}{9\text{fpi}^4} + \frac{\text{p1p}^2\partial_\mu\left[\text{p1p}^\dagger\right]^2}{6\text{fpi}^2} + \frac{\text{p1}^2\text{p1p}^2\partial_\mu\left[\text{p1p}^\dagger\right]^2}{9\text{fpi}^4} + \frac{2\text{p1p}^3\text{p1p}^\dagger\partial_\mu\left[\text{p1p}^\dagger\right]^2}{9\text{fpi}^4} + \frac{1}{2}\text{fpi}g\partial_\mu[\text{p0}]W0_{\mu,3} + \frac{gp0^4\partial_\mu[\text{p0}]W0_{\mu,3}}{24\text{fpi}^3} - $

$\frac{2gp0pp0p^\dagger\partial_\mu[\text{p0}]W0_{\mu,3}}{3\text{fpi}} + \frac{gp0^2\text{p0pp0p}^\dagger\partial_\mu[\text{p0}]W0_{\mu,3}}{6\text{fpi}^3} + \frac{gp0p^2\left(\text{p0p}^\dagger\right)^2\partial_\mu[\text{p0}]W0_{\mu,3}}{6\text{fpi}^3} - \frac{1}{2}igp0p^\dagger\partial_\mu[\text{p0p}]W0_{\mu,3} + \frac{gp0p0p^\dagger\partial_\mu[\text{p0p}]W0_{\mu,3}}{3\text{fpi}} + $

$\frac{igp0^2\text{p0p}^\dagger\partial_\mu[\text{p0p}]W0_{\mu,3}}{6\text{fpi}^2} - \frac{igp0^4\text{p0p}^\dagger\partial_\mu[\text{p0p}]W0_{\mu,3}}{72\text{fpi}^4} + \frac{igp0p\left(\text{p0p}^\dagger\right)^2\partial_\mu[\text{p0p}]W0_{\mu,3}}{3\text{fpi}^2} - \frac{igp0^2\text{p0p}\left(\text{p0p}^\dagger\right)^2\partial_\mu[\text{p0p}]W0_{\mu,3}}{18\text{fpi}^4} - \frac{igp0p^2\left(\text{p0p}^\dagger\right)^3\partial_\mu[\text{p0p}]W0_{\mu,3}}{18\text{fpi}^4} + $

$\frac{1}{2}igp0p0p\partial_\mu\left[\text{p0p}^\dagger\right]W0_{\mu,3} + \frac{gp0p0p\partial_\mu\left[\text{p0p}^\dagger\right]W0_{\mu,3}}{3\text{fpi}} - \frac{igp0^2\text{p0p}\partial_\mu\left[\text{p0p}^\dagger\right]W0_{\mu,3}}{6\text{fpi}^2} + \frac{igp0^4\text{p0p}\partial_\mu\left[\text{p0p}^\dagger\right]W0_{\mu,3}}{72\text{fpi}^4} - \frac{igp0p^2\text{p0p}^\dagger\partial_\mu\left[\text{p0p}^\dagger\right]W0_{\mu,3}}{3\text{fpi}^2} + $

$$\frac{ig\text{p0}^2\text{p0p}^2\text{p0p}^\dagger\partial_\mu\left[\text{p0p}^\dagger\right]\text{W0}_{\mu,3}}{18\text{fpi}^4} + \frac{ig\text{p0p}^3\left(\text{p0p}^\dagger\right)^2\partial_\mu\left[\text{p0p}^\dagger\right]\text{W0}_{\mu,3}}{18\text{fpi}^4} + \frac{1}{8}\text{fpi}^2 g^2\text{W0}_{\mu,3}^2 - \frac{g^2\text{p0}^4\text{W0}_{\mu,3}^2}{96\text{fpi}^2} + \frac{g^2\text{p0}^6\text{W0}_{\mu,3}^2}{288\text{fpi}^4} - \frac{g^2\text{p0}^2\text{p0pp0p}^\dagger\text{W0}_{\mu,3}^2}{24\text{fpi}^2} +$$

$$\frac{g^2\text{p0}^4\text{p0pp0p}^\dagger\text{W0}_{\mu,3}^2}{48\text{fpi}^4} - \frac{g^2\text{p0}^2\left(\text{p0p}^\dagger\right)^2\text{W0}_{\mu,3}^2}{24\text{fpi}^2} + \frac{g^2\text{p0}^2\text{p0p}^2\left(\text{p0p}^\dagger\right)^2\text{W0}_{\mu,3}^2}{24\text{fpi}^4} + \frac{g^2\text{p0p}^3\left(\text{p0p}^\dagger\right)^3\text{W0}_{\mu,3}^2}{36\text{fpi}^4} + \frac{1}{2}ig\text{p0p}^\dagger\partial_\mu[\text{p0}]\text{W0p}_\mu + \frac{g\text{p0p0p}^\dagger\partial_\mu[\text{p0}]\text{W0p}_\mu}{3\text{fpi}} -$$

$$\frac{ig\text{p0}^2\text{p0p}^\dagger\partial_\mu[\text{p0}]\text{W0p}_\mu}{6\text{fpi}^2} + \frac{ig\text{p0}^4\text{p0p}^\dagger\partial_\mu[\text{p0}]\text{W0p}_\mu}{72\text{fpi}^4} - \frac{ig\text{p0p}\left(\text{p0p}^\dagger\right)^2\partial_\mu[\text{p0}]\text{W0p}_\mu}{3\text{fpi}^2} + \frac{ig\text{p0}^2\text{p0p}\left(\text{p0p}^\dagger\right)^2\partial_\mu[\text{p0}]\text{W0p}_\mu}{18\text{fpi}^4} + \frac{ig\text{p0p}^2\left(\text{p0p}^\dagger\right)^3\partial_\mu[\text{p0}]\text{W0p}_\mu}{18\text{fpi}^4} +$$

$$\frac{g\left(\text{p0p}^\dagger\right)^2\partial_\mu[\text{p0p}]\text{W0p}_\mu}{3\text{fpi}} + \frac{1}{2}\text{fpi}g\partial_\mu\left[\text{p0p}^\dagger\right]\text{W0p}_\mu - \frac{1}{2}ig\text{p0}\partial_\mu\left[\text{p0p}^\dagger\right]\text{W0p}_\mu - \frac{g\text{p0}^2\partial_\mu\left[\text{p0p}^\dagger\right]\text{W0p}_\mu}{3\text{fpi}} + \frac{ig\text{p0}^3\partial_\mu\left[\text{p0p}^\dagger\right]\text{W0p}_\mu}{6\text{fpi}^2} + \frac{g\text{p0}^4\partial_\mu\left[\text{p0p}^\dagger\right]\text{W0p}_\mu}{24\text{fpi}^3} -$$

$$\frac{ig\text{p0}^5\partial_\mu\left[\text{p0p}^\dagger\right]\text{W0p}_\mu}{72\text{fpi}^4} - \frac{g\text{p0pp0p}^\dagger\partial_\mu\left[\text{p0p}^\dagger\right]\text{W0p}_\mu}{3\text{fpi}} + \frac{ig\text{p0p0pp0p}^\dagger\partial_\mu\left[\text{p0p}^\dagger\right]\text{W0p}_\mu}{3\text{fpi}^2} + \frac{g\text{p0}^2\text{p0pp0p}^\dagger\partial_\mu\left[\text{p0p}^\dagger\right]\text{W0p}_\mu}{6\text{fpi}^3} - \frac{ig\text{p0}^3\text{p0pp0p}^\dagger\partial_\mu\left[\text{p0p}^\dagger\right]\text{W0p}_\mu}{18\text{fpi}^4} +$$

$$\frac{g\text{p0p}^2\left(\text{p0p}^\dagger\right)^2\partial_\mu\left[\text{p0p}^\dagger\right]\text{W0p}_\mu}{6\text{fpi}^3} - \frac{ig\text{p0p0p}^2\left(\text{p0p}^\dagger\right)^2\partial_\mu\left[\text{p0p}^\dagger\right]\text{W0p}_\mu}{18\text{fpi}^4} - \frac{1}{2}ig\text{p0p}\partial_\mu[\text{p0}]\text{W0p}_\mu^\dagger + \frac{g\text{p0p0p}\partial_\mu[\text{p0}]\text{W0p}_\mu^\dagger}{3\text{fpi}} + \frac{ig\text{p0}^2\text{p0p}\partial_\mu[\text{p0}]\text{W0p}_\mu^\dagger}{6\text{fpi}^2} -$$

$$\frac{ig\text{p0}^4\text{p0p}\partial_\mu[\text{p0}]\text{W0p}_\mu^\dagger}{72\text{fpi}^4} + \frac{ig\text{p0p}^2\text{p0p}^\dagger\partial_\mu[\text{p0}]\text{W0p}_\mu^\dagger}{3\text{fpi}^2} - \frac{ig\text{p0}^2\text{p0p}^2\text{p0p}^\dagger\partial_\mu[\text{p0}]\text{W0p}_\mu^\dagger}{18\text{fpi}^4} - \frac{ig\text{p0p}^3\left(\text{p0p}^\dagger\right)^2\partial_\mu[\text{p0}]\text{W0p}_\mu^\dagger}{18\text{fpi}^4} + \frac{1}{2}\text{fpi}g\partial_\mu[\text{p0p}]\text{W0p}_\mu^\dagger +$$

$$\frac{1}{2}ig\text{p0}\partial_\mu[\text{p0p}]\text{W0p}_\mu^\dagger - \frac{g\text{p0}^2\partial_\mu[\text{p0p}]\text{W0p}_\mu^\dagger}{3\text{fpi}} - \frac{ig\text{p0}^3\partial_\mu[\text{p0p}]\text{W0p}_\mu^\dagger}{6\text{fpi}^2} + \frac{g\text{p0}^4\partial_\mu[\text{p0p}]\text{W0p}_\mu^\dagger}{24\text{fpi}^3} + \frac{ig\text{p0}^5\partial_\mu[\text{p0p}]\text{W0p}_\mu^\dagger}{72\text{fpi}^4} - \frac{g\text{p0pp0p}^\dagger\partial_\mu[\text{p0p}]\text{W0p}_\mu^\dagger}{3\text{fpi}} -$$

$$\frac{ig\text{p0p0pp0p}^\dagger\partial_\mu[\text{p0p}]\text{W0p}_\mu^\dagger}{3\text{fpi}^2} + \frac{g\text{p0}^2\text{p0pp0p}^\dagger\partial_\mu[\text{p0p}]\text{W0p}_\mu^\dagger}{6\text{fpi}^3} + \frac{ig\text{p0}^3\text{p0pp0p}^\dagger\partial_\mu[\text{p0p}]\text{W0p}_\mu^\dagger}{18\text{fpi}^4} + \frac{g\text{p0p}^2\left(\text{p0p}^\dagger\right)^2\partial_\mu[\text{p0p}]\text{W0p}_\mu^\dagger}{6\text{fpi}^3} + \frac{ig\text{p0p0p}^2\left(\text{p0p}^\dagger\right)^2\partial_\mu[\text{p0p}]\text{W0p}_\mu^\dagger}{18\text{fpi}^4} +$$

$$\frac{g\text{p0p}^2\partial_\mu\left[\text{p0p}^\dagger\right]\text{W0p}_\mu^\dagger}{3\text{fpi}} + \frac{1}{4}\text{fpi}^2 g^2\text{W0p}_\mu\text{W0p}_\mu^\dagger - \frac{g^2\text{p0}^4\text{W0p}_\mu\text{W0p}_\mu^\dagger}{48\text{fpi}^2} + \frac{g^2\text{p0}^6\text{W0p}_\mu\text{W0p}_\mu^\dagger}{144\text{fpi}^4} - \frac{g^2\text{p0}^2\text{p0pp0p}^\dagger\text{W0p}_\mu\text{W0p}_\mu^\dagger}{12\text{fpi}^2} +$$

$$\frac{g^2\text{p0}^4\text{p0pp0p}^\dagger\text{W0p}_\mu\text{W0p}_\mu^\dagger}{24\text{fpi}^4} - \frac{g^2\text{p0}^2\left(\text{p0p}^\dagger\right)^2\text{W0p}_\mu\text{W0p}_\mu^\dagger}{12\text{fpi}^2} + \frac{g^2\text{p0}^2\text{p0p}^2\left(\text{p0p}^\dagger\right)^2\text{W0p}_\mu\text{W0p}_\mu^\dagger}{12\text{fpi}^4} + \frac{g^2\text{p0p}^3\left(\text{p0p}^\dagger\right)^3\text{W0p}_\mu\text{W0p}_\mu^\dagger}{18\text{fpi}^4} - \frac{1}{2}\text{fpi}gt\partial_\mu[\text{p0}]\text{W1}_{\mu,3} -$$

$$\frac{gt\text{p0}^4\partial_\mu[\text{p0}]\text{W1}_{\mu,3}}{24\text{fpi}^3} + \frac{2gt\text{p0pp0p}^\dagger\partial_\mu[\text{p0}]\text{W1}_{\mu,3}}{3\text{fpi}} - \frac{gt\text{p0}^2\text{p0pp0p}^\dagger\partial_\mu[\text{p0}]\text{W1}_{\mu,3}}{6\text{fpi}^3} - \frac{gt\text{p0p}^2\left(\text{p0p}^\dagger\right)^2\partial_\mu[\text{p0}]\text{W1}_{\mu,3}}{6\text{fpi}^3} - \frac{1}{2}igt\text{p0p}^\dagger\partial_\mu[\text{p0p}]\text{W1}_{\mu,3} -$$

$$\frac{gt\text{p0p0p}^\dagger\partial_\mu[\text{p0p}]\text{W1}_{\mu,3}}{3\text{fpi}} + \frac{igt\text{p0}^2\text{p0p}^\dagger\partial_\mu[\text{p0p}]\text{W1}_{\mu,3}}{6\text{fpi}^2} - \frac{igt\text{p0}^4\text{p0p}^\dagger\partial_\mu[\text{p0p}]\text{W1}_{\mu,3}}{72\text{fpi}^4} + \frac{igt\text{p0p}\left(\text{p0p}^\dagger\right)^2\partial_\mu[\text{p0p}]\text{W1}_{\mu,3}}{3\text{fpi}^2} - \frac{igt\text{p0}^2\text{p0p}\left(\text{p0p}^\dagger\right)^2\partial_\mu[\text{p0p}]\text{W1}_{\mu,3}}{18\text{fpi}^4} -$$

$$\frac{igt\text{p0p}^2\left(\text{p0p}^\dagger\right)^3\partial_\mu[\text{p0p}]\text{W1}_{\mu,3}}{18\text{fpi}^4} + \frac{1}{2}igt\text{p0p}\partial_\mu\left[\text{p0p}^\dagger\right]\text{W1}_{\mu,3} - \frac{gt\text{p0p0p}\partial_\mu\left[\text{p0p}^\dagger\right]\text{W1}_{\mu,3}}{3\text{fpi}} - \frac{igt\text{p0}^2\text{p0p}\partial_\mu\left[\text{p0p}^\dagger\right]\text{W1}_{\mu,3}}{6\text{fpi}^2} + \frac{igt\text{p0}^4\text{p0p}\partial_\mu\left[\text{p0p}^\dagger\right]\text{W1}_{\mu,3}}{72\text{fpi}^4} -$$

$$\frac{gt\text{p0p}^2\text{p0p}^\dagger\partial_\mu\left[\text{p0p}^\dagger\right]\text{W1}_{\mu,3}}{3\text{fpi}^2} + \frac{igt\text{p0}^2\text{p0p}^2\text{p0p}^\dagger\partial_\mu\left[\text{p0p}^\dagger\right]\text{W1}_{\mu,3}}{18\text{fpi}^4} + \frac{igt\text{p0p}^3\left(\text{p0p}^\dagger\right)^2\partial_\mu\left[\text{p0p}^\dagger\right]\text{W1}_{\mu,3}}{18\text{fpi}^4} + \frac{1}{2}\text{fpi}gt\partial_\mu[\text{p1}]\text{W1}_{\mu,3} + \frac{gt\text{p1}^4\partial_\mu[\text{p1}]\text{W1}_{\mu,3}}{24\text{fpi}^3} -$$

$$\frac{2gt\text{p1pp1p}^\dagger\partial_\mu[\text{p1}]\text{W1}_{\mu,3}}{3\text{fpi}} + \frac{gt\text{p1}^2\text{p1pp1p}^\dagger\partial_\mu[\text{p1}]\text{W1}_{\mu,3}}{6\text{fpi}^3} + \frac{gt\text{p1p}^2\left(\text{p1p}^\dagger\right)^2\partial_\mu[\text{p1}]\text{W1}_{\mu,3}}{6\text{fpi}^3} - \frac{1}{2}igt\text{p1p}^\dagger\partial_\mu[\text{p1p}]\text{W1}_{\mu,3} + \frac{gt\text{p1p1p}^\dagger\partial_\mu[\text{p1p}]\text{W1}_{\mu,3}}{3\text{fpi}} +$$

$$\frac{igt\text{p1}^2\text{p1p}^\dagger\partial_\mu[\text{p1p}]\text{W1}_{\mu,3}}{6\text{fpi}^2} - \frac{igt\text{p1}^4\text{p1p}^\dagger\partial_\mu[\text{p1p}]\text{W1}_{\mu,3}}{72\text{fpi}^4} + \frac{igt\text{p1p}\left(\text{p1p}^\dagger\right)^2\partial_\mu[\text{p1p}]\text{W1}_{\mu,3}}{3\text{fpi}^2} - \frac{igt\text{p1}^2\text{p1p}\left(\text{p1p}^\dagger\right)^2\partial_\mu[\text{p1p}]\text{W1}_{\mu,3}}{18\text{fpi}^4} -$$

$$\frac{igt\text{p1p}^2\left(\text{p1p}^\dagger\right)^3\partial_\mu[\text{p1p}]\text{W1}_{\mu,3}}{18\text{fpi}^4} + \frac{1}{2}igt\text{p1p}\partial_\mu\left[\text{p1p}^\dagger\right]\text{W1}_{\mu,3} + \frac{gt\text{p1p1p}\partial_\mu\left[\text{p1p}^\dagger\right]\text{W1}_{\mu,3}}{3\text{fpi}} - \frac{igt\text{p1}^2\text{p1p}\partial_\mu\left[\text{p1p}^\dagger\right]\text{W1}_{\mu,3}}{6\text{fpi}^2} + \frac{igt\text{p1}^4\text{p1p}\partial_\mu\left[\text{p1p}^\dagger\right]\text{W1}_{\mu,3}}{72\text{fpi}^4} -$$

$$\frac{igt\text{p1p}^2\text{p1p}^\dagger\partial_\mu\left[\text{p1p}^\dagger\right]\text{W1}_{\mu,3}}{3\text{fpi}^2} + \frac{igt\text{p1}^2\text{p1p}^2\text{p1p}^\dagger\partial_\mu\left[\text{p1p}^\dagger\right]\text{W1}_{\mu,3}}{18\text{fpi}^4} + \frac{igt\text{p1p}^3\left(\text{p1p}^\dagger\right)^2\partial_\mu\left[\text{p1p}^\dagger\right]\text{W1}_{\mu,3}}{18\text{fpi}^4} - \frac{1}{4}\text{fpi}^2 ggt\text{W0}_{\mu,3}\text{W1}_{\mu,3} + \frac{ggt\text{p0}^4\text{W0}_{\mu,3}\text{W1}_{\mu,3}}{48\text{fpi}^2} -$$

$$\frac{ggt\text{p0}^6\text{W0}_{\mu,3}\text{W1}_{\mu,3}}{144\text{fpi}^4} + ggt\text{p0pp0p}^\dagger\text{W0}_{\mu,3}\text{W1}_{\mu,3} - \frac{ggt\text{p0}^2\text{p0pp0p}^\dagger\text{W0}_{\mu,3}\text{W1}_{\mu,3}}{4\text{fpi}^2} - \frac{ggt\text{p0}^4\text{p0pp0p}^\dagger\text{W0}_{\mu,3}\text{W1}_{\mu,3}}{72\text{fpi}^4} - \frac{7ggt\text{p0}^2\left(\text{p0p}^\dagger\right)^2\text{W0}_{\mu,3}\text{W1}_{\mu,3}}{12\text{fpi}^2} +$$

$$\frac{ggt\text{p0}^2\text{p0p}^2\left(\text{p0p}^\dagger\right)^2\text{W0}_{\mu,3}\text{W1}_{\mu,3}}{36\text{fpi}^4} + \frac{ggt\text{p0p}^3\left(\text{p0p}^\dagger\right)^3\text{W0}_{\mu,3}\text{W1}_{\mu,3}}{18\text{fpi}^4} - \frac{1}{2}i\text{fpi}ggt\text{p0p}^\dagger\text{W0p}_\mu\text{W1}_{\mu,3} - \frac{1}{2}ggt\text{p0p0p}^\dagger\text{W0p}_\mu\text{W1}_{\mu,3} +$$

$$\frac{iggt\text{p0}^2\text{p0p}^\dagger\text{W0p}_\mu\text{W1}_{\mu,3}}{3\text{fpi}} + \frac{ggt\text{p0}^3\text{p0p}^\dagger\text{W0p}_\mu\text{W1}_{\mu,3}}{6\text{fpi}^2} - \frac{iggt\text{p0}^4\text{p0p}^\dagger\text{W0p}_\mu\text{W1}_{\mu,3}}{24\text{fpi}^3} - \frac{ggt\text{p0}^5\text{p0p}^\dagger\text{W0p}_\mu\text{W1}_{\mu,3}}{72\text{fpi}^4} + \frac{2iggt\text{p0p}\left(\text{p0p}^\dagger\right)^2\text{W0p}_\mu\text{W1}_{\mu,3}}{3\text{fpi}} +$$

$$\frac{ggt\text{p0p0p}\left(\text{p0p}^\dagger\right)^2\text{W0p}_\mu\text{W1}_{\mu,3}}{3\text{fpi}^2} - \frac{iggt\text{p0}^2\text{p0p}\left(\text{p0p}^\dagger\right)^2\text{W0p}_\mu\text{W1}_{\mu,3}}{6\text{fpi}^3} - \frac{ggt\text{p0}^3\text{p0p}\left(\text{p0p}^\dagger\right)^2\text{W0p}_\mu\text{W1}_{\mu,3}}{18\text{fpi}^4} - \frac{iggt\text{p0p}^2\left(\text{p0p}^\dagger\right)^3\text{W0p}_\mu\text{W1}_{\mu,3}}{6\text{fpi}^3} -$$

$$\frac{ggt\text{p0p0p}^2\left(\text{p0p}^\dagger\right)^3\text{W0p}_\mu\text{W1}_{\mu,3}}{18\text{fpi}^4} + \frac{1}{2}i\text{fpi}ggt\text{p0p}\text{W0p}_\mu^\dagger\text{W1}_{\mu,3} - \frac{1}{2}ggt\text{p0p0p}\text{W0p}_\mu^\dagger\text{W1}_{\mu,3} - \frac{iggt\text{p0}^2\text{p0p}\text{W0p}_\mu^\dagger\text{W1}_{\mu,3}}{3\text{fpi}} + \frac{ggt\text{p0}^3\text{p0p}\text{W0p}_\mu^\dagger\text{W1}_{\mu,3}}{6\text{fpi}^2} +$$

$$\frac{iggt\text{p0}^4\text{p0p}\text{W0p}_\mu^\dagger\text{W1}_{\mu,3}}{24\text{fpi}^3} - \frac{ggt\text{p0}^5\text{p0p}\text{W0p}_\mu^\dagger\text{W1}_{\mu,3}}{72\text{fpi}^4} - \frac{2iggt\text{p0}^2\text{p0p}^\dagger\text{W0p}_\mu^\dagger\text{W1}_{\mu,3}}{3\text{fpi}} + \frac{ggt\text{p0p0p}^2\text{p0p}^\dagger\text{W0p}_\mu^\dagger\text{W1}_{\mu,3}}{3\text{fpi}^2} + \frac{iggt\text{p0}^2\text{p0p}^2\text{p0p}^\dagger\text{W0p}_\mu^\dagger\text{W1}_{\mu,3}}{6\text{fpi}^3} -$$

$$\frac{ggt\text{p0}^3\text{p0p}^2\text{p0p}^\dagger\text{W0p}_\mu^\dagger\text{W1}_{\mu,3}}{18\text{fpi}^4} + \frac{iggt\text{p0p}^3\left(\text{p0p}^\dagger\right)^2\text{W0p}_\mu^\dagger\text{W1}_{\mu,3}}{6\text{fpi}^3} - \frac{ggt\text{p0p0p}^3\left(\text{p0p}^\dagger\right)^2\text{W0p}_\mu^\dagger\text{W1}_{\mu,3}}{18\text{fpi}^4} + \frac{1}{4}\text{fpi}^2 gt^2\text{W1}_{\mu,3}^2 - \frac{gt^2\text{p0}^4\text{W1}_{\mu,3}^2}{96\text{fpi}^2} +$$

$$\frac{gt^2\text{p0}^6\text{W1}_{\mu,3}^2}{288\text{fpi}^4} - \frac{gt^2\text{p0}^2\text{p0pp0p}^\dagger\text{W1}_{\mu,3}^2}{24\text{fpi}^2} + \frac{gt^2\text{p0}^4\text{p0pp0p}^\dagger\text{W1}_{\mu,3}^2}{48\text{fpi}^4} - \frac{gt^2\text{p0}^2\left(\text{p0p}^\dagger\right)^2\text{W1}_{\mu,3}^2}{24\text{fpi}^2} + \frac{gt^2\text{p0}^2\text{p0p}^2\left(\text{p0p}^\dagger\right)^2\text{W1}_{\mu,3}^2}{24\text{fpi}^4} + \frac{gt^2\text{p0p}^3\left(\text{p0p}^\dagger\right)^3\text{W1}_{\mu,3}^2}{36\text{fpi}^4} -$$

$$\frac{gt^2\text{p1}^4\text{W1}_{\mu,3}^2}{96\text{fpi}^2} + \frac{gt^2\text{p1}^6\text{W1}_{\mu,3}^2}{288\text{fpi}^4} - \frac{gt^2\text{p1}^2\text{p1pp1p}^\dagger\text{W1}_{\mu,3}^2}{24\text{fpi}^2} + \frac{gt^2\text{p1}^4\text{p1pp1p}^\dagger\text{W1}_{\mu,3}^2}{48\text{fpi}^4} - \frac{gt^2\text{p1p}^2\left(\text{p1p}^\dagger\right)^2\text{W1}_{\mu,3}^2}{24\text{fpi}^2} + \frac{gt^2\text{p1}^2\text{p1p}^2\left(\text{p1p}^\dagger\right)^2\text{W1}_{\mu,3}^2}{24\text{fpi}^4} +$$

$$\frac{gt^2\text{p1p}^3\left(\text{p1p}^\dagger\right)^3\text{W1}_{\mu,3}^2}{36\text{fpi}^4} + \frac{1}{2}igt\text{p0p}^\dagger\partial_\mu[\text{p0}]\text{W1p}_\mu - \frac{gt\text{p0p0p}^\dagger\partial_\mu[\text{p0}]\text{W1p}_\mu}{3\text{fpi}} - \frac{igt\text{p0}^2\text{p0p}^\dagger\partial_\mu[\text{p0}]\text{W1p}_\mu}{6\text{fpi}^2} + \frac{igt\text{p0}^4\text{p0p}^\dagger\partial_\mu[\text{p0}]\text{W1p}_\mu}{72\text{fpi}^4} -$$

$$\frac{igt\text{p0p}\left(\text{p0p}^\dagger\right)^2\partial_\mu[\text{p0}]\text{W1p}_\mu}{3\text{fpi}^2} + \frac{igt\text{p0}^2\text{p0p}\left(\text{p0p}^\dagger\right)^2\partial_\mu[\text{p0}]\text{W1p}_\mu}{18\text{fpi}^4} + \frac{igt\text{p0p}^2\left(\text{p0p}^\dagger\right)^3\partial_\mu[\text{p0}]\text{W1p}_\mu}{18\text{fpi}^4} - \frac{gt\left(\text{p0p}^\dagger\right)^2\partial_\mu[\text{p0p}]\text{W1p}_\mu}{3\text{fpi}} -$$

$$\frac{1}{2}\text{fpi}gt\partial_\mu\left[\text{p0p}^\dagger\right]\text{W1p}_\mu - \frac{1}{2}igt\text{p0}\partial_\mu\left[\text{p0p}^\dagger\right]\text{W1p}_\mu + \frac{gt\text{p0}^2\partial_\mu\left[\text{p0p}^\dagger\right]\text{W1p}_\mu}{3\text{fpi}} + \frac{igt\text{p0}^3\partial_\mu\left[\text{p0p}^\dagger\right]\text{W1p}_\mu}{6\text{fpi}^2} - \frac{gt\text{p0}^4\partial_\mu\left[\text{p0p}^\dagger\right]\text{W1p}_\mu}{24\text{fpi}^3} -$$

$$\frac{igt\text{p0}^5\partial_\mu\left[\text{p0p}^\dagger\right]\text{W1p}_\mu}{72\text{fpi}^4} + \frac{gt\text{p0pp0p}^\dagger\partial_\mu\left[\text{p0p}^\dagger\right]\text{W1p}_\mu}{3\text{fpi}} + \frac{igt\text{p0p0pp0p}^\dagger\partial_\mu\left[\text{p0p}^\dagger\right]\text{W1p}_\mu}{3\text{fpi}^2} - \frac{gt\text{p0}^2\text{p0pp0p}^\dagger\partial_\mu\left[\text{p0p}^\dagger\right]\text{W1p}_\mu}{6\text{fpi}^3} - \frac{igt\text{p0}^3\text{p0pp0p}^\dagger\partial_\mu\left[\text{p0p}^\dagger\right]\text{W1p}_\mu}{18\text{fpi}^4} -$$

$$\frac{gt\text{p0p}^2\left(\text{p0p}^\dagger\right)^2\partial_\mu\left[\text{p0p}^\dagger\right]\text{W1p}_\mu}{6\text{fpi}^3} - \frac{igt\text{p0p0p}^2\left(\text{p0p}^\dagger\right)^2\partial_\mu\left[\text{p0p}^\dagger\right]\text{W1p}_\mu}{18\text{fpi}^4} + \frac{1}{2}igt\text{p1p}^\dagger\partial_\mu[\text{p1}]\text{W1p}_\mu + \frac{gt\text{p1p1p}^\dagger\partial_\mu[\text{p1}]\text{W1p}_\mu}{3\text{fpi}} - \frac{igt\text{p1}^2\text{p1p}^\dagger\partial_\mu[\text{p1}]\text{W1p}_\mu}{6\text{fpi}^2} +$$

$$\frac{igt\text{p1}^4\text{p1p}^\dagger\partial_\mu[\text{p1}]\text{W1p}_\mu}{72\text{fpi}^4} - \frac{igt\text{p1p}\left(\text{p1p}^\dagger\right)^2\partial_\mu[\text{p1}]\text{W1p}_\mu}{3\text{fpi}^2} + \frac{igt\text{p1}^2\text{p1p}\left(\text{p1p}^\dagger\right)^2\partial_\mu[\text{p1}]\text{W1p}_\mu}{18\text{fpi}^4} + \frac{igt\text{p1p}^2\left(\text{p1p}^\dagger\right)^3\partial_\mu[\text{p1}]\text{W1p}_\mu}{18\text{fpi}^4} + \frac{gt\left(\text{p1p}^\dagger\right)^2\partial_\mu[\text{p1p}]\text{W1p}_\mu}{3\text{fpi}} +$$

$$\frac{1}{2}\text{fpi}gt\partial_\mu\left[\text{p1p}^\dagger\right]\text{W1p}_\mu - \frac{1}{2}igt\text{p1}\partial_\mu\left[\text{p1p}^\dagger\right]\text{W1p}_\mu - \frac{gt\text{p1}^2\partial_\mu\left[\text{p1p}^\dagger\right]\text{W1p}_\mu}{3\text{fpi}} + \frac{igt\text{p1}^3\partial_\mu\left[\text{p1p}^\dagger\right]\text{W1p}_\mu}{6\text{fpi}^2} + \frac{gt\text{p1}^4\partial_\mu\left[\text{p1p}^\dagger\right]\text{W1p}_\mu}{24\text{fpi}^3} -$$

$$\frac{igt\text{p1}^5\partial_\mu\left[\text{p1p}^\dagger\right]\text{W1p}_\mu}{72\text{fpi}^4} - \frac{gt\text{p1pp1p}^\dagger\partial_\mu\left[\text{p1p}^\dagger\right]\text{W1p}_\mu}{3\text{fpi}} + \frac{igt\text{p1p1pp1p}^\dagger\partial_\mu\left[\text{p1p}^\dagger\right]\text{W1p}_\mu}{3\text{fpi}^2} + \frac{gt\text{p1}^2\text{p1pp1p}^\dagger\partial_\mu\left[\text{p1p}^\dagger\right]\text{W1p}_\mu}{6\text{fpi}^3} - \frac{igt\text{p1}^3\text{p1pp1p}^\dagger\partial_\mu\left[\text{p1p}^\dagger\right]\text{W1p}_\mu}{18\text{fpi}^4} +$$

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$$\frac{\mathrm{gtp1p}^2(\mathrm{p1p}^\dagger)^2\partial_\mu[\mathrm{p1p}^\dagger]\mathrm{W1p}_\mu}{6\mathrm{fpi}^3} - \frac{i\mathrm{gtp1p1p}^2(\mathrm{p1p}^\dagger)^2\partial_\mu[\mathrm{p1p}^\dagger]\mathrm{W1p}_\mu}{18\mathrm{fpi}^4} + \tfrac{1}{2}i\mathrm{fpi}g\mathrm{gtp0p}^\dagger\mathrm{W0}_{\mu,3}\mathrm{W1p}_\mu - \tfrac{1}{2}g\mathrm{gtp0p0p}^\dagger\mathrm{W0}_{\mu,3}\mathrm{W1p}_\mu -$$

$$\frac{ig\mathrm{gtp0}^2\mathrm{p0p}^\dagger\mathrm{W0}_{\mu,3}\mathrm{W1p}_\mu}{3\mathrm{fpi}} + \frac{g\mathrm{gtp0}^3\mathrm{p0p}^\dagger\mathrm{W0}_{\mu,3}\mathrm{W1p}_\mu}{6\mathrm{fpi}^2} + \frac{ig\mathrm{gtp0}^4\mathrm{p0p}^\dagger\mathrm{W0}_{\mu,3}\mathrm{W1p}_\mu}{24\mathrm{fpi}^3} - \frac{g\mathrm{gtp0}^5\mathrm{p0p}^\dagger\mathrm{W0}_{\mu,3}\mathrm{W1p}_\mu}{72\mathrm{fpi}^4} - \frac{2ig\mathrm{gtp0p}(\mathrm{p0p}^\dagger)^2\mathrm{W0}_{\mu,3}\mathrm{W1p}_\mu}{3\mathrm{fpi}} +$$

$$\frac{g\mathrm{gtp0p0p}(\mathrm{p0p}^\dagger)^2\mathrm{W0}_{\mu,3}\mathrm{W1p}_\mu}{3\mathrm{fpi}^2} + \frac{ig\mathrm{gtp0}^2\mathrm{p0p}(\mathrm{p0p}^\dagger)^2\mathrm{W0}_{\mu,3}\mathrm{W1p}_\mu}{6\mathrm{fpi}^3} - \frac{g\mathrm{gtp0}^3\mathrm{p0p}(\mathrm{p0p}^\dagger)^2\mathrm{W0}_{\mu,3}\mathrm{W1p}_\mu}{18\mathrm{fpi}^4} + \frac{ig\mathrm{gtp0p}^2(\mathrm{p0p}^\dagger)^3\mathrm{W0}_{\mu,3}\mathrm{W1p}_\mu}{6\mathrm{fpi}^3} -$$

$$\frac{g\mathrm{gtp0p0p}^2(\mathrm{p0p}^\dagger)^3\mathrm{W0}_{\mu,3}\mathrm{W1p}_\mu}{18\mathrm{fpi}^4} - \tfrac{1}{2}g\mathrm{gt}(\mathrm{p0p}^\dagger)^2\mathrm{W0p}_\mu\mathrm{W1p}_\mu + \frac{g\mathrm{gtp0}^2(\mathrm{p0p}^\dagger)^2\mathrm{W0p}_\mu\mathrm{W1p}_\mu}{6\mathrm{fpi}^2} - \frac{g\mathrm{gtp0}^4(\mathrm{p0p}^\dagger)^2\mathrm{W0p}_\mu\mathrm{W1p}_\mu}{72\mathrm{fpi}^4} +$$

$$\frac{g\mathrm{gtp0p}(\mathrm{p0p}^\dagger)^3\mathrm{W0p}_\mu\mathrm{W1p}_\mu}{3\mathrm{fpi}^2} - \frac{g\mathrm{gtp0}^2\mathrm{p0p}(\mathrm{p0p}^\dagger)^3\mathrm{W0p}_\mu\mathrm{W1p}_\mu}{18\mathrm{fpi}^4} - \frac{g\mathrm{gtp0p}^2(\mathrm{p0p}^\dagger)^4\mathrm{W0p}_\mu\mathrm{W1p}_\mu}{18\mathrm{fpi}^4} - \tfrac{1}{4}\mathrm{fpi}^2 g\mathrm{gtW0p}_\mu^\dagger\mathrm{W1p}_\mu - \tfrac{1}{2}i\mathrm{fpi}g\mathrm{gtp0W0p}_\mu^\dagger\mathrm{W1p}_\mu +$$

$$\tfrac{1}{2}g\mathrm{gtp0}^2\mathrm{W0p}_\mu^\dagger\mathrm{W1p}_\mu + \frac{ig\mathrm{gtp0}^3\mathrm{W0p}_\mu^\dagger\mathrm{W1p}_\mu}{3\mathrm{fpi}} - \frac{7g\mathrm{gtp0}^4\mathrm{W0p}_\mu^\dagger\mathrm{W1p}_\mu}{48\mathrm{fpi}^2} - \frac{ig\mathrm{gtp0}^5\mathrm{W0p}_\mu^\dagger\mathrm{W1p}_\mu}{24\mathrm{fpi}^3} + \frac{g\mathrm{gtp0}^6\mathrm{W0p}_\mu^\dagger\mathrm{W1p}_\mu}{144\mathrm{fpi}^4} + \tfrac{1}{2}g\mathrm{gtp0pp0p}^\dagger\mathrm{W0p}_\mu^\dagger\mathrm{W1p}_\mu +$$

$$\frac{2ig\mathrm{gtp0p0pp0p}^\dagger\mathrm{W0p}_\mu^\dagger\mathrm{W1p}_\mu}{3\mathrm{fpi}} - \frac{5g\mathrm{gtp0}^2\mathrm{p0pp0p}^\dagger\mathrm{W0p}_\mu^\dagger\mathrm{W1p}_\mu}{12\mathrm{fpi}^2} - \frac{ig\mathrm{gtp0}^3\mathrm{p0pp0p}^\dagger\mathrm{W0p}_\mu^\dagger\mathrm{W1p}_\mu}{6\mathrm{fpi}^3} + \frac{g\mathrm{gtp0}^4\mathrm{p0pp0p}^\dagger\mathrm{W0p}_\mu^\dagger\mathrm{W1p}_\mu}{36\mathrm{fpi}^4} -$$

$$\frac{g\mathrm{gtp0}^2(\mathrm{p0p}^\dagger)^2\mathrm{W0p}_\mu^\dagger\mathrm{W1p}_\mu}{4\mathrm{fpi}^2} - \frac{ig\mathrm{gtp0p0p}^2(\mathrm{p0p}^\dagger)^2\mathrm{W0p}_\mu^\dagger\mathrm{W1p}_\mu}{6\mathrm{fpi}^3} + \frac{g\mathrm{gtp0}^2\mathrm{p0p}^2(\mathrm{p0p}^\dagger)^2\mathrm{W0p}_\mu^\dagger\mathrm{W1p}_\mu}{36\mathrm{fpi}^4} - \tfrac{1}{2}i\mathrm{gtp0p}\partial_\mu[\mathrm{p0}]\mathrm{W1p}_\mu^\dagger - \frac{\mathrm{gtp0p0p}\partial_\mu[\mathrm{p0}]\mathrm{W1p}_\mu^\dagger}{3\mathrm{fpi}} +$$

$$\frac{i\mathrm{gtp0}^2\mathrm{p0p}\partial_\mu[\mathrm{p0}]\mathrm{W1p}_\mu^\dagger}{6\mathrm{fpi}^2} - \frac{i\mathrm{gtp0}^4\mathrm{p0p}\partial_\mu[\mathrm{p0}]\mathrm{W1p}_\mu^\dagger}{72\mathrm{fpi}^4} + \frac{i\mathrm{gtp0p}^2\mathrm{p0p}^\dagger\partial_\mu[\mathrm{p0}]\mathrm{W1p}_\mu^\dagger}{3\mathrm{fpi}} - \frac{i\mathrm{gtp0}^2\mathrm{p0p}^2\mathrm{p0p}^\dagger\partial_\mu[\mathrm{p0}]\mathrm{W1p}_\mu^\dagger}{18\mathrm{fpi}^4} - \frac{i\mathrm{gtp0p}^3(\mathrm{p0p}^\dagger)^2\partial_\mu[\mathrm{p0}]\mathrm{W1p}_\mu^\dagger}{18\mathrm{fpi}^4} -$$

$$\tfrac{1}{2}\mathrm{fpi}g\mathrm{t}\partial_\mu[\mathrm{p0p}]\mathrm{W1p}_\mu^\dagger + \tfrac{1}{2}i\mathrm{gtp0}\partial_\mu[\mathrm{p0p}]\mathrm{W1p}_\mu^\dagger + \frac{\mathrm{gtp0}^2\partial_\mu[\mathrm{p0p}]\mathrm{W1p}_\mu^\dagger}{3\mathrm{fpi}} - \frac{i\mathrm{gtp0}^3\partial_\mu[\mathrm{p0p}]\mathrm{W1p}_\mu^\dagger}{6\mathrm{fpi}^2} - \frac{\mathrm{gtp0}^4\partial_\mu[\mathrm{p0p}]\mathrm{W1p}_\mu^\dagger}{24\mathrm{fpi}^3} + \frac{i\mathrm{gtp0}^5\partial_\mu[\mathrm{p0p}]\mathrm{W1p}_\mu^\dagger}{72\mathrm{fpi}^4} +$$

$$\frac{\mathrm{gtp0pp0p}^\dagger\partial_\mu[\mathrm{p0p}]\mathrm{W1p}_\mu^\dagger}{3\mathrm{fpi}} - \frac{i\mathrm{gtp0p0pp0p}^\dagger\partial_\mu[\mathrm{p0p}]\mathrm{W1p}_\mu^\dagger}{3\mathrm{fpi}^2} - \frac{\mathrm{gtp0}^2\mathrm{p0pp0p}^\dagger\partial_\mu[\mathrm{p0p}]\mathrm{W1p}_\mu^\dagger}{6\mathrm{fpi}^3} + \frac{i\mathrm{gtp0}^3\mathrm{p0pp0p}^\dagger\partial_\mu[\mathrm{p0p}]\mathrm{W1p}_\mu^\dagger}{18\mathrm{fpi}^4} - \frac{\mathrm{gtp0}^2(\mathrm{p0p}^\dagger)^2\partial_\mu[\mathrm{p0p}]\mathrm{W1p}_\mu^\dagger}{6\mathrm{fpi}^3} +$$

$$\frac{i\mathrm{gtp0p0p}^2(\mathrm{p0p}^\dagger)^2\partial_\mu[\mathrm{p0p}]\mathrm{W1p}_\mu^\dagger}{18\mathrm{fpi}^4} - \frac{\mathrm{gtp0}^2\partial_\mu[\mathrm{p0p}]\mathrm{W1p}_\mu^\dagger}{3\mathrm{fpi}} - \tfrac{1}{2}i\mathrm{gtp1p}\partial_\mu[\mathrm{p1}]\mathrm{W1p}_\mu^\dagger + \frac{\mathrm{gtp1p1p}\partial_\mu[\mathrm{p1}]\mathrm{W1p}_\mu^\dagger}{3\mathrm{fpi}} + \frac{i\mathrm{gtp1}^2\mathrm{p1p}\partial_\mu[\mathrm{p1}]\mathrm{W1p}_\mu^\dagger}{6\mathrm{fpi}^2} -$$

$$\frac{i\mathrm{gtp1}^4\mathrm{p1p}\partial_\mu[\mathrm{p1}]\mathrm{W1p}_\mu^\dagger}{72\mathrm{fpi}^4} + \frac{i\mathrm{gtp1p}^2\mathrm{p1p}^\dagger\partial_\mu[\mathrm{p1}]\mathrm{W1p}_\mu^\dagger}{3\mathrm{fpi}} - \frac{i\mathrm{gtp1}^2\mathrm{p1p}^2\mathrm{p1p}^\dagger\partial_\mu[\mathrm{p1}]\mathrm{W1p}_\mu^\dagger}{18\mathrm{fpi}^4} - \frac{i\mathrm{gtp1p}^3(\mathrm{p1p}^\dagger)^2\partial_\mu[\mathrm{p1}]\mathrm{W1p}_\mu^\dagger}{18\mathrm{fpi}^4} + \tfrac{1}{2}\mathrm{fpi}g\mathrm{t}\partial_\mu[\mathrm{p1p}]\mathrm{W1p}_\mu^\dagger +$$

$$\tfrac{1}{2}i\mathrm{gtp1}\partial_\mu[\mathrm{p1p}]\mathrm{W1p}_\mu^\dagger - \frac{\mathrm{gtp1}^2\partial_\mu[\mathrm{p1p}]\mathrm{W1p}_\mu^\dagger}{3\mathrm{fpi}} - \frac{i\mathrm{gtp1}^3\partial_\mu[\mathrm{p1p}]\mathrm{W1p}_\mu^\dagger}{6\mathrm{fpi}^2} + \frac{\mathrm{gtp1}^4\partial_\mu[\mathrm{p1p}]\mathrm{W1p}_\mu^\dagger}{24\mathrm{fpi}^3} + \frac{i\mathrm{gtp1}^5\partial_\mu[\mathrm{p1p}]\mathrm{W1p}_\mu^\dagger}{72\mathrm{fpi}^4} - \frac{\mathrm{gtp1p1pp1p}^\dagger\partial_\mu[\mathrm{p1p}]\mathrm{W1p}_\mu^\dagger}{3\mathrm{fpi}} -$$

$$\frac{i\mathrm{gtp1p1pp1p}^\dagger\partial_\mu[\mathrm{p1p}]\mathrm{W1p}_\mu^\dagger}{3\mathrm{fpi}^2} + \frac{\mathrm{gtp1}^2\mathrm{p1pp1p}^\dagger\partial_\mu[\mathrm{p1p}]\mathrm{W1p}_\mu^\dagger}{6\mathrm{fpi}^3} + \frac{i\mathrm{gtp1}^3\mathrm{p1pp1p}^\dagger\partial_\mu[\mathrm{p1p}]\mathrm{W1p}_\mu^\dagger}{18\mathrm{fpi}^4} + \frac{\mathrm{gtp1p}^2(\mathrm{p1p}^\dagger)^2\partial_\mu[\mathrm{p1p}]\mathrm{W1p}_\mu^\dagger}{6\mathrm{fpi}^3} +$$

$$\frac{i\mathrm{gtp1p1p}^2(\mathrm{p1p}^\dagger)^2\partial_\mu[\mathrm{p1p}]\mathrm{W1p}_\mu^\dagger}{18\mathrm{fpi}^4} + \frac{\mathrm{gtp1p}^2\partial_\mu[\mathrm{p1p}^\dagger]\mathrm{W1p}_\mu^\dagger}{3\mathrm{fpi}} - \tfrac{1}{2}i\mathrm{fpi}g\mathrm{gtp0pW0}_{\mu,3}\mathrm{W1p}_\mu^\dagger - \tfrac{1}{2}g\mathrm{gtp0p0pW0}_{\mu,3}\mathrm{W1p}_\mu^\dagger + \frac{ig\mathrm{gtp0}^2\mathrm{p0pW0}_{\mu,3}\mathrm{W1p}_\mu^\dagger}{3\mathrm{fpi}} +$$

$$\frac{g\mathrm{gtp0}^3\mathrm{p0pW0}_{\mu,3}\mathrm{W1p}_\mu^\dagger}{6\mathrm{fpi}^2} - \frac{ig\mathrm{gtp0}^4\mathrm{p0pW0}_{\mu,3}\mathrm{W1p}_\mu^\dagger}{24\mathrm{fpi}^3} - \frac{g\mathrm{gtp0}^5\mathrm{p0pW0}_{\mu,3}\mathrm{W1p}_\mu^\dagger}{72\mathrm{fpi}^4} + \frac{2ig\mathrm{gtp0}^2\mathrm{p0p}^\dagger\mathrm{W0}_{\mu,3}\mathrm{W1p}_\mu^\dagger}{3\mathrm{fpi}} + \frac{g\mathrm{gtp0p0p}^2\mathrm{p0p}^\dagger\mathrm{W0}_{\mu,3}\mathrm{W1p}_\mu^\dagger}{3\mathrm{fpi}^2} -$$

$$\frac{ig\mathrm{gtp0}^2\mathrm{p0p}^2\mathrm{p0p}^\dagger\mathrm{W0}_{\mu,3}\mathrm{W1p}_\mu^\dagger}{6\mathrm{fpi}^3} - \frac{g\mathrm{gtp0}^3\mathrm{p0p}^2\mathrm{p0p}^\dagger\mathrm{W0}_{\mu,3}\mathrm{W1p}_\mu^\dagger}{18\mathrm{fpi}^4} - \frac{ig\mathrm{gtp0p}^3(\mathrm{p0p}^\dagger)^2\mathrm{W0}_{\mu,3}\mathrm{W1p}_\mu^\dagger}{6\mathrm{fpi}^3} - \frac{g\mathrm{gtp0p0p}^3(\mathrm{p0p}^\dagger)^2\mathrm{W0}_{\mu,3}\mathrm{W1p}_\mu^\dagger}{18\mathrm{fpi}^4} -$$

$$\tfrac{1}{4}\mathrm{fpi}^2 g\mathrm{gtW0p}_\mu\mathrm{W1p}_\mu^\dagger + \tfrac{1}{2}i\mathrm{fpi}g\mathrm{gtp0W0p}_\mu\mathrm{W1p}_\mu^\dagger + \tfrac{1}{2}g\mathrm{gtp0}^2\mathrm{W0p}_\mu\mathrm{W1p}_\mu^\dagger - \frac{ig\mathrm{gtp0}^3\mathrm{W0p}_\mu\mathrm{W1p}_\mu^\dagger}{3\mathrm{fpi}} - \frac{7g\mathrm{gtp0}^4\mathrm{W0p}_\mu\mathrm{W1p}_\mu^\dagger}{48\mathrm{fpi}^2} + \frac{ig\mathrm{gtp0}^5\mathrm{W0p}_\mu\mathrm{W1p}_\mu^\dagger}{24\mathrm{fpi}^3} +$$

$$\frac{g\mathrm{gtp0}^6\mathrm{W0p}_\mu\mathrm{W1p}_\mu^\dagger}{144\mathrm{fpi}^4} + \tfrac{1}{2}g\mathrm{gtp0pp0p}^\dagger\mathrm{W0p}_\mu\mathrm{W1p}_\mu^\dagger - \frac{2ig\mathrm{gtp0p0pp0p}^\dagger\mathrm{W0p}_\mu\mathrm{W1p}_\mu^\dagger}{3\mathrm{fpi}} - \frac{5g\mathrm{gtp0}^2\mathrm{p0pp0p}^\dagger\mathrm{W0p}_\mu\mathrm{W1p}_\mu^\dagger}{12\mathrm{fpi}^2} + \frac{ig\mathrm{gtp0}^3\mathrm{p0pp0p}^\dagger\mathrm{W0p}_\mu\mathrm{W1p}_\mu^\dagger}{6\mathrm{fpi}^3} +$$

$$\frac{g\mathrm{gtp0}^4\mathrm{p0pp0p}^\dagger\mathrm{W0p}_\mu\mathrm{W1p}_\mu^\dagger}{36\mathrm{fpi}^4} - \frac{g\mathrm{gtp0}^2(\mathrm{p0p}^\dagger)^2\mathrm{W0p}_\mu\mathrm{W1p}_\mu^\dagger}{4\mathrm{fpi}^2} + \frac{ig\mathrm{gtp0p0p}^2(\mathrm{p0p}^\dagger)^2\mathrm{W0p}_\mu\mathrm{W1p}_\mu^\dagger}{6\mathrm{fpi}^3} + \frac{g\mathrm{gtp0}^2\mathrm{p0p}^2(\mathrm{p0p}^\dagger)^2\mathrm{W0p}_\mu\mathrm{W1p}_\mu^\dagger}{36\mathrm{fpi}^4} -$$

$$\tfrac{1}{2}g\mathrm{gtp0p}^2\mathrm{W0p}_\mu^\dagger\mathrm{W1p}_\mu^\dagger + \frac{g\mathrm{gtp0}^2\mathrm{p0p}^2\mathrm{W0p}_\mu^\dagger\mathrm{W1p}_\mu^\dagger}{6\mathrm{fpi}^2} - \frac{g\mathrm{gtp0}^4\mathrm{p0p}^2\mathrm{W0p}_\mu^\dagger\mathrm{W1p}_\mu^\dagger}{72\mathrm{fpi}^4} + \frac{g\mathrm{gtp0p}^3\mathrm{p0p}^\dagger\mathrm{W0p}_\mu^\dagger\mathrm{W1p}_\mu^\dagger}{3\mathrm{fpi}^2} - \frac{g\mathrm{gtp0}^2\mathrm{p0p}^3\mathrm{p0p}^\dagger\mathrm{W0p}_\mu^\dagger\mathrm{W1p}_\mu^\dagger}{18\mathrm{fpi}^4} -$$

$$\frac{g\mathrm{gtp0p}^4(\mathrm{p0p}^\dagger)^2\mathrm{W0p}_\mu^\dagger\mathrm{W1p}_\mu^\dagger}{18\mathrm{fpi}^4} + \tfrac{1}{2}\mathrm{fpi}^2 g\mathrm{t}^2\mathrm{W1p}_\mu\mathrm{W1p}_\mu^\dagger - \frac{g\mathrm{t}^2\mathrm{p0}^4\mathrm{W1p}_\mu\mathrm{W1p}_\mu^\dagger}{48\mathrm{fpi}^2} + \frac{g\mathrm{t}^2\mathrm{p0}^6\mathrm{W1p}_\mu\mathrm{W1p}_\mu^\dagger}{144\mathrm{fpi}^4} - \frac{g\mathrm{t}^2\mathrm{p0}^2\mathrm{p0pp0p}^\dagger\mathrm{W1p}_\mu\mathrm{W1p}_\mu^\dagger}{12\mathrm{fpi}^2} +$$

$$\frac{g\mathrm{t}^2\mathrm{p0}^4\mathrm{p0pp0p}^\dagger\mathrm{W1p}_\mu\mathrm{W1p}_\mu^\dagger}{24\mathrm{fpi}^4} - \frac{g\mathrm{t}^2\mathrm{p0p}^2(\mathrm{p0p}^\dagger)^2\mathrm{W1p}_\mu\mathrm{W1p}_\mu^\dagger}{12\mathrm{fpi}^2} + \frac{g\mathrm{t}^2\mathrm{p0}^2\mathrm{p0p}^2(\mathrm{p0p}^\dagger)^2\mathrm{W1p}_\mu\mathrm{W1p}_\mu^\dagger}{12\mathrm{fpi}^4} + \frac{g\mathrm{t}^2\mathrm{p0p}^3(\mathrm{p0p}^\dagger)^3\mathrm{W1p}_\mu\mathrm{W1p}_\mu^\dagger}{18\mathrm{fpi}^4} - \frac{g\mathrm{t}^2\mathrm{p1}^4\mathrm{W1p}_\mu\mathrm{W1p}_\mu^\dagger}{48\mathrm{fpi}^2} +$$

$$\frac{g\mathrm{t}^2\mathrm{p1}^6\mathrm{W1p}_\mu\mathrm{W1p}_\mu^\dagger}{144\mathrm{fpi}^4} - \frac{g\mathrm{t}^2\mathrm{p1}^2\mathrm{p1pp1p}^\dagger\mathrm{W1p}_\mu\mathrm{W1p}_\mu^\dagger}{12\mathrm{fpi}^2} + \frac{g\mathrm{t}^2\mathrm{p1}^4\mathrm{p1pp1p}^\dagger\mathrm{W1p}_\mu\mathrm{W1p}_\mu^\dagger}{24\mathrm{fpi}^4} - \frac{g\mathrm{t}^2\mathrm{p1p}^2(\mathrm{p1p}^\dagger)^2\mathrm{W1p}_\mu\mathrm{W1p}_\mu^\dagger}{12\mathrm{fpi}^2} + \frac{g\mathrm{t}^2\mathrm{p1}^2\mathrm{p1p}^2(\mathrm{p1p}^\dagger)^2\mathrm{W1p}_\mu\mathrm{W1p}_\mu^\dagger}{12\mathrm{fpi}^4} +$$

$$\frac{g\mathrm{t}^2\mathrm{p1p}^3(\mathrm{p1p}^\dagger)^3\mathrm{W1p}_\mu\mathrm{W1p}_\mu^\dagger}{18\mathrm{fpi}^4} - \tfrac{1}{2}\mathrm{fpi}g\mathrm{p}\partial_\mu[\mathrm{p1}]\mathrm{W23}_\mu - \frac{g\mathrm{pp1}^4\partial_\mu[\mathrm{p1}]\mathrm{W23}_\mu}{24\mathrm{fpi}^3} + \frac{2g\mathrm{pp1pp1p}^\dagger\partial_\mu[\mathrm{p1}]\mathrm{W23}_\mu}{3\mathrm{fpi}} - \frac{g\mathrm{pp1}^2\mathrm{p1pp1p}^\dagger\partial_\mu[\mathrm{p1}]\mathrm{W23}_\mu}{6\mathrm{fpi}^3} -$$

$$\frac{g\mathrm{pp1p}^2(\mathrm{p1p}^\dagger)^2\partial_\mu[\mathrm{p1}]\mathrm{W23}_\mu}{6\mathrm{fpi}^3} - \tfrac{1}{2}i\mathrm{gpp1p}^\dagger\partial_\mu[\mathrm{p1p}]\mathrm{W23}_\mu - \frac{g\mathrm{pp1p1p}^\dagger\partial_\mu[\mathrm{p1p}]\mathrm{W23}_\mu}{3\mathrm{fpi}} + \frac{ig\mathrm{pp1}^2\mathrm{p1p}^\dagger\partial_\mu[\mathrm{p1p}]\mathrm{W23}_\mu}{6\mathrm{fpi}^2} - \frac{ig\mathrm{pp1}^4\mathrm{p1p}^\dagger\partial_\mu[\mathrm{p1p}]\mathrm{W23}_\mu}{72\mathrm{fpi}^4} +$$

$$\frac{ig\mathrm{pp1p}(\mathrm{p1p}^\dagger)^2\partial_\mu[\mathrm{p1p}]\mathrm{W23}_\mu}{3\mathrm{fpi}^2} - \frac{ig\mathrm{pp1}^2\mathrm{p1p}(\mathrm{p1p}^\dagger)^2\partial_\mu[\mathrm{p1p}]\mathrm{W23}_\mu}{18\mathrm{fpi}^4} - \frac{ig\mathrm{pp1p}^2(\mathrm{p1p}^\dagger)^3\partial_\mu[\mathrm{p1p}]\mathrm{W23}_\mu}{18\mathrm{fpi}^4} + \tfrac{1}{2}i\mathrm{gpp1p}\partial_\mu[\mathrm{p1p}^\dagger]\mathrm{W23}_\mu -$$

$$\frac{g\mathrm{pp1p1p}\partial_\mu[\mathrm{p1p}^\dagger]\mathrm{W23}_\mu}{3\mathrm{fpi}} - \frac{ig\mathrm{pp1}^2\mathrm{p1p}\partial_\mu[\mathrm{p1p}^\dagger]\mathrm{W23}_\mu}{6\mathrm{fpi}^2} + \frac{ig\mathrm{pp1}^4\mathrm{p1p}\partial_\mu[\mathrm{p1p}^\dagger]\mathrm{W23}_\mu}{72\mathrm{fpi}^4} - \frac{ig\mathrm{pp1p}^2\mathrm{p1p}^\dagger\partial_\mu[\mathrm{p1p}^\dagger]\mathrm{W23}_\mu}{3\mathrm{fpi}^2} + \frac{ig\mathrm{pp1}^2\mathrm{p1p}^2\mathrm{p1p}^\dagger\partial_\mu[\mathrm{p1p}^\dagger]\mathrm{W23}_\mu}{18\mathrm{fpi}^4} +$$

$$\frac{ig\mathrm{pp1p}^3(\mathrm{p1p}^\dagger)^2\partial_\mu[\mathrm{p1p}^\dagger]\mathrm{W23}_\mu}{18\mathrm{fpi}^4} - \tfrac{1}{4}\mathrm{fpi}^2 g\mathrm{pgtW1}_{\mu,3}\mathrm{W23}_\mu + \frac{g\mathrm{pgtp1}^4\mathrm{W1}_{\mu,3}\mathrm{W23}_\mu}{48\mathrm{fpi}^2} - \frac{g\mathrm{pgtp1}^6\mathrm{W1}_{\mu,3}\mathrm{W23}_\mu}{144\mathrm{fpi}^4} + g\mathrm{pgtp1pp1p}^\dagger\mathrm{W1}_{\mu,3}\mathrm{W23}_\mu -$$

$$\frac{g\mathrm{pgtp1}^2\mathrm{p1pp1p}^\dagger\mathrm{W1}_{\mu,3}\mathrm{W23}_\mu}{4\mathrm{fpi}^2} - \frac{g\mathrm{pgtp1}^4\mathrm{p1pp1p}^\dagger\mathrm{W1}_{\mu,3}\mathrm{W23}_\mu}{72\mathrm{fpi}^4} - \frac{7g\mathrm{pgtp1}^2(\mathrm{p1p}^\dagger)^2\mathrm{W1}_{\mu,3}\mathrm{W23}_\mu}{12\mathrm{fpi}^2} + \frac{g\mathrm{pgtp1}^2\mathrm{p1p}^2(\mathrm{p1p}^\dagger)^2\mathrm{W1}_{\mu,3}\mathrm{W23}_\mu}{36\mathrm{fpi}^4} +$$

$$\frac{g\mathrm{pgtp1p}^3(\mathrm{p1p}^\dagger)^3\mathrm{W1}_{\mu,3}\mathrm{W23}_\mu}{18\mathrm{fpi}^4} - \tfrac{1}{2}i\mathrm{fpi}g\mathrm{pgtp1p}^\dagger\mathrm{W1p}_\mu\mathrm{W23}_\mu - \tfrac{1}{2}g\mathrm{pgtp1p1p}^\dagger\mathrm{W1p}_\mu\mathrm{W23}_\mu + \frac{ig\mathrm{pgtp1}^2\mathrm{p1p}^\dagger\mathrm{W1p}_\mu\mathrm{W23}_\mu}{3\mathrm{fpi}} +$$

$$\frac{g\mathrm{pgtp1}^3\mathrm{p1p}^\dagger\mathrm{W1p}_\mu\mathrm{W23}_\mu}{6\mathrm{fpi}^2} - \frac{ig\mathrm{pgtp1}^4\mathrm{p1p}^\dagger\mathrm{W1p}_\mu\mathrm{W23}_\mu}{24\mathrm{fpi}^3} - \frac{g\mathrm{pgtp1}^5\mathrm{p1p}^\dagger\mathrm{W1p}_\mu\mathrm{W23}_\mu}{72\mathrm{fpi}^4} + \frac{2ig\mathrm{pgtp1p}(\mathrm{p1p}^\dagger)^2\mathrm{W1p}_\mu\mathrm{W23}_\mu}{3\mathrm{fpi}} + \frac{g\mathrm{pgtp1p1p}(\mathrm{p1p}^\dagger)^2\mathrm{W1p}_\mu\mathrm{W23}_\mu}{3\mathrm{fpi}^2} -$$

$$\frac{ig\mathrm{pgtp1}^2\mathrm{p1p}(\mathrm{p1p}^\dagger)^2\mathrm{W1p}_\mu\mathrm{W23}_\mu}{6\mathrm{fpi}^3} - \frac{g\mathrm{pgtp1}^3\mathrm{p1p}(\mathrm{p1p}^\dagger)^2\mathrm{W1p}_\mu\mathrm{W23}_\mu}{18\mathrm{fpi}^4} - \frac{ig\mathrm{pgtp1p}^2(\mathrm{p1p}^\dagger)^3\mathrm{W1p}_\mu\mathrm{W23}_\mu}{6\mathrm{fpi}^3} - \frac{g\mathrm{pgtp1p1p}^2(\mathrm{p1p}^\dagger)^3\mathrm{W1p}_\mu\mathrm{W23}_\mu}{18\mathrm{fpi}^4} +$$

$$\tfrac{1}{2}i\mathrm{fpi}g\mathrm{pgtp1pW1p}_\mu^\dagger\mathrm{W23}_\mu - \tfrac{1}{2}g\mathrm{pgtp1p1pW1p}_\mu^\dagger\mathrm{W23}_\mu - \frac{ig\mathrm{pgtp1}^2\mathrm{p1pW1p}_\mu^\dagger\mathrm{W23}_\mu}{3\mathrm{fpi}} + \frac{g\mathrm{pgtp1}^3\mathrm{p1pW1p}_\mu^\dagger\mathrm{W23}_\mu}{6\mathrm{fpi}^2} + \frac{ig\mathrm{pgtp1}^4\mathrm{p1pW1p}_\mu^\dagger\mathrm{W23}_\mu}{24\mathrm{fpi}^3} -$$

$$\frac{g\mathrm{pgtp1}^5\mathrm{p1pW1p}_\mu^\dagger\mathrm{W23}_\mu}{72\mathrm{fpi}^4} - \frac{2ig\mathrm{pgtp1p}^2\mathrm{p1p}^\dagger\mathrm{W1p}_\mu^\dagger\mathrm{W23}_\mu}{3\mathrm{fpi}} + \frac{g\mathrm{pgtp1p1p}^2\mathrm{p1p}^\dagger\mathrm{W1p}_\mu^\dagger\mathrm{W23}_\mu}{3\mathrm{fpi}^2} + \frac{ig\mathrm{pgtp1}^2\mathrm{p1p}^2\mathrm{p1p}^\dagger\mathrm{W1p}_\mu^\dagger\mathrm{W23}_\mu}{6\mathrm{fpi}^3} -$$

$$\frac{\text{gpgtp1}^3\text{p1p}^2\text{p1p}^\dagger\text{W1p}_\mu^\dagger\text{W23}_\mu}{18\text{fpi}^4} + \frac{i\text{gpgtp1p}^3\left(\text{p1p}^\dagger\right)^2\text{W1p}_\mu^\dagger\text{W23}_\mu}{6\text{fpi}^3} - \frac{\text{gpgtp1p1p}^3\left(\text{p1p}^\dagger\right)^2\text{W1p}_\mu^\dagger\text{W23}_\mu}{18\text{fpi}^4} + \frac{1}{8}\text{fpi}^2\text{gp}^2\text{W23}_\mu^2 - \frac{\text{gp}^2\text{p1}^4\text{W23}_\mu^2}{96\text{fpi}^2} +$$
$$\frac{\text{gp}^2\text{p1}^6\text{W23}_\mu^2}{288\text{fpi}^4} - \frac{\text{gp}^2\text{p1}^2\text{p1pp1p}^\dagger\text{W23}_\mu^2}{24\text{fpi}^2} + \frac{\text{gp}^2\text{p1}^4\text{p1pp1p}^\dagger\text{W23}_\mu^2}{48\text{fpi}^4} - \frac{\text{gp}^2\text{p1p}^2\left(\text{p1p}^\dagger\right)^2\text{W23}_\mu^2}{24\text{fpi}^2} + \frac{\text{gp}^2\text{p1}^2\text{p1p}^2\left(\text{p1p}^\dagger\right)^2\text{W23}_\mu^2}{24\text{fpi}^4} + \frac{\text{gp}^2\text{p1p}^3\left(\text{p1p}^\dagger\right)^3\text{W23}_\mu^2}{36\text{fpi}^4}$$

4.4 $L_{\mathbf{Gold-Leptons}}$

$-\text{eL1MFeR1}^\dagger.P_- - \text{MFnL1nR1}^\dagger.P_- - \text{eL1}^\dagger\text{MF}P_+.\text{eR1} - \text{MFnL1}^\dagger P_+.\text{nR1} - \text{EpLMFeL0}^\dagger.P_+.\text{eR1} + \frac{i\text{EpLMFp0eL0}^\dagger.P_+.\text{eR1}}{\text{fpi}} +$
$\frac{\text{EpLMFp0}^2\text{eL0}^\dagger.P_+.\text{eR1}}{2\text{fpi}^2} + \frac{\text{EpLMFp0pp0p}^\dagger\text{eL0}^\dagger.P_+.\text{eR1}}{\text{fpi}^2} - \frac{i\sqrt{2}\text{EpLMFp0p}^\dagger\text{eL0}^\dagger.P_+.\text{nR1}}{\text{fpi}} - \text{EpRelMFelL1}^\dagger.P_+.\text{elR2} +$
$\frac{i\text{EpRelMFp1elL1}^\dagger.P_+.\text{elR2}}{\text{fpi}} + \frac{\text{EpRelMFp1}^2\text{elL1}^\dagger.P_+.\text{elR2}}{2\text{fpi}^2} + \frac{\text{EpRelMFp1pp1p}^\dagger\text{elL1}^\dagger.P_+.\text{elR2}}{\text{fpi}^2} - \frac{i\sqrt{2}\text{EpRnuMFp1p}^\dagger\text{elL1}^\dagger.P_+.\text{n1R2}}{\text{fpi}} -$
$\text{EpRelMFelR2}^\dagger.P_-.\text{elL1} - \frac{i\text{EpRelMFp1elR2}^\dagger.P_-.\text{elL1}}{\text{fpi}} + \frac{\text{EpRelMFp1}^2\text{elR2}^\dagger.P_-.\text{elL1}}{2\text{fpi}^2} + \frac{\text{EpRelMFp1pp1p}^\dagger\text{elR2}^\dagger.P_-.\text{elL1}}{\text{fpi}^2} +$
$\frac{i\sqrt{2}\text{EpRelMFp1p}^\dagger\text{elR2}^\dagger.P_-.\text{n1L1}}{\text{fpi}} - \text{EpLMFeR1}^\dagger.P_-.\text{eL0} - \frac{i\text{EpLMFp0eR1}^\dagger.P_-.\text{eL0}}{\text{fpi}} + \frac{\text{EpLMFp0}^2\text{eR1}^\dagger.P_-.\text{eL0}}{2\text{fpi}^2} + \frac{\text{EpLMFp0pp0p}^\dagger\text{eR1}^\dagger.P_-.\text{eL0}}{\text{fpi}^2} +$
$\frac{i\sqrt{2}\text{EpLMFp0p}^\dagger\text{eR1}^\dagger.P_-.\text{nL0}}{\text{fpi}} - \text{EpRmuMFmuL1}^\dagger.P_+.\text{muR2} + \frac{i\text{EpRmuMFp1muL1}^\dagger.P_+.\text{muR2}}{\text{fpi}} + \frac{\text{EpRmuMFp1}^2\text{muL1}^\dagger.P_+.\text{muR2}}{2\text{fpi}^2} +$
$\frac{\text{EpRmuMFp1pp1p}^\dagger\text{muL1}^\dagger.P_+.\text{muR2}}{\text{fpi}^2} - \frac{i\sqrt{2}\text{EpRnuMFp1p}^\dagger\text{muL1}^\dagger.P_+.\text{n2R2}}{\text{fpi}} - \text{EpRmuMFmuR2}^\dagger.P_-.\text{muL1} - \frac{i\text{EpRmuMFp1muR2}^\dagger.P_-.\text{muL1}}{\text{fpi}} +$
$\frac{\text{EpRmuMFp1}^2\text{muR2}^\dagger.P_-.\text{muL1}}{2\text{fpi}^2} + \frac{\text{EpRmuMFp1pp1p}^\dagger\text{muR2}^\dagger.P_-.\text{muL1}}{\text{fpi}^2} + \frac{i\sqrt{2}\text{EpRmuMFp1p}^\dagger\text{muR2}^\dagger.P_-.\text{n2L1}}{\text{fpi}} - \frac{i\sqrt{2}\text{EpRelMFp1p}^\dagger\text{n1L1}^\dagger.P_+.\text{elR2}}{\text{fpi}} -$
$\text{EpRnuMFn1L1}^\dagger.P_+.\text{n1R2} - \frac{i\text{EpRnuMFp1n1L1}^\dagger.P_+.\text{n1R2}}{\text{fpi}} + \frac{\text{EpRnuMFp1}^2\text{n1L1}^\dagger.P_+.\text{n1R2}}{2\text{fpi}^2} + \frac{\text{EpRnuMFp1pp1p}^\dagger\text{n1L1}^\dagger.P_+.\text{n1R2}}{\text{fpi}^2} +$
$\frac{i\sqrt{2}\text{EpRnuMFp1pn1R2}^\dagger.P_-.\text{elL1}}{\text{fpi}} - \text{EpRnuMFn1R2}^\dagger.P_-.\text{n1L1} + \frac{i\text{EpRnuMFp1n1R2}^\dagger.P_-.\text{n1L1}}{\text{fpi}} + \frac{\text{EpRnuMFp1}^2\text{n1R2}^\dagger.P_-.\text{n1L1}}{2\text{fpi}^2} +$
$\frac{\text{EpRnuMFp1pp1p}^\dagger\text{n1R2}^\dagger.P_-.\text{n1L1}}{\text{fpi}^2} - \frac{i\sqrt{2}\text{EpRmuMFp1pn2L1}^\dagger.P_+.\text{muR2}}{\text{fpi}} - \text{EpRnuMFn2L1}^\dagger.P_+.\text{n2R2} - \frac{i\text{EpRnuMFp1n2L1}^\dagger.P_+.\text{n2R2}}{\text{fpi}} +$
$\frac{\text{EpRnuMFp1}^2\text{n2L1}^\dagger.P_+.\text{n2R2}}{2\text{fpi}^2} + \frac{\text{EpRnuMFp1pp1p}^\dagger\text{n2L1}^\dagger.P_+.\text{n2R2}}{\text{fpi}^2} + \frac{i\sqrt{2}\text{EpRnuMFp1pn2R2}^\dagger.P_-.\text{muL1}}{\text{fpi}} - \text{EpRnuMFn2R2}^\dagger.P_-.\text{n2L1} +$
$\frac{i\text{EpRnuMFp1n2R2}^\dagger.P_-.\text{n2L1}}{\text{fpi}} + \frac{\text{EpRnuMFp1}^2\text{n2R2}^\dagger.P_-.\text{n2L1}}{2\text{fpi}^2} + \frac{\text{EpRnuMFp1pp1p}^\dagger\text{n2R2}^\dagger.P_-.\text{n2L1}}{\text{fpi}^2} - \text{EpRnuMFn3L1}^\dagger.P_+.\text{n3R2} -$
$\frac{i\text{EpRnuMFp1n3L1}^\dagger.P_+.\text{n3R2}}{\text{fpi}} + \frac{\text{EpRnuMFp1}^2\text{n3L1}^\dagger.P_+.\text{n3R2}}{2\text{fpi}^2} + \frac{\text{EpRnuMFp1pp1p}^\dagger\text{n3L1}^\dagger.P_+.\text{n3R2}}{\text{fpi}^2} - \frac{i\sqrt{2}\text{EpRtaMFp1pn3L1}^\dagger.P_+.\text{taR2}}{\text{fpi}} -$
$\text{EpRnuMFn3R2}^\dagger.P_-.\text{n3L1} + \frac{i\text{EpRnuMFp1n3R2}^\dagger.P_-.\text{n3L1}}{\text{fpi}} + \frac{\text{EpRnuMFp1}^2\text{n3R2}^\dagger.P_-.\text{n3L1}}{2\text{fpi}^2} + \frac{\text{EpRnuMFp1pp1p}^\dagger\text{n3R2}^\dagger.P_-.\text{n3L1}}{\text{fpi}^2} +$
$\frac{i\sqrt{2}\text{EpRnuMFp1pn3R2}^\dagger.P_-.\text{taL1}}{\text{fpi}} - \frac{i\sqrt{2}\text{EpLMFp0pnL0}^\dagger.P_+.\text{eR1}}{\text{fpi}} - \text{EpLMFnL0}^\dagger.P_+.\text{nR1} - \frac{i\text{EpLMFp0nL0}^\dagger.P_+.\text{nR1}}{\text{fpi}} +$
$\frac{\text{EpLMFp0}^2\text{nL0}^\dagger.P_+.\text{nR1}}{2\text{fpi}^2} + \frac{\text{EpLMFp0pp0p}^\dagger\text{nL0}^\dagger.P_+.\text{nR1}}{\text{fpi}^2} + \frac{i\sqrt{2}\text{EpLMFp0pnR1}^\dagger.P_-.\text{eL0}}{\text{fpi}} - \text{EpLMFnR1}^\dagger.P_-.\text{nL0} + \frac{i\text{EpLMFp0nR1}^\dagger.P_-.\text{nL0}}{\text{fpi}} +$
$\frac{\text{EpLMFp0}^2\text{nR1}^\dagger.P_-.\text{nL0}}{2\text{fpi}^2} + \frac{\text{EpLMFp0pp0p}^\dagger\text{nR1}^\dagger.P_-.\text{nL0}}{\text{fpi}^2} - \frac{i\sqrt{2}\text{EpRnuMFp1p}^\dagger\text{taL1}^\dagger.P_+.\text{n3R2}}{\text{fpi}} - \text{EpRtaMFtaL1}^\dagger.P_+.\text{taR2} +$
$\frac{i\text{EpRtaMFp1taL1}^\dagger.P_+.\text{taR2}}{\text{fpi}} + \frac{\text{EpRtaMFp1}^2\text{taL1}^\dagger.P_+.\text{taR2}}{2\text{fpi}^2} + \frac{\text{EpRtaMFp1pp1p}^\dagger\text{taL1}^\dagger.P_+.\text{taR2}}{\text{fpi}^2} + \frac{i\sqrt{2}\text{EpRtaMFp1p}^\dagger\text{taR2}^\dagger.P_-.\text{n3L1}}{\text{fpi}} -$
$\text{EpRtaMFtaR2}^\dagger.P_-.\text{taL1} - \frac{i\text{EpRtaMFp1taR2}^\dagger.P_-.\text{taL1}}{\text{fpi}} + \frac{\text{EpRtaMFp1}^2\text{taR2}^\dagger.P_-.\text{taL1}}{2\text{fpi}^2} + \frac{\text{EpRtaMFp1pp1p}^\dagger\text{taR2}^\dagger.P_-.\text{taL1}}{\text{fpi}^2}$

4.5 $L_{\mathbf{Gold-Quarks}}$

$-\text{dL1MFdR1}^\dagger.P_- - \text{dL1}^\dagger\text{MF}P_+.\text{dR1} - \text{MFuL1}^\dagger P_+.\text{uR1} - \text{MFuL1uR1}^\dagger.P_- - \text{EpRboMFboL1}^\dagger.P_+.\text{boR2} +$
$\frac{i\text{EpRboMFp1boL1}^\dagger.P_+.\text{boR2}}{\text{fpi}} + \frac{\text{EpRboMFp1}^2\text{boL1}^\dagger.P_+.\text{boR2}}{2\text{fpi}^2} + \frac{\text{EpRboMFp1pp1p}^\dagger\text{boL1}^\dagger.P_+.\text{boR2}}{\text{fpi}^2} - \frac{i\sqrt{2}\text{EpRtoMFp1p}^\dagger\text{boL1}^\dagger.P_+.\text{toR2}}{\text{fpi}} -$
$\text{EpRboMFboR2}^\dagger.P_-.\text{boL1} - \frac{i\text{EpRboMFp1boR2}^\dagger.P_-.\text{boL1}}{\text{fpi}} + \frac{\text{EpRboMFp1}^2\text{boR2}^\dagger.P_-.\text{boL1}}{2\text{fpi}^2} + \frac{\text{EpRboMFp1pp1p}^\dagger\text{boR2}^\dagger.P_-.\text{boL1}}{\text{fpi}^2} +$
$\frac{i\sqrt{2}\text{EpRboMFp1p}^\dagger\text{boR2}^\dagger.P_-.\text{toL1}}{\text{fpi}} - \text{EpRchMFchL1}^\dagger.P_+.\text{chR2} - \frac{i\text{EpRchMFp1chL1}^\dagger.P_+.\text{chR2}}{\text{fpi}} + \frac{\text{EpRchMFp1}^2\text{chL1}^\dagger.P_+.\text{chR2}}{2\text{fpi}^2} +$
$\frac{\text{EpRchMFp1pp1p}^\dagger\text{chL1}^\dagger.P_+.\text{chR2}}{\text{fpi}^2} - \frac{i\sqrt{2}\text{EpRstMFp1pchL1}^\dagger.P_+.\text{stR2}}{\text{fpi}} - \text{EpRchMFchR2}^\dagger.P_-.\text{chL1} + \frac{i\text{EpRchMFp1chR2}^\dagger.P_-.\text{chL1}}{\text{fpi}} +$
$\frac{\text{EpRchMFp1}^2\text{chR2}^\dagger.P_-.\text{chL1}}{2\text{fpi}^2} + \frac{\text{EpRchMFp1pp1p}^\dagger\text{chR2}^\dagger.P_-.\text{chL1}}{\text{fpi}^2} + \frac{i\sqrt{2}\text{EpRchMFp1pchR2}^\dagger.P_-.\text{stL1}}{\text{fpi}} - \text{EpLMFdL0}^\dagger.P_+.\text{dR1} +$
$\frac{i\text{EpLMFp0dL0}^\dagger.P_+.\text{dR1}}{\text{fpi}} + \frac{\text{EpLMFp0}^2\text{dL0}^\dagger.P_+.\text{dR1}}{2\text{fpi}^2} + \frac{\text{EpLMFp0pp0p}^\dagger\text{dL0}^\dagger.P_+.\text{dR1}}{\text{fpi}^2} - \frac{i\sqrt{2}\text{EpLMFp0p}^\dagger\text{dL0}^\dagger.P_+.\text{uR1}}{\text{fpi}} - \text{EpRdoMFdoL1}^\dagger.P_+.\text{doR2} +$
$\frac{i\text{EpRdoMFp1doL1}^\dagger.P_+.\text{doR2}}{\text{fpi}} + \frac{\text{EpRdoMFp1}^2\text{doL1}^\dagger.P_+.\text{doR2}}{2\text{fpi}^2} + \frac{\text{EpRdoMFp1pp1p}^\dagger\text{doL1}^\dagger.P_+.\text{doR2}}{\text{fpi}^2} - \frac{i\sqrt{2}\text{EpRupMFp1p}^\dagger\text{doL1}^\dagger.P_+.\text{upR2}}{\text{fpi}} -$
$\text{EpRdoMFdoR2}^\dagger.P_-.\text{doL1} - \frac{i\text{EpRdoMFp1doR2}^\dagger.P_-.\text{doL1}}{\text{fpi}} + \frac{\text{EpRdoMFp1}^2\text{doR2}^\dagger.P_-.\text{doL1}}{2\text{fpi}^2} + \frac{\text{EpRdoMFp1pp1p}^\dagger\text{doR2}^\dagger.P_-.\text{doL1}}{\text{fpi}^2} +$
$\frac{i\sqrt{2}\text{EpRdoMFp1p}^\dagger\text{doR2}^\dagger.P_-.\text{upL1}}{\text{fpi}} - \text{EpLMFdR1}^\dagger.P_-.\text{dL0} - \frac{i\text{EpLMFp0dR1}^\dagger.P_-.\text{dL0}}{\text{fpi}} + \frac{\text{EpLMFp0}^2\text{dR1}^\dagger.P_-.\text{dL0}}{2\text{fpi}^2} + \frac{\text{EpLMFp0pp0p}^\dagger\text{dR1}^\dagger.P_-.\text{dL0}}{\text{fpi}^2} +$
$\frac{i\sqrt{2}\text{EpLMFp0p}^\dagger\text{dR1}^\dagger.P_-.\text{uL0}}{\text{fpi}} - \frac{i\sqrt{2}\text{EpRchMFp1p}^\dagger\text{stL1}^\dagger.P_+.\text{chR2}}{\text{fpi}} - \text{EpRstMFstL1}^\dagger.P_+.\text{stR2} + \frac{i\text{EpRstMFp1stL1}^\dagger.P_+.\text{stR2}}{\text{fpi}} +$
$\frac{\text{EpRstMFp1}^2\text{stL1}^\dagger.P_+.\text{stR2}}{2\text{fpi}^2} + \frac{\text{EpRstMFp1pp1p}^\dagger\text{stL1}^\dagger.P_+.\text{stR2}}{\text{fpi}^2} + \frac{i\sqrt{2}\text{EpRstMFp1p}^\dagger\text{stR2}^\dagger.P_-.\text{chL1}}{\text{fpi}} - \text{EpRstMFstR2}^\dagger.P_-.\text{stL1} -$
$\frac{i\text{EpRstMFp1stR2}^\dagger.P_-.\text{stL1}}{\text{fpi}} + \frac{\text{EpRstMFp1}^2\text{stR2}^\dagger.P_-.\text{stL1}}{2\text{fpi}^2} + \frac{\text{EpRstMFp1pp1p}^\dagger\text{stR2}^\dagger.P_-.\text{stL1}}{\text{fpi}^2} - \frac{i\sqrt{2}\text{EpRboMFp1ptoL1}^\dagger.P_+.\text{boR2}}{\text{fpi}} -$
$\text{EpRtoMFtoL1}^\dagger.P_+.\text{toR2} - \frac{i\text{EpRtoMFp1toL1}^\dagger.P_+.\text{toR2}}{\text{fpi}} + \frac{\text{EpRtoMFp1}^2\text{toL1}^\dagger.P_+.\text{toR2}}{2\text{fpi}^2} + \frac{\text{EpRtoMFp1pp1p}^\dagger\text{toL1}^\dagger.P_+.\text{toR2}}{\text{fpi}^2} +$
$\frac{i\sqrt{2}\text{EpRtoMFp1ptoR2}^\dagger.P_-.\text{boL1}}{\text{fpi}} - \text{EpRtoMFtoR2}^\dagger.P_-.\text{toL1} + \frac{i\text{EpRtoMFp1toR2}^\dagger.P_-.\text{toL1}}{\text{fpi}} + \frac{\text{EpRtoMFp1}^2\text{toR2}^\dagger.P_-.\text{toL1}}{2\text{fpi}^2} +$

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$$\frac{\text{EpRtoMFp1pp1p}^\dagger\text{toR2}^\dagger.P_-.\text{toL1}}{\text{fpi}^2} - \frac{i\sqrt{2}\,\text{EpLMFp0puL0}^\dagger.P_+.\text{dR1}}{\text{fpi}} - \text{EpLMFuL0}^\dagger.P_+.\text{uR1} - \frac{i\,\text{EpLMFp0uL0}^\dagger.P_+.\text{uR1}}{\text{fpi}} +$$

$$\frac{\text{EpLMFp0}^2\text{uL0}^\dagger.P_+.\text{uR1}}{2\text{fpi}^2} + \frac{\text{EpLMFp0pp0p}^\dagger\text{uL0}^\dagger.P_+.\text{uR1}}{\text{fpi}^2} - \frac{i\sqrt{2}\,\text{EpRdoMFp1pupL1}^\dagger.P_+.\text{doR2}}{\text{fpi}} - \text{EpRupMFupL1}^\dagger.P_+.\text{upR2} -$$

$$\frac{i\,\text{EpRupMFp1upL1}^\dagger.P_+.\text{upR2}}{\text{fpi}} + \frac{\text{EpRupMFp1}^2\text{upL1}^\dagger.P_+.\text{upR2}}{2\text{fpi}^2} + \frac{\text{EpRupMFp1pp1p}^\dagger\text{upL1}^\dagger.P_+.\text{upR2}}{\text{fpi}^2} + \frac{i\sqrt{2}\,\text{EpRupMFp1pupR2}^\dagger.P_-.\text{doL1}}{\text{fpi}} -$$

$$\text{EpRupMFupR2}^\dagger.P_-.\text{upL1} + \frac{i\,\text{EpRupMFp1upR2}^\dagger.P_-.\text{upL1}}{\text{fpi}} + \frac{\text{EpRupMFp1}^2\text{upR2}^\dagger.P_-.\text{upL1}}{2\text{fpi}^2} + \frac{\text{EpRupMFp1pp1p}^\dagger\text{upR2}^\dagger.P_-.\text{upL1}}{\text{fpi}^2} +$$

$$\frac{i\sqrt{2}\,\text{EpLMFp0puR1}^\dagger.P_-.\text{dL0}}{\text{fpi}} - \text{EpLMFuR1}^\dagger.P_-.\text{uL0} + \frac{i\,\text{EpLMFp0uR1}^\dagger.P_-.\text{uL0}}{\text{fpi}} + \frac{\text{EpLMFp0}^2\text{uR1}^\dagger.P_-.\text{uL0}}{2\text{fpi}^2} + \frac{\text{EpLMFp0pp0p}^\dagger\text{uR1}^\dagger.P_-.\text{uL0}}{\text{fpi}^2}$$

4.6 L_{Ghost}

$-\frac{1}{4}\text{fpi}^2 g^2\text{ccghostW03.ghostW03} + \frac{1}{6}g^2\text{p0pp0p}^\dagger\text{ccghostW03.ghostW03} + \frac{1}{4}i\text{fpi}g^2\text{p0pccghostW03.ghostW0m} - \frac{1}{12}g^2\text{p0p0pccghostW03.ghostW0m} - \frac{1}{4}i\text{fpi}g^2\text{p0p}^\dagger\text{ccghostW03.ghostW0p} - \frac{1}{12}g^2\text{p0p0p}^\dagger\text{ccghostW03.ghostW0p} + \frac{1}{4}\text{fpi}^2 gg\text{tccghostW03.ghostW13} - \frac{1}{6}gg\text{tp0pp0p}^\dagger\text{ccghostW03.ghostW13} + \frac{1}{4}i\text{fpi}gg\text{tp0pccghostW03.ghostW1m} + \frac{1}{12}gg\text{tp0p0pccghostW03.ghostW1m} - \frac{1}{4}i\text{fpi}gg\text{tp0p}^\dagger\text{ccghostW03.ghostW1p} + \frac{1}{12}gg\text{tp0p0p}^\dagger\text{ccghostW03.ghostW1p} + \frac{1}{4}i\text{fpi}g^2\text{p0p}^\dagger\text{ccghostW0m.ghostW03} - \frac{1}{12}g^2\text{p0p0p}^\dagger\text{ccghostW0m.ghostW03} - \frac{1}{4}\text{fpi}^2 g^2\text{ccghostW0m.ghostW0m} - \frac{1}{4}i\text{fpi}g^2\text{p0ccghostW0m.ghostW0m} + \frac{1}{12}g^2\text{p0}^2\text{ccghostW0m.ghostW0m} + \frac{1}{12}g^2\text{p0pp0p}^\dagger\text{ccghostW0m.ghostW0m} - \frac{1}{12}g^2\left(\text{p0p}^\dagger\right)^2\text{ccghostW0m.ghostW0p} + \frac{1}{4}i\text{fpi}gg\text{tp0p}^\dagger\text{ccghostW0m.ghostW13} + \frac{1}{12}gg\text{tp0p0p}^\dagger\text{ccghostW0m.ghostW13} + \frac{1}{4}\text{fpi}^2 gg\text{tccghostW0m.ghostW1m} - \frac{1}{4}i\text{fpi}gg\text{tp0ccghostW0m.ghostW1m} - \frac{1}{12}gg\text{tp0}^2\text{ccghostW0m.ghostW1m} - \frac{1}{12}gg\text{tp0pp0p}^\dagger\text{ccghostW0m.ghostW1m} + \frac{1}{12}gg\text{t}\left(\text{p0p}^\dagger\right)^2\text{ccghostW0m.ghostW1p} - \frac{1}{4}i\text{fpi}g^2\text{p0pccghostW0p.ghostW03} - \frac{1}{12}g^2\text{p0p0pccghostW0p.ghostW03} - \frac{1}{12}g^2\text{p0p}^2\text{ccghostW0p.ghostW0m} - \frac{1}{4}\text{fpi}^2 g^2\text{ccghostW0p.ghostW0p} + \frac{1}{4}i\text{fpi}g^2\text{p0ccghostW0p.ghostW0p} + \frac{1}{12}g^2\text{p0}^2\text{ccghostW0p.ghostW0p} + \frac{1}{12}g^2\text{p0pp0p}^\dagger\text{ccghostW0p.ghostW0p} - \frac{1}{4}i\text{fpi}gg\text{tp0pccghostW0p.ghostW13} + \frac{1}{12}gg\text{tp0p0pccghostW0p.ghostW13} + \frac{1}{12}gg\text{tp0p}^2\text{ccghostW0p.ghostW1m} + \frac{1}{4}\text{fpi}^2 gg\text{tccghostW0p.ghostW1p} + \frac{1}{4}i\text{fpi}gg\text{tp0ccghostW0p.ghostW1p} - \frac{1}{12}gg\text{tp0}^2\text{ccghostW0p.ghostW1p} - \frac{1}{12}gg\text{tp0pp0p}^\dagger\text{ccghostW0p.ghostW1p} + \frac{1}{4}\text{fpi}^2 gg\text{tccghostW13.ghostW03} - \frac{1}{6}gg\text{tp0pp0p}^\dagger\text{ccghostW13.ghostW03} - \frac{1}{4}i\text{fpi}gg\text{tp0pccghostW13.ghostW0m} + \frac{1}{12}gg\text{tp0p0pccghostW13.ghostW0m} + \frac{1}{4}i\text{fpi}gg\text{tp0p}^\dagger\text{ccghostW13.ghostW0p} + \frac{1}{12}gg\text{tp0p0p}^\dagger\text{ccghostW13.ghostW0p} - \frac{1}{2}\text{fpi}^2 g\text{t}^2\text{ccghostW13.ghostW13} + \frac{1}{6}g\text{t}^2\text{p0pp0p}^\dagger\text{ccghostW13.ghostW13} + \frac{1}{6}g\text{t}^2\text{p1pp1p}^\dagger\text{ccghostW13.ghostW13} - \frac{1}{4}i\text{fpi}g\text{t}^2\text{p0pccghostW13.ghostW1m} - \frac{1}{12}g\text{t}^2\text{p0p0pccghostW13.ghostW1m} + \frac{1}{4}i\text{fpi}g\text{t}^2\text{p1pccghostW13.ghostW1m} - \frac{1}{12}g\text{t}^2\text{p1p1pccghostW13.ghostW1m} + \frac{1}{4}i\text{fpi}g\text{t}^2\text{p0p}^\dagger\text{ccghostW13.ghostW1p} - \frac{1}{12}g\text{t}^2\text{p0p0p}^\dagger\text{ccghostW13.ghostW1p} - \frac{1}{4}i\text{fpi}g\text{t}^2\text{p1p}^\dagger\text{ccghostW13.ghostW1p} - \frac{1}{12}g\text{t}^2\text{p1p1p}^\dagger\text{ccghostW13.ghostW1p} + \frac{1}{4}\text{fpi}^2 g\text{pgtccghostW13.ghostW23} - \frac{1}{6}g\text{pgtp1pp1p}^\dagger\text{ccghostW13.ghostW23} - \frac{1}{4}i\text{fpi}gg\text{tp0p}^\dagger\text{ccghostW1m.ghostW03} + \frac{1}{12}gg\text{tp0p0p}^\dagger\text{ccghostW1m.ghostW03} + \frac{1}{4}\text{fpi}^2 gg\text{tccghostW1m.ghostW0m} + \frac{1}{4}i\text{fpi}gg\text{tp0ccghostW1m.ghostW0m} - \frac{1}{12}gg\text{tp0}^2\text{ccghostW1m.ghostW0m} - \frac{1}{12}gg\text{tp0pp0p}^\dagger\text{ccghostW1m.ghostW0m} + \frac{1}{12}gg\text{t}\left(\text{p0p}^\dagger\right)^2\text{ccghostW1m.ghostW0p} - \frac{1}{4}i\text{fpi}g\text{t}^2\text{p0p}^\dagger\text{ccghostW1m.ghostW13} - \frac{1}{12}g\text{t}^2\text{p0p0p}^\dagger\text{ccghostW1m.ghostW13} + \frac{1}{4}i\text{fpi}g\text{t}^2\text{p1p}^\dagger\text{ccghostW1m.ghostW13} - \frac{1}{12}g\text{t}^2\text{p1p1p}^\dagger\text{ccghostW1m.ghostW13} - \frac{1}{2}\text{fpi}^2 g\text{t}^2\text{ccghostW1m.ghostW1m} + \frac{1}{4}i\text{fpi}g\text{t}^2\text{p0ccghostW1m.ghostW1m} + \frac{1}{12}g\text{t}^2\text{p0}^2\text{ccghostW1m.ghostW1m} + \frac{1}{12}g\text{t}^2\text{p0pp0p}^\dagger\text{ccghostW1m.ghostW1m} - \frac{1}{4}i\text{fpi}g\text{t}^2\text{p1ccghostW1m.ghostW1m} + \frac{1}{12}g\text{t}^2\text{p1}^2\text{ccghostW1m.ghostW1m} + \frac{1}{12}g\text{t}^2\text{p1pp1p}^\dagger\text{ccghostW1m.ghostW1m} - \frac{1}{12}g\text{t}^2\left(\text{p0p}^\dagger\right)^2\text{ccghostW1m.ghostW1p} - \frac{1}{12}g\text{t}^2\left(\text{p1p}^\dagger\right)^2\text{ccghostW1m.ghostW1p} + \frac{1}{4}i\text{fpi}g\text{pgtp1p}^\dagger\text{ccghostW1m.ghostW23} + \frac{1}{12}g\text{pgtp1p1p}^\dagger\text{ccghostW1m.ghostW23} + \frac{1}{4}i\text{fpi}gg\text{tp0pccghostW1p.ghostW03} + \frac{1}{12}gg\text{tp0p0pccghostW1p.ghostW03} + \frac{1}{12}gg\text{tp0p}^2\text{ccghostW1p.ghostW0m} + \frac{1}{4}\text{fpi}^2 gg\text{tccghostW1p.ghostW0p} - \frac{1}{4}i\text{fpi}gg\text{tp0ccghostW1p.ghostW0p} - \frac{1}{12}gg\text{tp0}^2\text{ccghostW1p.ghostW0p} - \frac{1}{12}gg\text{tp0pp0p}^\dagger\text{ccghostW1p.ghostW0p} + \frac{1}{4}i\text{fpi}g\text{t}^2\text{p0pccghostW1p.ghostW13} - \frac{1}{12}g\text{t}^2\text{p0p0pccghostW1p.ghostW13} - \frac{1}{4}i\text{fpi}g\text{t}^2\text{p1pccghostW1p.ghostW13} - \frac{1}{12}g\text{t}^2\text{p1p1pccghostW1p.ghostW13} - \frac{1}{12}g\text{t}^2\text{p0p}^2\text{ccghostW1p.ghostW1m} - \frac{1}{12}g\text{t}^2\text{p1p}^2\text{ccghostW1p.ghostW1m} - \frac{1}{2}\text{fpi}^2 g\text{t}^2\text{ccghostW1p.ghostW1p} - \frac{1}{4}i\text{fpi}g\text{t}^2\text{p0ccghostW1p.ghostW1p} + \frac{1}{12}g\text{t}^2\text{p0}^2\text{ccghostW1p.ghostW1p} + \frac{1}{12}g\text{t}^2\text{p0pp0p}^\dagger\text{ccghostW1p.ghostW1p} + \frac{1}{4}i\text{fpi}g\text{t}^2\text{p1ccghostW1p.ghostW1p} + \frac{1}{12}g\text{t}^2\text{p1}^2\text{ccghostW1p.ghostW1p} + \frac{1}{12}g\text{t}^2\text{p1pp1p}^\dagger\text{ccghostW1p.ghostW1p} - \frac{1}{4}i\text{fpi}g\text{pgtp1pccghostW1p.ghostW23} + \frac{1}{12}g\text{pgtp1p1pccghostW1p.ghostW23} + \frac{1}{4}\text{fpi}^2 g\text{pgtccghostW23.ghostW13} - \frac{1}{6}g\text{pgtp1pp1p}^\dagger\text{ccghostW23.ghostW13} - \frac{1}{4}i\text{fpi}g\text{pgtp1pccghostW23.ghostW1m} + \frac{1}{12}g\text{pgtp1p1pccghostW23.ghostW1m} + \frac{1}{4}i\text{fpi}g\text{pgtp1p}^\dagger\text{ccghostW23.ghostW1p} + \frac{1}{12}g\text{pgtp1p1p}^\dagger\text{ccghostW23.ghostW1p} - \frac{1}{4}\text{fpi}^2 g\text{p}^2\text{ccghostW23.ghostW23} + \frac{1}{6}g\text{p}^2\text{p1pp1p}^\dagger\text{ccghostW23.ghostW23} - g\text{pghW23}^\dagger.\partial_\mu[\text{W23BRST}[\mu]] - \text{ghG}_a^\dagger.\partial_\mu\left[\partial_\mu[\text{ghG}_a]\right] - \text{ghW0}_a^\dagger.\partial_\mu\left[\partial_\mu[\text{ghW0}_a]\right] - \text{ghW1}_a^\dagger.\partial_\mu\left[\partial_\mu[\text{ghW1}_a]\right] - g\partial_\mu\left[\text{W0}_{\mu,\text{c}\$6000}\right]\text{ghW0}_a^\dagger.\text{ghW0}_{\text{b}\$6000}\text{ep0}_{a,\text{b}\$6000,\text{c}\$6000} - g\text{t}\partial_\mu\left[\text{W1}_{\mu,\text{c}\$6001}\right]\text{ghW1}_a^\dagger.\text{ghW1}_{\text{b}\$6001}\text{ep1}_{a,\text{b}\$6001,\text{c}\$6001} - g\text{s}\partial_\mu\left[G_{\mu,\text{c}\$5999}\right]\text{ghG}_a^\dagger.\text{ghG}_{\text{b}\$5999}f_{a,\text{b}\$5999,\text{c}\$5999} - g\text{sghG}_a^\dagger.\partial_\mu\left[\text{ghG}_{\text{b}\$5999}\right]f_{a,\text{b}\$5999,\text{c}\$5999}G_{\mu,\text{c}\$5999} - g\text{ghW0}_a^\dagger.\partial_\mu\left[\text{ghW0}_{\text{b}\$6000}\right]\text{ep0}_{a,\text{b}\$6000,\text{c}\$6000}\text{W0}_{\mu,\text{c}\$6000} - g\text{tghW1}_a^\dagger.\partial_\mu\left[\text{ghW1}_{\text{b}\$6001}\right]\text{ep1}_{a,\text{b}\$6001,\text{c}\$6001}\text{W1}_{\mu,\text{c}\$6001}$

5 Parameters

In this section, we describe the parameters of our model implementation.

5.1 External Parameters

In this subsection, we describe the external parameters of our model. The details of the external parameters can be found in

P	C	I	V	D	PN	BN	OB	IO	Description
αEWM1	F		127.9		aEWM1	SMINPUTS		QED, -2	alpha EM inverse at the Z pole.
Gf	F		0.0000116637			SMINPUTS		QED, 2	Fermi constant. Not used in this implementation, but may be used by some Monte Carlos.
αS	F		0.1172		aS	SMINPUTS		QCD, 2	Strong coupling constant at the Z pole
ZM	F		91.1876			SMINPUTS			Z pole. The Z mass is set separately as MZ. This parameter is not used in this implementation, but may be used by some Monte Carlos.
MF	F		4000.						Heavy Dirac mass

Table 12: Details of external parameters. The headers are as follows: P = parameter, C = complex, I = indices, V = value, D = definition, PN = parameter name, BN = block name, OB = order block, and IO = interaction order.

Table 12.

5.2 Internal Parameters

In this subsection, we describe the internal parameters of our model.   The details of the internal parameters can be found

P	C	I	V	NV	D	PN	IO	Description
gs	F		Eq. 2	1.21358		G	QCD, 1	Strong coupling constant at the Z pole
αEW	F		Eq. 3	0.00781861		aEW	QED, 2	
EE	F		Eq. 4	0.313451			QED, 1	Electromagnetic coupling constant
cM	F		Eq. 5	0.881677				Ratio of masses of W and Z
sM	F		Eq. 6	0.471854				weak mixing angle (Sqrt[1-MW$\hat{2}$/MZ$\hat{2}$])
RM	F		Eq. 7	0.160796				Ratio of masses
x	F		Eq. 8	0.33062				g/gtilde
t	F		Eq. 9	0.515755				gprime/g
EpL	F		Eq. 10	0.236954				Ideal Delocalization
g	F		Eq. 11	0.691631		g0	QED, 1	g
gp	F		Eq. 12	0.356712			QED, 1	gprime
gt	F		Eq. 13	2.09192			QED, 1	gtilde
fpi	F		Eq. 14	333.371				decay constant
EpRnu	F			0.	EpRnu $\to$ 0			EpR for neutrinos
EpRel	F			0.	EpRel $\to$ 0			EpR for electron
EpRup	F			0.	EpRup $\to$ 0			EpR for up quark
EpRdo	F			0.	EpRdo $\to$ 0			EpR for down quark
EpRmu	F		Eq. 19	0.000114607				EpR for muon
EpRta	F		Eq. 20	0.00192675				EpR for tauon
EpRch	F		Eq. 21	0.00137702				EpR for charm quark
EpRst	F		Eq. 22	0.000112764				EpR for strange quark
EpRto	F		Eq. 23	0.188568				EpR for top quark
EpRbo	F		Eq. 24	0.00455398				EpR for bottom quark
MZP	F		Eq. 25	501.681				Mass of Z prime
MhNu	F		Eq. 26	4110.76				mass of the heavy Neutrino

Table 13: Details of internal parameters. The headers are as follows: P = parameter, C = complex, I = Indices, V = value, NV = numerical value, D = definition, PN = parameter name, and IO = interaction order.

in Tables 13, 14, 15, 16, 17, 18. The values and definitions of the internal parameters will be written below.

$$gs = 2\sqrt{\pi}\sqrt{\alpha S} \tag{2}$$

$$\alpha EW = \frac{1}{\alpha EWM1} \tag{3}$$

$$EE = 2\sqrt{\pi}\sqrt{\alpha EW} \tag{4}$$

$$cM = \frac{MW}{MZ} \tag{5}$$

$$sM = \sqrt{1 - cM^2} \tag{6}$$

P	C	I	V	NV	D	PN	IO	Description
MhEl	F		Eq. 27	4110.76				mass of the heavy Electron
MhMu	F		Eq. 28	4110.76				mass of the heavy Muon
MhTa	F		Eq. 29	4110.77				mass of the heavy Tauon
MhUp	F		Eq. 30	4110.76				mass of the heavy Up quark
MhDo	F		Eq. 31	4110.76				mass of the heavy Down quark
MhCh	F		Eq. 32	4110.76				mass of the heavy Charm quark
MhSt	F		Eq. 33	4110.76				mass of the heavy St quark
MhTo	F		Eq. 34	4175.88				mass of the heavy Top quark
MhBo	F		Eq. 35	4110.8				mass of the heavy Bottom quark
v0g	F		Eq. 36	0.453206	$v0g \to \frac{EE}{g}$			photon at site 0
v1g	F		Eq. 37	0.149839	$v1g \to \frac{EE}{gt}$			photon at site 1
v2g	F		Eq. 38	0.878722	$v2g \to \frac{EE}{gp}$			photon at site 2
v0Z	F		Eq. 39	0.875867				Z at site 0
v1Z	F		Eq. 40	0.108406				Z at site 1
v2Z	F		Eq. 41	-0.470218				Z at site 2
v0ZP	F		Eq. 42	-0.165716				Zp at site 0
v1ZP	F		Eq. 43	0.982749				Zp at site 1
v2ZP	F		Eq. 44	-0.0821088				Zp at site 2
v0W	F		Eq. 45	0.985884				W at site 0
v1W	F		Eq. 46	0.167427				W at site 1
v0WP	F		Eq. 47	-0.167427				Wp at site 0
v1WP	F		Eq. 48	0.985884				Wp at site 1
Npi	F		Eq. 49	0.23057				Charged Goldstone Boson normalization constant
v0pi	F		Eq. 50	0.687541				Charged Goldstone Boson at site 0
v1pi	F		Eq. 51	0.726145				Charged Goldstone Boson at site 1

Table 14: Details of internal parameters. The headers are as follows: P = parameter, C = complex, I = Indices, V = value, NV = numerical value, D = definition, PN = parameter name, and IO = interaction order.

$$RM = \frac{MW}{MWP} \tag{7}$$

$$x = \frac{1 + RM^2 - \sqrt{1 - 6RM^2 + RM^4}}{2RM} \tag{8}$$

$$t = \frac{\sqrt{-\frac{(-1+cM^2)\left(2cM^4(x^2+x^4)+x^2\left(2+x^2-\sqrt{4+x^4}\right)+cM^2\left(-x^6+2x^2\left(-4+\sqrt{4+x^4}\right)+x^4\left(-4+\sqrt{4+x^4}\right)+2\left(-2+\sqrt{4+x^4}\right)\right)\right)}{cM^2x^2\left(x^2+cM^4(1+x^2)^2-cM^2(2+3x^2+x^4)\right)}}}{\sqrt{2}} \tag{9}$$

$$EpL = \frac{\sqrt{2}x}{\sqrt{2 - x^2 + \sqrt{4 + x^4}}} \tag{10}$$

$$g = EE\sqrt{1 + \frac{1}{t^2} + x^2} \tag{11}$$

P	C	I	V	NV	D	PN	IO	Description
v0piP	F		Eq. 52	−0.726145				Heavy Charged Goldstone Boson at site 0
v1piP	F			0.687541				Heavy Charged Goldstone Boson at site 1
Npi0	F		Eq. 54	0.261513				Neutral Goldstone Boson normalization constant
v0pi0	F		Eq. 55	0.69279				Neutral Goldstone Boson at site 0
v1pi0	F		Eq. 56	0.721139				Neutral Goldstone Boson at site 1
v0pi0P	F		Eq. 57	−0.721139				Heavy Neutral Goldstone Boson at site 0
v1pi0P	F			0.69279				Heavy Neutral Goldstone Boson at site 1
vL0nu	F		Eq. 59	−0.973056				Left neutrino at site 0
vL0el	F		Eq. 60	−0.973056				Left electron at site 0
vL0mu	F		Eq. 61	−0.973056				Left muon at site 0
vL0ta	F		Eq. 62	−0.973056				Left tauon at site 0
vL0up	F		Eq. 63	−0.973056				Left up quark at site 0
vL0do	F		Eq. 64	−0.973056				Left down quark at site 0
vL0ch	F		Eq. 65	−0.973056				Left charm quark at site 0
vL0st	F		Eq. 66	−0.973056				Left strange quark at site 0
vL0to	F		Eq. 67	−0.97472				Left top quark at site 0
vL0bo	F		Eq. 68	−0.973057				Left bottom quark at site 0
vL1nu	F		Eq. 69	0.23057				Left neutrino at site 1
vL1el	F		Eq. 70	0.23057				Left electron at site 1
vL1mu	F		Eq. 71	0.23057				Left muon at site 1
vL1ta	F		Eq. 72	0.230569				Left tauon at site 1

Table 15: Details of internal parameters. The headers are as follows: P = parameter, C = complex, I = Indices, V = value, NV = numerical value, D = definition, PN = parameter name, and IO = interaction order.

$$gp = EE\sqrt{1 + t^2 + t^2 x^2} \tag{12}$$

$$gt = EE\sqrt{1 + \frac{1}{x^2} + \frac{1}{t^2 x^2}} \tag{13}$$

$$fpi = \frac{2\sqrt{2}MW}{gt\sqrt{2 + x^2 - \sqrt{4 + x^4}}} \tag{14}$$

$$EpRnu = 0 \tag{15}$$

$$EpRel = 0 \tag{16}$$

$$EpRup = 0 \tag{17}$$

$$EpRdo = 0 \tag{18}$$

P	C	I	V	NV	D	PN	IO	Description
vL1up	F		Eq. 73	0.23057				Left up quark at site 1
vL1do	F		Eq. 74	0.23057				Left down quark at site 1
vL1ch	F		Eq. 75	0.230569				Left charm quark at site 1
vL1st	F		Eq. 76	0.23057				Left strange quark at site 1
vL1to	F		Eq. 77	0.223429				Left top quark at site 1
vL1bo	F		Eq. 78	0.230565				Left bottom quark at site 1
vR1nu	F			0.	vR1nu $\to$ 0			Right neutrino at site 1
vR1el	F			0.	vR1el $\to$ 0			Right electron at site 1
vR1up	F			0.	vR1up $\to$ 0			Right up quark at site 1
vR1do	F			0.	vR1do $\to$ 0			Right down quark at site 1
vR1mu	F		Eq. 83	-0.000108515				Right muon at site 1
vR1ta	F		Eq. 84	-0.00182432				Right tauon at site 1
vR1ch	F		Eq. 85	-0.00130382				Right charm quark at site 1
vR1st	F		Eq. 86	-0.000106769				Right strange quark at site 1
vR1to	F		Eq. 87	-0.176059				Right top quark at site 1
vR1bo	F		Eq. 88	-0.00431184				Right bottom quark at site 1
vR2nu	F			1.	vR2nu $\to$ 1			Right neutrino at site 2
vR2el	F			1.	vR2el $\to$ 1			Right electron at site 2
vR2up	F			1.	vR2up $\to$ 1			Right up quark at site 2
vR2do	F			1.	vR2do $\to$ 1			Right down quark at site 2
vR2mu	F		Eq. 93	1.				Right muon at site 2
vR2ta	F		Eq. 94	0.999998				Right tauon at site 2
vR2ch	F		Eq. 95	0.999999				Right charm quark at site 2
vR2st	F		Eq. 96	1.				Right strange quark at site 2
vR2to	F		Eq. 97	0.98438				Right top quark at site 2
vR2bo	F		Eq. 98	0.999991				Right bottom quark at site 2
vL0hNu	F		Eq. 99	-0.23057				Left Neutrino at site 0
vL0hEl	F		Eq. 100	-0.23057				Left Electron at site 0

Table 16: Details of internal parameters. The headers are as follows: P = parameter, C = complex, I = Indices, V = value, NV = numerical value, D = definition, PN = parameter name, and IO = interaction order.

$$EpRmu = \sqrt{\frac{mmu^2 \left(-MF^2 - EpL^2 MF^2 + mmu^2\right)}{MF^2 \left(-EpL^2 MF^2 + mmu^2\right)}} \tag{19}$$

$$EpRta = \sqrt{\frac{mta^2 \left(-MF^2 - EpL^2 MF^2 + mta^2\right)}{MF^2 \left(-EpL^2 MF^2 + mta^2\right)}} \tag{20}$$

$$EpRch = \sqrt{\frac{mch^2 \left(mch^2 - MF^2 - EpL^2 MF^2\right)}{MF^2 \left(mch^2 - EpL^2 MF^2\right)}} \tag{21}$$

$$EpRst = \sqrt{\frac{mst^2 \left(-MF^2 - EpL^2 MF^2 + mst^2\right)}{MF^2 \left(-EpL^2 MF^2 + mst^2\right)}} \tag{22}$$

$$EpRto = \sqrt{\frac{mto^2 \left(-MF^2 - EpL^2 MF^2 + mto^2\right)}{MF^2 \left(-EpL^2 MF^2 + mto^2\right)}} \tag{23}$$

P	C	I	V	NV	D	PN	IO	Description
vL0hMu	F		Eq. 101	−0.23057				Left Muon at site 0
vL0hTa	F		Eq. 102	−0.230569				Left Tauon at site 0
vL0hUp	F		Eq. 103	−0.23057				Left Up quark at site 0
vL0hDo	F		Eq. 104	−0.23057				Left Down quark at site 0
vL0hCh	F		Eq. 105	−0.230569				Left Charm quark at site 0
vL0hSt	F		Eq. 106	−0.23057				Left Strange quark at site 0
vL0hTo	F		Eq. 107	−0.223429				Left Top quark at site 0
vL0hBo	F		Eq. 108	−0.230565				Left Bottom quark at site 0
vL1hNu	F		Eq. 109	−0.973056				Left Neutrino at site 1
vL1hEl	F		Eq. 110	−0.973056				Left Electron at site 1
vL1hMu	F		Eq. 111	−0.973056				Left Muon at site 1
vL1hTa	F		Eq. 112	−0.973056				Left Tauon at site 1
vL1hUp	F		Eq. 113	−0.973056				Left Up quark at site 1
vL1hDo	F		Eq. 114	−0.973056				Left Down quark at site 1
vL1hCh	F		Eq. 115	−0.973056				Left Charm quark at site 1
vL1hSt	F		Eq. 116	−0.973056				Left Strange quark at site 1
vL1hTo	F		Eq. 117	−0.97472				Left Top quark at site 1
vL1hBo	F		Eq. 118	−0.973057				Left Bottom quark at site 1
vR1hNu	F			−1.	vR1hNu → −1			Right Neutrino at site 1
vR1hEl	F			−1.	vR1hEl → −1			Right Electron at site 1
vR1hUp	F			−1.	vR1hUp → −1			Right Up quark at site 1
vR1hDo	F			−1.	vR1hDo → −1			Right Down quark at site 1
vR1hMu	F		Eq. 123	−1.				Right Muon at site 1
vR1hTa	F		Eq. 124	−0.999998				Right Tauon at site 1
vR1hCh	F		Eq. 125	−0.999999				Right Charm quark at site 1
vR1hSt	F		Eq. 126	−1.				Right Strange quark at site 1
vR1hTo	F		Eq. 127	−0.98438				Right Top quark at site 1
vR1hBo	F		Eq. 128	−0.999991				Right Bottom quark at site 1

Table 17: Details of internal parameters. The headers are as follows: P = parameter, C = complex, I = Indices, V = value, NV = numerical value, D = definition, PN = parameter name, and IO = interaction order.

$$\text{EpRbo} = \sqrt{\frac{\text{mbo}^2 \left(\text{mbo}^2 - \text{MF}^2 - \text{EpL}^2\text{MF}^2\right)}{\text{MF}^2 \left(\text{mbo}^2 - \text{EpL}^2\text{MF}^2\right)}} \tag{24}$$

$$\text{MZP} = \frac{\text{MWP}\sqrt{2 + x^2 + t^2x^2 + \sqrt{4 + x^4 - 2t^2x^4 + t^4x^4}}}{\sqrt{2 + x^2 + \sqrt{4 + x^4}}} \tag{25}$$

$$\text{MhNu} = \frac{\sqrt{1 + \text{EpL}^2 + \sqrt{1 + 2\text{EpL}^2 + \text{EpL}^4}}\text{MF}}{\sqrt{2}} \tag{26}$$

$$\text{MhEl} = \frac{\sqrt{1 + \text{EpL}^2 + \sqrt{1 + 2\text{EpL}^2 + \text{EpL}^4}}\text{MF}}{\sqrt{2}} \tag{27}$$

$$\text{MhMu} = \frac{\sqrt{1 + \text{EpL}^2 + \text{EpRmu}^2 + \sqrt{1 + 2\text{EpL}^2 + \text{EpL}^4 + 2\text{EpRmu}^2 - 2\text{EpL}^2\text{EpRmu}^2 + \text{EpRmu}^4}}\text{MF}}{\sqrt{2}} \tag{28}$$

P	C	I	V	NV	D	PN	IO	Description
vR2hNu	F			0.	vR2hNu → 0			Right Neutrino at site 2
vR2hEl	F			0.	vR2hEl → 0			Right Electron at site 2
vR2hUp	F			0.	vR2hUp → 0			Right Up quark at site 2
vR2hDo	F			0.	vR2hDo → 0			Right Down quark at site 2
vR2hMu	F		Eq. 133	−0.000108515				Right Muon at site 2
vR2hTa	F		Eq. 134	−0.00182432				Right Tauon at site 2
vR2hCh	F		Eq. 135	−0.00130382				Right Charm quark at site 2
vR2hSt	F		Eq. 136	−0.000106769				Right Strange quark at site 2
vR2hTo	F		Eq. 137	−0.176059				Right Top quark at site 2
vR2hBo	F		Eq. 138	−0.00431184				Right Bottom quark at site 2

Table 18: Details of internal parameters. The headers are as follows: P = parameter, C = complex, I = Indices, V = value, NV = numerical value, D = definition, PN = parameter name, and IO = interaction order.

$$\text{MhTa} = \frac{\sqrt{1 + \text{EpL}^2 + \text{EpRta}^2 + \sqrt{1 + 2\text{EpL}^2 + \text{EpL}^4 + 2\text{EpRta}^2 - 2\text{EpL}^2\text{EpRta}^2 + \text{EpRta}^4}}\text{MF}}{\sqrt{2}} \tag{29}$$

$$\text{MhUp} = \frac{\sqrt{1 + \text{EpL}^2 + \sqrt{1 + 2\text{EpL}^2 + \text{EpL}^4}}\text{MF}}{\sqrt{2}} \tag{30}$$

$$\text{MhDo} = \frac{\sqrt{1 + \text{EpL}^2 + \sqrt{1 + 2\text{EpL}^2 + \text{EpL}^4}}\text{MF}}{\sqrt{2}} \tag{31}$$

$$\text{MhCh} = \frac{\sqrt{1 + \text{EpL}^2 + \text{EpRch}^2 + \sqrt{1 + 2\text{EpL}^2 + \text{EpL}^4 + 2\text{EpRch}^2 - 2\text{EpL}^2\text{EpRch}^2 + \text{EpRch}^4}}\text{MF}}{\sqrt{2}} \tag{32}$$

$$\text{MhSt} = \frac{\sqrt{1 + \text{EpL}^2 + \text{EpRst}^2 + \sqrt{1 + 2\text{EpL}^2 + \text{EpL}^4 + 2\text{EpRst}^2 - 2\text{EpL}^2\text{EpRst}^2 + \text{EpRst}^4}}\text{MF}}{\sqrt{2}} \tag{33}$$

$$\text{MhTo} = \frac{\sqrt{1 + \text{EpL}^2 + \text{EpRto}^2 + \sqrt{1 + 2\text{EpL}^2 + \text{EpL}^4 + 2\text{EpRto}^2 - 2\text{EpL}^2\text{EpRto}^2 + \text{EpRto}^4}}\text{MF}}{\sqrt{2}} \tag{34}$$

$$\text{MhBo} = \frac{\sqrt{1 + \text{EpL}^2 + \text{EpRbo}^2 + \sqrt{1 + 2\text{EpL}^2 + \text{EpL}^4 + 2\text{EpRbo}^2 - 2\text{EpL}^2\text{EpRbo}^2 + \text{EpRbo}^4}}\text{MF}}{\sqrt{2}} \tag{35}$$

$$\text{v0g} = \frac{t}{\sqrt{1 + t^2 (1 + x^2)}} \tag{36}$$

$$\text{v1g} = \frac{tx}{\sqrt{1 + t^2 (1 + x^2)}} \tag{37}$$

$$\text{v2g} = \frac{1}{\sqrt{1 + t^2 (1 + x^2)}} \tag{38}$$

$$\text{v0Z} = \frac{\left(-1 + t^2\right) x^2 + \sqrt{4 + \left(-1 + t^2\right)^2 x^4}}{t\sqrt{4 + \frac{\left(-2 + \left(-1+t^2\right)x^2 + \sqrt{4 + \left(-1+t^2\right)^2 x^4}\right)^2}{t^2 x^2} + \frac{\left(\left(-1+t^2\right)x^2 + \sqrt{4 + \left(-1+t^2\right)^2 x^4}\right)^2}{t^2}}} \tag{39}$$

$$v1Z = -\frac{-2 + \left(-1 + t^2\right) x^2 + \sqrt{4 + \left(-1 + t^2\right)^2 x^4}}{\sqrt{2}\sqrt{4 + \left(-1 + t^2\right)^2 x^6 - 2\sqrt{4 + \left(-1 + t^2\right)^2 x^4} + \left(-1 + t^2\right) x^4 \left(-1 + t^2 + \sqrt{4 + \left(-1 + t^2\right)^2 x^4}\right) + x^2 \left(4 - \sqrt{4 + \left(-1 + t^2\right)^2 x}\right.}} \tag{40}$$

$$v2Z = -\frac{2}{\sqrt{4 + \frac{\left(-2 + \left(-1 + t^2\right)x^2 + \sqrt{4 + \left(-1 + t^2\right)^2 x^4}\right)^2}{t^2 x^2} + \frac{\left(\left(-1 + t^2\right)x^2 + \sqrt{4 + \left(-1 + t^2\right)^2 x^4}\right)^2}{t^2}}} \tag{41}$$

$$v0ZP = \frac{\left(-1 + t^2\right) x^2 - \sqrt{4 + \left(-1 + t^2\right)^2 x^4}}{t\sqrt{4 + \frac{\left(-\left(-1 + t^2\right)x^2 + \sqrt{4 + \left(-1 + t^2\right)^2 x^4}\right)^2}{t^2} + \frac{\left(2 - \left(-1 + t^2\right)x^2 + \sqrt{4 + \left(-1 + t^2\right)^2 x^4}\right)^2}{t^2 x^2}}} \tag{42}$$

$$v1ZP = \frac{2 - \left(-1 + t^2\right) x^2 + \sqrt{4 + \left(-1 + t^2\right)^2 x^4}}{tx\sqrt{4 + \frac{\left(-\left(-1 + t^2\right)x^2 + \sqrt{4 + \left(-1 + t^2\right)^2 x^4}\right)^2}{t^2} + \frac{\left(2 - \left(-1 + t^2\right)x^2 + \sqrt{4 + \left(-1 + t^2\right)^2 x^4}\right)^2}{t^2 x^2}}} \tag{43}$$

$$v2ZP = -\frac{2}{\sqrt{4 + \frac{\left(-\left(-1 + t^2\right)x^2 + \sqrt{4 + \left(-1 + t^2\right)^2 x^4}\right)^2}{t^2} + \frac{\left(2 - \left(-1 + t^2\right)x^2 + \sqrt{4 + \left(-1 + t^2\right)^2 x^4}\right)^2}{t^2 x^2}}} \tag{44}$$

$$v0W = \frac{2 - x^2 + \sqrt{4 + x^4}}{\sqrt{2}\sqrt{4 + x^4 + 2\sqrt{4 + x^4} - x^2\sqrt{4 + x^4}}} \tag{45}$$

$$v1W = \frac{1}{\sqrt{1 + \frac{\left(2 - x^2 + \sqrt{4 + x^4}\right)^2}{4x^2}}} \tag{46}$$

$$v0WP = -\frac{-2 + x^2 + \sqrt{4 + x^4}}{2x\sqrt{1 + \frac{\left(-2 + x^2 + \sqrt{4 + x^4}\right)^2}{4x^2}}} \tag{47}$$

$$v1WP = \frac{1}{\sqrt{1 + \frac{\left(-2 + x^2 + \sqrt{4 + x^4}\right)^2}{4x^2}}} \tag{48}$$

$$Npi = \sqrt{v1W^2 + \left(-v1W + v0Wx\right)^2} \tag{49}$$

$$v0pi = \frac{-v1W + v0Wx}{Npi} \tag{50}$$

$$v1pi = \frac{v1W}{Npi} \tag{51}$$

$$v0piP = -v1pi \tag{52}$$

$$v1piP = v0pi \tag{53}$$

$$Npi0 = \sqrt{\left(-v1Z + v0Zx\right)^2 + \left(v1Z - tv2Zx\right)^2} \tag{54}$$

$$v0pi0 = \frac{-v1Z + v0Zx}{Npi0} \tag{55}$$

$$v1pi0 = \frac{v1Z - tv2Zx}{Npi0} \tag{56}$$

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$$v0pi0P = -v1pi0 \tag{57}$$

$$v1pi0P = v0pi0 \tag{58}$$

$$vL0nu = -\frac{1 - EpL^2 + \sqrt{1 + 2EpL^2 + EpL^4}}{2EpL\sqrt{1 + \frac{\left(1 - EpL^2 + \sqrt{1 + 2EpL^2 + EpL^4}\right)^2}{4EpL^2}}} \tag{59}$$

$$vL0el = -\frac{1 - EpL^2 + \sqrt{1 + 2EpL^2 + EpL^4}}{2EpL\sqrt{1 + \frac{\left(1 - EpL^2 + \sqrt{1 + 2EpL^2 + EpL^4}\right)^2}{4EpL^2}}} \tag{60}$$

$$vL0mu = -\frac{1 - EpL^2 + EpRmu^2 + \sqrt{EpL^4 - 2EpL^2\left(-1 + EpRmu^2\right) + \left(1 + EpRmu^2\right)^2}}{2EpL\sqrt{1 + \frac{\left(1 - EpL^2 + EpRmu^2 + \sqrt{EpL^4 - 2EpL^2(-1 + EpRmu^2) + (1 + EpRmu^2)^2}\right)^2}{4EpL^2}}} \tag{61}$$

$$vL0ta = -\frac{1 - EpL^2 + EpRta^2 + \sqrt{EpL^4 - 2EpL^2\left(-1 + EpRta^2\right) + \left(1 + EpRta^2\right)^2}}{2EpL\sqrt{1 + \frac{\left(1 - EpL^2 + EpRta^2 + \sqrt{EpL^4 - 2EpL^2(-1 + EpRta^2) + (1 + EpRta^2)^2}\right)^2}{4EpL^2}}} \tag{62}$$

$$vL0up = -\frac{1 - EpL^2 + \sqrt{1 + 2EpL^2 + EpL^4}}{2EpL\sqrt{1 + \frac{\left(1 - EpL^2 + \sqrt{1 + 2EpL^2 + EpL^4}\right)^2}{4EpL^2}}} \tag{63}$$

$$vL0do = -\frac{1 - EpL^2 + \sqrt{1 + 2EpL^2 + EpL^4}}{2EpL\sqrt{1 + \frac{\left(1 - EpL^2 + \sqrt{1 + 2EpL^2 + EpL^4}\right)^2}{4EpL^2}}} \tag{64}$$

$$vL0ch = -\frac{1 - EpL^2 + EpRch^2 + \sqrt{EpL^4 - 2EpL^2\left(-1 + EpRch^2\right) + \left(1 + EpRch^2\right)^2}}{2EpL\sqrt{1 + \frac{\left(1 - EpL^2 + EpRch^2 + \sqrt{EpL^4 - 2EpL^2(-1 + EpRch^2) + (1 + EpRch^2)^2}\right)^2}{4EpL^2}}} \tag{65}$$

$$vL0st = -\frac{1 - EpL^2 + EpRst^2 + \sqrt{EpL^4 - 2EpL^2\left(-1 + EpRst^2\right) + \left(1 + EpRst^2\right)^2}}{2EpL\sqrt{1 + \frac{\left(1 - EpL^2 + EpRst^2 + \sqrt{EpL^4 - 2EpL^2(-1 + EpRst^2) + (1 + EpRst^2)^2}\right)^2}{4EpL^2}}} \tag{66}$$

$$vL0to = -\frac{1 - EpL^2 + EpRto^2 + \sqrt{EpL^4 - 2EpL^2\left(-1 + EpRto^2\right) + \left(1 + EpRto^2\right)^2}}{2EpL\sqrt{1 + \frac{\left(1 - EpL^2 + EpRto^2 + \sqrt{EpL^4 - 2EpL^2(-1 + EpRto^2) + (1 + EpRto^2)^2}\right)^2}{4EpL^2}}} \tag{67}$$

$$vL0bo = -\frac{1 - EpL^2 + EpRbo^2 + \sqrt{EpL^4 - 2EpL^2\left(-1 + EpRbo^2\right) + \left(1 + EpRbo^2\right)^2}}{2EpL\sqrt{1 + \frac{\left(1 - EpL^2 + EpRbo^2 + \sqrt{EpL^4 - 2EpL^2(-1 + EpRbo^2) + (1 + EpRbo^2)^2}\right)^2}{4EpL^2}}} \tag{68}$$

$$vL1nu = \frac{1}{\sqrt{1 + \frac{\left(1 - EpL^2 + \sqrt{1 + 2EpL^2 + EpL^4}\right)^2}{4EpL^2}}} \tag{69}$$

$$vL1el = \frac{1}{\sqrt{1 + \frac{\left(1 - EpL^2 + \sqrt{1 + 2EpL^2 + EpL^4}\right)^2}{4EpL^2}}} \tag{70}$$

$$vL1mu = \frac{1}{\sqrt{1 + \frac{\left(1 - EpL^2 + EpRmu^2 + \sqrt{EpL^4 - 2EpL^2(-1 + EpRmu^2) + (1 + EpRmu^2)^2}\right)^2}{4EpL^2}}} \tag{71}$$

$$vL1ta = \frac{1}{\sqrt{1 + \frac{\left(1-EpL^2+EpRta^2+\sqrt{EpL^4-2EpL^2(-1+EpRta^2)+(1+EpRta^2)^2}\right)^2}{4EpL^2}}} \tag{72}$$

$$vL1up = \frac{1}{\sqrt{1 + \frac{\left(1-EpL^2+\sqrt{1+2EpL^2+EpL^4}\right)^2}{4EpL^2}}} \tag{73}$$

$$vL1do = \frac{1}{\sqrt{1 + \frac{\left(1-EpL^2+\sqrt{1+2EpL^2+EpL^4}\right)^2}{4EpL^2}}} \tag{74}$$

$$vL1ch = \frac{1}{\sqrt{1 + \frac{\left(1-EpL^2+EpRch^2+\sqrt{EpL^4-2EpL^2(-1+EpRch^2)+(1+EpRch^2)^2}\right)^2}{4EpL^2}}} \tag{75}$$

$$vL1st = \frac{1}{\sqrt{1 + \frac{\left(1-EpL^2+EpRst^2+\sqrt{EpL^4-2EpL^2(-1+EpRst^2)+(1+EpRst^2)^2}\right)^2}{4EpL^2}}} \tag{76}$$

$$vL1to = \frac{1}{\sqrt{1 + \frac{\left(1-EpL^2+EpRto^2+\sqrt{EpL^4-2EpL^2(-1+EpRto^2)+(1+EpRto^2)^2}\right)^2}{4EpL^2}}} \tag{77}$$

$$vL1bo = \frac{1}{\sqrt{1 + \frac{\left(1-EpL^2+EpRbo^2+\sqrt{EpL^4-2EpL^2(-1+EpRbo^2)+(1+EpRbo^2)^2}\right)^2}{4EpL^2}}} \tag{78}$$

$$vR1nu = 0 \tag{79}$$

$$vR1el = 0 \tag{80}$$

$$vR1up = 0 \tag{81}$$

$$vR1do = 0 \tag{82}$$

$$vR1mu = -\frac{-1-EpL^2+EpRmu^2+\sqrt{EpL^4-2EpL^2\left(-1+EpRmu^2\right)+\left(1+EpRmu^2\right)^2}}{2EpRmu\sqrt{1 + \frac{\left(-1-EpL^2+EpRmu^2+\sqrt{EpL^4-2EpL^2(-1+EpRmu^2)+(1+EpRmu^2)^2}\right)^2}{4EpRmu^2}}} \tag{83}$$

$$vR1ta = -\frac{-1-EpL^2+EpRta^2+\sqrt{EpL^4-2EpL^2\left(-1+EpRta^2\right)+\left(1+EpRta^2\right)^2}}{2EpRta\sqrt{1 + \frac{\left(-1-EpL^2+EpRta^2+\sqrt{EpL^4-2EpL^2(-1+EpRta^2)+(1+EpRta^2)^2}\right)^2}{4EpRta^2}}} \tag{84}$$

$$vR1ch = -\frac{-1-EpL^2+EpRch^2+\sqrt{EpL^4-2EpL^2\left(-1+EpRch^2\right)+\left(1+EpRch^2\right)^2}}{2EpRch\sqrt{1 + \frac{\left(-1-EpL^2+EpRch^2+\sqrt{EpL^4-2EpL^2(-1+EpRch^2)+(1+EpRch^2)^2}\right)^2}{4EpRch^2}}} \tag{85}$$

$$vR1st = -\frac{-1-EpL^2+EpRst^2+\sqrt{EpL^4-2EpL^2\left(-1+EpRst^2\right)+\left(1+EpRst^2\right)^2}}{2EpRst\sqrt{1 + \frac{\left(-1-EpL^2+EpRst^2+\sqrt{EpL^4-2EpL^2(-1+EpRst^2)+(1+EpRst^2)^2}\right)^2}{4EpRst^2}}} \tag{86}$$

$$vR1to = -\frac{-1-EpL^2+EpRto^2+\sqrt{EpL^4-2EpL^2\left(-1+EpRto^2\right)+\left(1+EpRto^2\right)^2}}{2EpRto\sqrt{1 + \frac{\left(-1-EpL^2+EpRto^2+\sqrt{EpL^4-2EpL^2(-1+EpRto^2)+(1+EpRto^2)^2}\right)^2}{4EpRto^2}}} \tag{87}$$

$$\text{vR1bo} = -\frac{-1 - \text{EpL}^2 + \text{EpRbo}^2 + \sqrt{\text{EpL}^4 - 2\text{EpL}^2\left(-1 + \text{EpRbo}^2\right) + \left(1 + \text{EpRbo}^2\right)^2}}{2\text{EpRbo}\sqrt{1 + \frac{\left(-1 - \text{EpL}^2 + \text{EpRbo}^2 + \sqrt{\text{EpL}^4 - 2\text{EpL}^2\left(-1 + \text{EpRbo}^2\right) + \left(1 + \text{EpRbo}^2\right)^2}\right)^2}{4\text{EpRbo}^2}}} \tag{88}$$

$$\text{vR2nu} = 1 \tag{89}$$

$$\text{vR2el} = 1 \tag{90}$$

$$\text{vR2up} = 1 \tag{91}$$

$$\text{vR2do} = 1 \tag{92}$$

$$\text{vR2mu} = \frac{1}{\sqrt{1 + \frac{\left(-1 - \text{EpL}^2 + \text{EpRmu}^2 + \sqrt{\text{EpL}^4 - 2\text{EpL}^2\left(-1 + \text{EpRmu}^2\right) + \left(1 + \text{EpRmu}^2\right)^2}\right)^2}{4\text{EpRmu}^2}}} \tag{93}$$

$$\text{vR2ta} = \frac{1}{\sqrt{1 + \frac{\left(-1 - \text{EpL}^2 + \text{EpRta}^2 + \sqrt{\text{EpL}^4 - 2\text{EpL}^2\left(-1 + \text{EpRta}^2\right) + \left(1 + \text{EpRta}^2\right)^2}\right)^2}{4\text{EpRta}^2}}} \tag{94}$$

$$\text{vR2ch} = \frac{1}{\sqrt{1 + \frac{\left(-1 - \text{EpL}^2 + \text{EpRch}^2 + \sqrt{\text{EpL}^4 - 2\text{EpL}^2\left(-1 + \text{EpRch}^2\right) + \left(1 + \text{EpRch}^2\right)^2}\right)^2}{4\text{EpRch}^2}}} \tag{95}$$

$$\text{vR2st} = \frac{1}{\sqrt{1 + \frac{\left(-1 - \text{EpL}^2 + \text{EpRst}^2 + \sqrt{\text{EpL}^4 - 2\text{EpL}^2\left(-1 + \text{EpRst}^2\right) + \left(1 + \text{EpRst}^2\right)^2}\right)^2}{4\text{EpRst}^2}}} \tag{96}$$

$$\text{vR2to} = \frac{1}{\sqrt{1 + \frac{\left(-1 - \text{EpL}^2 + \text{EpRto}^2 + \sqrt{\text{EpL}^4 - 2\text{EpL}^2\left(-1 + \text{EpRto}^2\right) + \left(1 + \text{EpRto}^2\right)^2}\right)^2}{4\text{EpRto}^2}}} \tag{97}$$

$$\text{vR2bo} = \frac{1}{\sqrt{1 + \frac{\left(-1 - \text{EpL}^2 + \text{EpRbo}^2 + \sqrt{\text{EpL}^4 - 2\text{EpL}^2\left(-1 + \text{EpRbo}^2\right) + \left(1 + \text{EpRbo}^2\right)^2}\right)^2}{4\text{EpRbo}^2}}} \tag{98}$$

$$\text{vL0hNu} = \frac{1 - \text{EpL}^2 - \sqrt{1 + 2\text{EpL}^2 + \text{EpL}^4}}{2\text{EpL}\sqrt{1 + \frac{\left(-1 + \text{EpL}^2 + \sqrt{1 + 2\text{EpL}^2 + \text{EpL}^4}\right)^2}{4\text{EpL}^2}}} \tag{99}$$

$$\text{vL0hEl} = \frac{1 - \text{EpL}^2 - \sqrt{1 + 2\text{EpL}^2 + \text{EpL}^4}}{2\text{EpL}\sqrt{1 + \frac{\left(-1 + \text{EpL}^2 + \sqrt{1 + 2\text{EpL}^2 + \text{EpL}^4}\right)^2}{4\text{EpL}^2}}} \tag{100}$$

$$\text{vL0hMu} = \frac{1 - \text{EpL}^2 + \text{EpRmu}^2 - \sqrt{\text{EpL}^4 - 2\text{EpL}^2\left(-1 + \text{EpRmu}^2\right) + \left(1 + \text{EpRmu}^2\right)^2}}{2\text{EpL}\sqrt{1 + \frac{\left(-1 + \text{EpL}^2 - \text{EpRmu}^2 + \sqrt{\text{EpL}^4 - 2\text{EpL}^2\left(-1 + \text{EpRmu}^2\right) + \left(1 + \text{EpRmu}^2\right)^2}\right)^2}{4\text{EpL}^2}}} \tag{101}$$

$$\text{vL0hTa} = \frac{1 - \text{EpL}^2 + \text{EpRta}^2 - \sqrt{\text{EpL}^4 - 2\text{EpL}^2\left(-1 + \text{EpRta}^2\right) + \left(1 + \text{EpRta}^2\right)^2}}{2\text{EpL}\sqrt{1 + \frac{\left(-1 + \text{EpL}^2 - \text{EpRta}^2 + \sqrt{\text{EpL}^4 - 2\text{EpL}^2\left(-1 + \text{EpRta}^2\right) + \left(1 + \text{EpRta}^2\right)^2}\right)^2}{4\text{EpL}^2}}} \tag{102}$$

$$\text{vL0hUp} = \frac{1 - \text{EpL}^2 - \sqrt{1 + 2\text{EpL}^2 + \text{EpL}^4}}{2\text{EpL}\sqrt{1 + \frac{\left(-1 + \text{EpL}^2 + \sqrt{1 + 2\text{EpL}^2 + \text{EpL}^4}\right)^2}{4\text{EpL}^2}}} \tag{103}$$

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$$\text{vL0hDo} = \frac{1 - \text{EpL}^2 - \sqrt{1 + 2\text{EpL}^2 + \text{EpL}^4}}{2\text{EpL}\sqrt{1 + \frac{\left(-1 + \text{EpL}^2 + \sqrt{1 + 2\text{EpL}^2 + \text{EpL}^4}\right)^2}{4\text{EpL}^2}}} \tag{104}$$

$$\text{vL0hCh} = \frac{1 - \text{EpL}^2 + \text{EpRch}^2 - \sqrt{\text{EpL}^4 - 2\text{EpL}^2\left(-1 + \text{EpRch}^2\right) + \left(1 + \text{EpRch}^2\right)^2}}{2\text{EpL}\sqrt{1 + \frac{\left(-1 + \text{EpL}^2 - \text{EpRch}^2 + \sqrt{\text{EpL}^4 - 2\text{EpL}^2\left(-1 + \text{EpRch}^2\right) + \left(1 + \text{EpRch}^2\right)^2}\right)^2}{4\text{EpL}^2}}} \tag{105}$$

$$\text{vL0hSt} = \frac{1 - \text{EpL}^2 + \text{EpRst}^2 - \sqrt{\text{EpL}^4 - 2\text{EpL}^2\left(-1 + \text{EpRst}^2\right) + \left(1 + \text{EpRst}^2\right)^2}}{2\text{EpL}\sqrt{1 + \frac{\left(-1 + \text{EpL}^2 - \text{EpRst}^2 + \sqrt{\text{EpL}^4 - 2\text{EpL}^2\left(-1 + \text{EpRst}^2\right) + \left(1 + \text{EpRst}^2\right)^2}\right)^2}{4\text{EpL}^2}}} \tag{106}$$

$$\text{vL0hTo} = \frac{1 - \text{EpL}^2 + \text{EpRto}^2 - \sqrt{\text{EpL}^4 - 2\text{EpL}^2\left(-1 + \text{EpRto}^2\right) + \left(1 + \text{EpRto}^2\right)^2}}{2\text{EpL}\sqrt{1 + \frac{\left(-1 + \text{EpL}^2 - \text{EpRto}^2 + \sqrt{\text{EpL}^4 - 2\text{EpL}^2\left(-1 + \text{EpRto}^2\right) + \left(1 + \text{EpRto}^2\right)^2}\right)^2}{4\text{EpL}^2}}} \tag{107}$$

$$\text{vL0hBo} = \frac{1 - \text{EpL}^2 + \text{EpRbo}^2 - \sqrt{\text{EpL}^4 - 2\text{EpL}^2\left(-1 + \text{EpRbo}^2\right) + \left(1 + \text{EpRbo}^2\right)^2}}{2\text{EpL}\sqrt{1 + \frac{\left(-1 + \text{EpL}^2 - \text{EpRbo}^2 + \sqrt{\text{EpL}^4 - 2\text{EpL}^2\left(-1 + \text{EpRbo}^2\right) + \left(1 + \text{EpRbo}^2\right)^2}\right)^2}{4\text{EpL}^2}}} \tag{108}$$

$$\text{vL1hNu} = -\frac{1}{\sqrt{1 + \frac{\left(-1 + \text{EpL}^2 + \sqrt{1 + 2\text{EpL}^2 + \text{EpL}^4}\right)^2}{4\text{EpL}^2}}} \tag{109}$$

$$\text{vL1hEl} = -\frac{1}{\sqrt{1 + \frac{\left(-1 + \text{EpL}^2 + \sqrt{1 + 2\text{EpL}^2 + \text{EpL}^4}\right)^2}{4\text{EpL}^2}}} \tag{110}$$

$$\text{vL1hMu} = -\frac{1}{\sqrt{1 + \frac{\left(-1 + \text{EpL}^2 - \text{EpRmu}^2 + \sqrt{\text{EpL}^4 - 2\text{EpL}^2\left(-1 + \text{EpRmu}^2\right) + \left(1 + \text{EpRmu}^2\right)^2}\right)^2}{4\text{EpL}^2}}} \tag{111}$$

$$\text{vL1hTa} = -\frac{1}{\sqrt{1 + \frac{\left(-1 + \text{EpL}^2 - \text{EpRta}^2 + \sqrt{\text{EpL}^4 - 2\text{EpL}^2\left(-1 + \text{EpRta}^2\right) + \left(1 + \text{EpRta}^2\right)^2}\right)^2}{4\text{EpL}^2}}} \tag{112}$$

$$\text{vL1hUp} = -\frac{1}{\sqrt{1 + \frac{\left(-1 + \text{EpL}^2 + \sqrt{1 + 2\text{EpL}^2 + \text{EpL}^4}\right)^2}{4\text{EpL}^2}}} \tag{113}$$

$$\text{vL1hDo} = -\frac{1}{\sqrt{1 + \frac{\left(-1 + \text{EpL}^2 + \sqrt{1 + 2\text{EpL}^2 + \text{EpL}^4}\right)^2}{4\text{EpL}^2}}} \tag{114}$$

$$\text{vL1hCh} = -\frac{1}{\sqrt{1 + \frac{\left(-1 + \text{EpL}^2 - \text{EpRch}^2 + \sqrt{\text{EpL}^4 - 2\text{EpL}^2\left(-1 + \text{EpRch}^2\right) + \left(1 + \text{EpRch}^2\right)^2}\right)^2}{4\text{EpL}^2}}} \tag{115}$$

$$\text{vL1hSt} = -\frac{1}{\sqrt{1 + \frac{\left(-1 + \text{EpL}^2 - \text{EpRst}^2 + \sqrt{\text{EpL}^4 - 2\text{EpL}^2\left(-1 + \text{EpRst}^2\right) + \left(1 + \text{EpRst}^2\right)^2}\right)^2}{4\text{EpL}^2}}} \tag{116}$$

$$\text{vL1hTo} = -\frac{1}{\sqrt{1 + \frac{\left(-1 + \text{EpL}^2 - \text{EpRto}^2 + \sqrt{\text{EpL}^4 - 2\text{EpL}^2\left(-1 + \text{EpRto}^2\right) + \left(1 + \text{EpRto}^2\right)^2}\right)^2}{4\text{EpL}^2}}} \tag{117}$$

$$\text{vL1hBo} = -\frac{1}{\sqrt{1 + \frac{\left(-1 + \text{EpL}^2 - \text{EpRbo}^2 + \sqrt{\text{EpL}^4 - 2\text{EpL}^2\left(-1 + \text{EpRbo}^2\right) + \left(1 + \text{EpRbo}^2\right)^2}\right)^2}{4\text{EpL}^2}}} \tag{118}$$

$$vR1hNu = -1 \tag{119}$$

$$vR1hEl = -1 \tag{120}$$

$$vR1hUp = -1 \tag{121}$$

$$vR1hDo = -1 \tag{122}$$

$$vR1hMu = \frac{-1 - EpL^2 + EpRmu^2 - \sqrt{EpL^4 - 2EpL^2\left(-1 + EpRmu^2\right) + \left(1 + EpRmu^2\right)^2}}{2EpRmu\sqrt{1 + \frac{\left(1 + EpL^2 - EpRmu^2 + \sqrt{EpL^4 - 2EpL^2(-1 + EpRmu^2) + (1 + EpRmu^2)^2}\right)^2}{4EpRmu^2}}} \tag{123}$$

$$vR1hTa = \frac{-1 - EpL^2 + EpRta^2 - \sqrt{EpL^4 - 2EpL^2\left(-1 + EpRta^2\right) + \left(1 + EpRta^2\right)^2}}{2EpRta\sqrt{1 + \frac{\left(1 + EpL^2 - EpRta^2 + \sqrt{EpL^4 - 2EpL^2(-1 + EpRta^2) + (1 + EpRta^2)^2}\right)^2}{4EpRta^2}}} \tag{124}$$

$$vR1hCh = \frac{-1 - EpL^2 + EpRch^2 - \sqrt{EpL^4 - 2EpL^2\left(-1 + EpRch^2\right) + \left(1 + EpRch^2\right)^2}}{2EpRch\sqrt{1 + \frac{\left(1 + EpL^2 - EpRch^2 + \sqrt{EpL^4 - 2EpL^2(-1 + EpRch^2) + (1 + EpRch^2)^2}\right)^2}{4EpRch^2}}} \tag{125}$$

$$vR1hSt = \frac{-1 - EpL^2 + EpRst^2 - \sqrt{EpL^4 - 2EpL^2\left(-1 + EpRst^2\right) + \left(1 + EpRst^2\right)^2}}{2EpRst\sqrt{1 + \frac{\left(1 + EpL^2 - EpRst^2 + \sqrt{EpL^4 - 2EpL^2(-1 + EpRst^2) + (1 + EpRst^2)^2}\right)^2}{4EpRst^2}}} \tag{126}$$

$$vR1hTo = \frac{-1 - EpL^2 + EpRto^2 - \sqrt{EpL^4 - 2EpL^2\left(-1 + EpRto^2\right) + \left(1 + EpRto^2\right)^2}}{2EpRto\sqrt{1 + \frac{\left(1 + EpL^2 - EpRto^2 + \sqrt{EpL^4 - 2EpL^2(-1 + EpRto^2) + (1 + EpRto^2)^2}\right)^2}{4EpRto^2}}} \tag{127}$$

$$vR1hBo = \frac{-1 - EpL^2 + EpRbo^2 - \sqrt{EpL^4 - 2EpL^2\left(-1 + EpRbo^2\right) + \left(1 + EpRbo^2\right)^2}}{2EpRbo\sqrt{1 + \frac{\left(1 + EpL^2 - EpRbo^2 + \sqrt{EpL^4 - 2EpL^2(-1 + EpRbo^2) + (1 + EpRbo^2)^2}\right)^2}{4EpRbo^2}}} \tag{128}$$

$$vR2hNu = 0 \tag{129}$$

$$vR2hEl = 0 \tag{130}$$

$$vR2hUp = 0 \tag{131}$$

$$vR2hDo = 0 \tag{132}$$

$$vR2hMu = -\frac{1}{\sqrt{1 + \frac{\left(1 + EpL^2 - EpRmu^2 + \sqrt{EpL^4 - 2EpL^2(-1 + EpRmu^2) + (1 + EpRmu^2)^2}\right)^2}{4EpRmu^2}}} \tag{133}$$

$$vR2hTa = -\frac{1}{\sqrt{1 + \frac{\left(1 + EpL^2 - EpRta^2 + \sqrt{EpL^4 - 2EpL^2(-1 + EpRta^2) + (1 + EpRta^2)^2}\right)^2}{4EpRta^2}}} \tag{134}$$

$$vR2hCh = -\frac{1}{\sqrt{1 + \frac{\left(1 + EpL^2 - EpRch^2 + \sqrt{EpL^4 - 2EpL^2(-1 + EpRch^2) + (1 + EpRch^2)^2}\right)^2}{4EpRch^2}}} \tag{135}$$

$$\text{vR2hSt} = -\frac{1}{\sqrt{1 + \frac{\left(1 + \text{EpL}^2 - \text{EpRst}^2 + \sqrt{\text{EpL}^4 - 2\text{EpL}^2(-1 + \text{EpRst}^2) + (1 + \text{EpRst}^2)^2}\right)^2}{4\text{EpRst}^2}}} \tag{136}$$

$$\text{vR2hTo} = -\frac{1}{\sqrt{1 + \frac{\left(1 + \text{EpL}^2 - \text{EpRto}^2 + \sqrt{\text{EpL}^4 - 2\text{EpL}^2(-1 + \text{EpRto}^2) + (1 + \text{EpRto}^2)^2}\right)^2}{4\text{EpRto}^2}}} \tag{137}$$

$$\text{vR2hBo} = -\frac{1}{\sqrt{1 + \frac{\left(1 + \text{EpL}^2 - \text{EpRbo}^2 + \sqrt{\text{EpL}^4 - 2\text{EpL}^2(-1 + \text{EpRbo}^2) + (1 + \text{EpRbo}^2)^2}\right)^2}{4\text{EpRbo}^2}}} \tag{138}$$

6 Vertices

In this section, we describe the vertices of our model implementation.

6.1 $V_{\mathbf{Gauge}}$

$$\begin{pmatrix} G & 1 \\ G & 2 \\ G & 3 \end{pmatrix}$$

$-\mathrm{gs}f_{a_1,a_2,a_3}p_1^{\mu_3}\eta_{\mu_1,\mu_2} + \mathrm{gs}f_{a_1,a_2,a_3}p_2^{\mu_3}\eta_{\mu_1,\mu_2} + \mathrm{gs}f_{a_1,a_2,a_3}p_1^{\mu_2}\eta_{\mu_1,\mu_3} - \mathrm{gs}f_{a_1,a_2,a_3}p_3^{\mu_2}\eta_{\mu_1,\mu_3} - \mathrm{gs}f_{a_1,a_2,a_3}p_2^{\mu_1}\eta_{\mu_2,\mu_3} + \mathrm{gs}f_{a_1,a_2,a_3}p_3^{\mu_1}\eta_{\mu_2,\mu_3}$

$$\begin{pmatrix} G & 1 \\ G & 2 \\ G & 3 \\ G & 4 \end{pmatrix}$$

$i\mathrm{gs}^2 f_{a_1,a_3,\mathrm{a1}}f_{a_2,a_4,\mathrm{a1}}\eta_{\mu_1,\mu_4}\eta_{\mu_2,\mu_3} + i\mathrm{gs}^2 f_{a_1,a_2,\mathrm{a1}}f_{a_3,a_4,\mathrm{a1}}\eta_{\mu_1,\mu_4}\eta_{\mu_2,\mu_3} + i\mathrm{gs}^2 f_{a_1,a_4,\mathrm{a1}}f_{a_2,a_3,\mathrm{a1}}\eta_{\mu_1,\mu_3}\eta_{\mu_2,\mu_4} - i\mathrm{gs}^2 f_{a_1,a_2,\mathrm{a1}}f_{a_3,a_4,\mathrm{a1}}\eta_{\mu_1,\mu_3}\eta_{\mu_2,\mu_4} - i\mathrm{gs}^2 f_{a_1,a_4,\mathrm{a1}}f_{a_2,a_3,\mathrm{a1}}\eta_{\mu_1,\mu_2}\eta_{\mu_3,\mu_4} - i\mathrm{gs}^2 f_{a_1,a_3,\mathrm{a1}}f_{a_2,a_4,\mathrm{a1}}\eta_{\mu_1,\mu_2}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \mathrm{W0} & 1 \\ \mathrm{W0} & 2 \\ \mathrm{W0} & 3 \\ \mathrm{W0} & 4 \end{pmatrix}$$

$-2ig^2\delta_{s_1,s_4}\delta_{s_2,s_3}\eta_{\mu_1,\mu_4}\eta_{\mu_2,\mu_3} + ig^2\delta_{s_1,s_3}\delta_{s_2,s_4}\eta_{\mu_1,\mu_4}\eta_{\mu_2,\mu_3} + ig^2\delta_{s_1,s_2}\delta_{s_3,s_4}\eta_{\mu_1,\mu_4}\eta_{\mu_2,\mu_3} + ig^2\delta_{s_1,s_4}\delta_{s_2,s_3}\eta_{\mu_1,\mu_3}\eta_{\mu_2,\mu_4} - 2ig^2\delta_{s_1,s_3}\delta_{s_2,s_4}\eta_{\mu_1,\mu_3}\eta_{\mu_2,\mu_4} + ig^2\delta_{s_1,s_2}\delta_{s_3,s_4}\eta_{\mu_1,\mu_3}\eta_{\mu_2,\mu_4} + ig^2\delta_{s_1,s_4}\delta_{s_2,s_3}\eta_{\mu_1,\mu_2}\eta_{\mu_3,\mu_4} + ig^2\delta_{s_1,s_3}\delta_{s_2,s_4}\eta_{\mu_1,\mu_2}\eta_{\mu_3,\mu_4} - 2ig^2\delta_{s_1,s_2}\delta_{s_3,s_4}\eta_{\mu_1,\mu_2}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \mathrm{W0} & 1 \\ \mathrm{W0} & 2 \\ \mathrm{W0} & 3 \end{pmatrix}$$

$-g\epsilon_{s_1,s_2,s_3}p_1^{\mu_3}\eta_{\mu_1,\mu_2} + g\epsilon_{s_1,s_2,s_3}p_2^{\mu_3}\eta_{\mu_1,\mu_2} + g\epsilon_{s_1,s_2,s_3}p_1^{\mu_2}\eta_{\mu_1,\mu_3} - g\epsilon_{s_1,s_2,s_3}p_3^{\mu_2}\eta_{\mu_1,\mu_3} - g\epsilon_{s_1,s_2,s_3}p_2^{\mu_1}\eta_{\mu_2,\mu_3} + g\epsilon_{s_1,s_2,s_3}p_3^{\mu_1}\eta_{\mu_2,\mu_3}$

$$\begin{pmatrix} \mathrm{W1} & 1 \\ \mathrm{W1} & 2 \\ \mathrm{W1} & 3 \\ \mathrm{W1} & 4 \end{pmatrix}$$

$-2ig\mathrm{t}^2\delta_{t_1,t_4}\delta_{t_2,t_3}\eta_{\mu_1,\mu_4}\eta_{\mu_2,\mu_3} + ig\mathrm{t}^2\delta_{t_1,t_3}\delta_{t_2,t_4}\eta_{\mu_1,\mu_4}\eta_{\mu_2,\mu_3} + ig\mathrm{t}^2\delta_{t_1,t_2}\delta_{t_3,t_4}\eta_{\mu_1,\mu_4}\eta_{\mu_2,\mu_3} + ig\mathrm{t}^2\delta_{t_1,t_4}\delta_{t_2,t_3}\eta_{\mu_1,\mu_3}\eta_{\mu_2,\mu_4} - 2ig\mathrm{t}^2\delta_{t_1,t_3}\delta_{t_2,t_4}\eta_{\mu_1,\mu_3}\eta_{\mu_2,\mu_4} + ig\mathrm{t}^2\delta_{t_1,t_2}\delta_{t_3,t_4}\eta_{\mu_1,\mu_3}\eta_{\mu_2,\mu_4} + ig\mathrm{t}^2\delta_{t_1,t_4}\delta_{t_2,t_3}\eta_{\mu_1,\mu_2}\eta_{\mu_3,\mu_4} + ig\mathrm{t}^2\delta_{t_1,t_3}\delta_{t_2,t_4}\eta_{\mu_1,\mu_2}\eta_{\mu_3,\mu_4} - 2ig\mathrm{t}^2\delta_{t_1,t_2}\delta_{t_3,t_4}\eta_{\mu_1,\mu_2}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \mathrm{W1} & 1 \\ \mathrm{W1} & 2 \\ \mathrm{W1} & 3 \end{pmatrix}$$

$-g\mathrm{t}\epsilon_{t_1,t_2,t_3}p_1^{\mu_3}\eta_{\mu_1,\mu_2} + g\mathrm{t}\epsilon_{t_1,t_2,t_3}p_2^{\mu_3}\eta_{\mu_1,\mu_2} + g\mathrm{t}\epsilon_{t_1,t_2,t_3}p_1^{\mu_2}\eta_{\mu_1,\mu_3} - g\mathrm{t}\epsilon_{t_1,t_2,t_3}p_3^{\mu_2}\eta_{\mu_1,\mu_3} - g\mathrm{t}\epsilon_{t_1,t_2,t_3}p_2^{\mu_1}\eta_{\mu_2,\mu_3} + g\mathrm{t}\epsilon_{t_1,t_2,t_3}p_3^{\mu_1}\eta_{\mu_2,\mu_3}$

6.2 $V_{\mathbf{Fermion}}$

$$\begin{pmatrix} G & 1 \\ d^\dagger & 2 \\ d & 3 \end{pmatrix}$$

$-i\mathrm{gs}\gamma^{\mu_1}_{s_2,s_3}\delta_{f_2,f_3}T^{a_1}_{i_2,i_3}$

$$\begin{pmatrix} G & 1 \\ \mathrm{hd}^\dagger & 2 \\ \mathrm{hd} & 3 \end{pmatrix}$$

$-i\mathrm{gs}\gamma^{\mu_1}_{s_2,s_3}\delta_{f_2,f_3}T^{a_1}_{i_2,i_3}$

$$\begin{pmatrix} G & 1 \\ \mathrm{hu}^\dagger & 2 \\ \mathrm{hu} & 3 \end{pmatrix}$$

$-i\mathrm{gs}\gamma^{\mu_1}_{s_2,s_3}\delta_{f_2,f_3}T^{a_1}_{i_2,i_3}$

$$\begin{pmatrix} G & 1 \\ u^\dagger & 2 \\ u & 3 \end{pmatrix}$$

$-i\mathrm{gs}\gamma^{\mu_1}_{s_2,s_3}\delta_{f_2,f_3}T^{a_1}_{i_2,i_3}$

$$\begin{pmatrix} \mathrm{WP} & 1 \\ \mathrm{nL1}^\dagger & 2 \\ \mathrm{eL1} & 3 \end{pmatrix}$$

$-\dfrac{i\mathrm{gtv1WP}\delta_{f_2,f_3}(\gamma^{\mu_1}.P_-)_{s_2,s_3}}{\sqrt{2}}$

$$\begin{pmatrix} \mathrm{WP} & 1 \\ \mathrm{uL0}^\dagger & 2 \\ \mathrm{dL0} & 3 \end{pmatrix}$$

$-\dfrac{i\mathrm{gv0WP}\delta_{i_2,i_3}\delta_{f_2,f_3}(\gamma^{\mu_1}.P_-)_{s_2,s_3}}{\sqrt{2}}$

$$\begin{pmatrix} \text{WP} & 1 \\ \text{uL1}^\dagger & 2 \\ \text{dL1} & 3 \end{pmatrix} \qquad -\frac{ig\text{tv1WP}\delta_{i_2,i_3}\delta_{f_2,f_3}(\gamma^{\mu_1}.P_-)_{s_2,s_3}}{\sqrt{2}}$$

$$\begin{pmatrix} \text{WP}^\dagger & 1 \\ \text{dL0}^\dagger & 2 \\ \text{uL0} & 3 \end{pmatrix} \qquad -\frac{ig\text{v0WP}\delta_{i_2,i_3}\delta_{f_2,f_3}(\gamma^{\mu_1}.P_-)_{s_2,s_3}}{\sqrt{2}}$$

$$\begin{pmatrix} \text{WP}^\dagger & 1 \\ \text{dL1}^\dagger & 2 \\ \text{uL1} & 3 \end{pmatrix} \qquad -\frac{ig\text{tv1WP}\delta_{i_2,i_3}\delta_{f_2,f_3}(\gamma^{\mu_1}.P_-)_{s_2,s_3}}{\sqrt{2}}$$

$$\begin{pmatrix} \text{WP}^\dagger & 1 \\ \text{eL0}^\dagger & 2 \\ \text{nL0} & 3 \end{pmatrix} \qquad -\frac{ig\text{v0WP}\delta_{f_2,f_3}(\gamma^{\mu_1}.P_-)_{s_2,s_3}}{\sqrt{2}}$$

$$\begin{pmatrix} \text{WP}^\dagger & 1 \\ \text{eL1}^\dagger & 2 \\ \text{nL1} & 3 \end{pmatrix} \qquad -\frac{ig\text{tv1WP}\delta_{f_2,f_3}(\gamma^{\mu_1}.P_-)_{s_2,s_3}}{\sqrt{2}}$$

$$\begin{pmatrix} Z & 1 \\ \text{dL0}^\dagger & 2 \\ \text{dL0} & 3 \end{pmatrix} \qquad \tfrac{1}{2}ig\text{v0Z}\delta_{i_2,i_3}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_-\right)_{s_2,s_3} - \tfrac{1}{6}ig\text{pv2Z}\delta_{i_2,i_3}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_-\right)_{s_2,s_3}$$

$$\begin{pmatrix} Z & 1 \\ \text{dL1}^\dagger & 2 \\ \text{dL1} & 3 \end{pmatrix} \qquad \tfrac{1}{2}ig\text{tv1Z}\delta_{i_2,i_3}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_-\right)_{s_2,s_3} - \tfrac{1}{6}ig\text{pv2Z}\delta_{i_2,i_3}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_-\right)_{s_2,s_3}$$

$$\begin{pmatrix} Z & 1 \\ \text{eL0}^\dagger & 2 \\ \text{eL0} & 3 \end{pmatrix} \qquad \tfrac{1}{2}ig\text{v0Z}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_-\right)_{s_2,s_3} + \tfrac{1}{2}ig\text{pv2Z}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_-\right)_{s_2,s_3}$$

$$\begin{pmatrix} Z & 1 \\ \text{eL1}^\dagger & 2 \\ \text{eL1} & 3 \end{pmatrix} \qquad \tfrac{1}{2}ig\text{tv1Z}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_-\right)_{s_2,s_3} + \tfrac{1}{2}ig\text{pv2Z}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_-\right)_{s_2,s_3}$$

$$\begin{pmatrix} Z & 1 \\ \text{nL0}^\dagger & 2 \\ \text{nL0} & 3 \end{pmatrix} \qquad -\tfrac{1}{2}ig\text{v0Z}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_-\right)_{s_2,s_3} + \tfrac{1}{2}ig\text{pv2Z}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_-\right)_{s_2,s_3}$$

$$\begin{pmatrix} Z & 1 \\ \text{nL1}^\dagger & 2 \\ \text{nL1} & 3 \end{pmatrix} \qquad -\tfrac{1}{2}ig\text{tv1Z}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_-\right)_{s_2,s_3} + \tfrac{1}{2}ig\text{pv2Z}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_-\right)_{s_2,s_3}$$

$$\begin{pmatrix} Z & 1 \\ \text{uL0}^\dagger & 2 \\ \text{uL0} & 3 \end{pmatrix} \qquad -\tfrac{1}{2}ig\text{v0Z}\delta_{i_2,i_3}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_-\right)_{s_2,s_3} - \tfrac{1}{6}ig\text{pv2Z}\delta_{i_2,i_3}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_-\right)_{s_2,s_3}$$

$$\begin{pmatrix} Z & 1 \\ \text{uL1}^\dagger & 2 \\ \text{uL1} & 3 \end{pmatrix} \qquad -\tfrac{1}{2}ig\text{tv1Z}\delta_{i_2,i_3}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_-\right)_{s_2,s_3} - \tfrac{1}{6}ig\text{pv2Z}\delta_{i_2,i_3}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_-\right)_{s_2,s_3}$$

$$\begin{pmatrix} \text{ZP} & 1 \\ \text{dL0}^\dagger & 2 \\ \text{dL0} & 3 \end{pmatrix} \qquad \tfrac{1}{2}ig\text{v0ZP}\delta_{i_2,i_3}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_-\right)_{s_2,s_3} - \tfrac{1}{6}ig\text{pv2ZP}\delta_{i_2,i_3}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_-\right)_{s_2,s_3}$$

$$\begin{pmatrix} \text{ZP} & 1 \\ \text{dL1}^\dagger & 2 \\ \text{dL1} & 3 \end{pmatrix} \qquad \tfrac{1}{2}ig\text{tv1ZP}\delta_{i_2,i_3}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_-\right)_{s_2,s_3} - \tfrac{1}{6}ig\text{pv2ZP}\delta_{i_2,i_3}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_-\right)_{s_2,s_3}$$

$$\begin{pmatrix} \text{ZP} & 1 \\ \text{eL0}^\dagger & 2 \\ \text{eL0} & 3 \end{pmatrix} \qquad \tfrac{1}{2}ig\text{v0ZP}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_-\right)_{s_2,s_3} + \tfrac{1}{2}ig\text{pv2ZP}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_-\right)_{s_2,s_3}$$

$$\begin{pmatrix} \text{ZP} & 1 \\ \text{eL1}^\dagger & 2 \\ \text{eL1} & 3 \end{pmatrix} \qquad \tfrac{1}{2}ig\text{tv1ZP}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_-\right)_{s_2,s_3} + \tfrac{1}{2}ig\text{pv2ZP}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_-\right)_{s_2,s_3}$$

$$\begin{pmatrix} \text{ZP} & 1 \\ \text{nL0}^\dagger & 2 \\ \text{nL0} & 3 \end{pmatrix} \qquad -\tfrac{1}{2}ig\text{v0ZP}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_-\right)_{s_2,s_3} + \tfrac{1}{2}ig\text{pv2ZP}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_-\right)_{s_2,s_3}$$

$$\begin{pmatrix} \text{ZP} & 1 \\ \text{nL1}^\dagger & 2 \\ \text{nL1} & 3 \end{pmatrix} \qquad -\tfrac{1}{2}ig\text{tv1ZP}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_-\right)_{s_2,s_3} + \tfrac{1}{2}ig\text{pv2ZP}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_-\right)_{s_2,s_3}$$

$$\begin{pmatrix} \text{ZP} & 1 \\ \text{uL0}^\dagger & 2 \\ \text{uL0} & 3 \end{pmatrix} \qquad -\tfrac{1}{2}ig\text{v0ZP}\delta_{i_2,i_3}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_-\right)_{s_2,s_3} - \tfrac{1}{6}ig\text{pv2ZP}\delta_{i_2,i_3}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_-\right)_{s_2,s_3}$$

$$\begin{pmatrix} \text{ZP} & 1 \\ \text{uL1}^\dagger & 2 \\ \text{uL1} & 3 \end{pmatrix} \qquad -\tfrac{1}{2}ig\text{tv1ZP}\delta_{i_2,i_3}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_-\right)_{s_2,s_3} - \tfrac{1}{6}ig\text{pv2ZP}\delta_{i_2,i_3}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_-\right)_{s_2,s_3}$$

$$\begin{pmatrix} A & 1 \\ \text{dL0}^\dagger & 2 \\ \text{dL0} & 3 \end{pmatrix} \qquad \tfrac{1}{3}i\text{EE}\delta_{i_2,i_3}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_-\right)_{s_2,s_3}$$

$$\begin{pmatrix} A & 1 \\ \text{dL1}^\dagger & 2 \\ \text{dL1} & 3 \end{pmatrix} \qquad \tfrac{1}{3}i\text{EE}\delta_{i_2,i_3}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_-\right)_{s_2,s_3}$$

$$\begin{pmatrix} A & 1 \\ \text{eL0}^\dagger & 2 \\ \text{eL0} & 3 \end{pmatrix} \qquad i\text{EE}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_-\right)_{s_2,s_3}$$

$$\begin{pmatrix} A & 1 \\ \text{eL1}^\dagger & 2 \\ \text{eL1} & 3 \end{pmatrix} \qquad i\text{EE}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_-\right)_{s_2,s_3}$$

$$\begin{pmatrix} A & 1 \\ \text{uL0}^\dagger & 2 \\ \text{uL0} & 3 \end{pmatrix} \qquad -\tfrac{2}{3}i\text{EE}\delta_{i_2,i_3}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_-\right)_{s_2,s_3}$$

$$\begin{pmatrix} A & 1 \\ \text{uL1}^\dagger & 2 \\ \text{uL1} & 3 \end{pmatrix} \qquad -\tfrac{2}{3}i\text{EE}\delta_{i_2,i_3}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_-\right)_{s_2,s_3}$$

$$\begin{pmatrix} W & 1 \\ \text{nL0}^\dagger & 2 \\ \text{eL0} & 3 \end{pmatrix} \qquad -\frac{ig\text{v0W}\delta_{f_2,f_3}(\gamma^{\mu_1}.P_-)_{s_2,s_3}}{\sqrt{2}}$$

$$\begin{pmatrix} W & 1 \\ \text{nL1}^\dagger & 2 \\ \text{eL1} & 3 \end{pmatrix} \qquad -\frac{ig\text{tv1W}\delta_{f_2,f_3}(\gamma^{\mu_1}.P_-)_{s_2,s_3}}{\sqrt{2}}$$

$$\begin{pmatrix} W & 1 \\ \text{uL0}^\dagger & 2 \\ \text{dL0} & 3 \end{pmatrix} \qquad -\frac{ig\text{v0W}\delta_{i_2,i_3}\delta_{f_2,f_3}(\gamma^{\mu_1}.P_-)_{s_2,s_3}}{\sqrt{2}}$$

$$\begin{pmatrix} W & 1 \\ \text{uL1}^\dagger & 2 \\ \text{dL1} & 3 \end{pmatrix} \qquad -\frac{i\text{gtv1W}\delta_{i_2,i_3}\delta_{f_2,f_3}(\gamma^{\mu_1}.P_-)_{s_2,s_3}}{\sqrt{2}}$$

$$\begin{pmatrix} W^\dagger & 1 \\ \text{dL0}^\dagger & 2 \\ \text{uL0} & 3 \end{pmatrix} \qquad -\frac{i\text{gv0W}\delta_{i_2,i_3}\delta_{f_2,f_3}(\gamma^{\mu_1}.P_-)_{s_2,s_3}}{\sqrt{2}}$$

$$\begin{pmatrix} W^\dagger & 1 \\ \text{dL1}^\dagger & 2 \\ \text{uL1} & 3 \end{pmatrix} \qquad -\frac{i\text{gtv1W}\delta_{i_2,i_3}\delta_{f_2,f_3}(\gamma^{\mu_1}.P_-)_{s_2,s_3}}{\sqrt{2}}$$

$$\begin{pmatrix} W^\dagger & 1 \\ \text{eL0}^\dagger & 2 \\ \text{nL0} & 3 \end{pmatrix} \qquad -\frac{i\text{gv0W}\delta_{f_2,f_3}(\gamma^{\mu_1}.P_-)_{s_2,s_3}}{\sqrt{2}}$$

$$\begin{pmatrix} W^\dagger & 1 \\ \text{eL1}^\dagger & 2 \\ \text{nL1} & 3 \end{pmatrix} \qquad -\frac{i\text{gtv1W}\delta_{f_2,f_3}(\gamma^{\mu_1}.P_-)_{s_2,s_3}}{\sqrt{2}}$$

$$\begin{pmatrix} \text{WP} & 1 \\ \text{nL0}^\dagger & 2 \\ \text{eL0} & 3 \end{pmatrix} \qquad -\frac{i\text{gv0WP}\delta_{f_2,f_3}(\gamma^{\mu_1}.P_-)_{s_2,s_3}}{\sqrt{2}}$$

$$\begin{pmatrix} \text{WP} & 1 \\ \text{nR1}^\dagger & 2 \\ \text{eR1} & 3 \end{pmatrix} \qquad -\frac{i\text{gtv1WP}\delta_{f_2,f_3}(\gamma^{\mu_1}.P_+)_{s_2,s_3}}{\sqrt{2}}$$

$$\begin{pmatrix} \text{WP} & 1 \\ \text{uR1}^\dagger & 2 \\ \text{dR1} & 3 \end{pmatrix} \qquad -\frac{i\text{gtv1WP}\delta_{i_2,i_3}\delta_{f_2,f_3}(\gamma^{\mu_1}.P_+)_{s_2,s_3}}{\sqrt{2}}$$

$$\begin{pmatrix} \text{WP}^\dagger & 1 \\ \text{dR1}^\dagger & 2 \\ \text{uR1} & 3 \end{pmatrix} \qquad -\frac{i\text{gtv1WP}\delta_{i_2,i_3}\delta_{f_2,f_3}(\gamma^{\mu_1}.P_+)_{s_2,s_3}}{\sqrt{2}}$$

$$\begin{pmatrix} \text{WP}^\dagger & 1 \\ \text{eR1}^\dagger & 2 \\ \text{nR1} & 3 \end{pmatrix} \qquad -\frac{i\text{gtv1WP}\delta_{f_2,f_3}(\gamma^{\mu_1}.P_+)_{s_2,s_3}}{\sqrt{2}}$$

$$\begin{pmatrix} Z & 1 \\ \text{dR1}^\dagger & 2 \\ \text{dR1} & 3 \end{pmatrix} \qquad \frac{1}{2}i\text{gtv1Z}\delta_{i_2,i_3}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_+\right)_{s_2,s_3} - \frac{1}{6}i\text{gpv2Z}\delta_{i_2,i_3}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_+\right)_{s_2,s_3}$$

$$\begin{pmatrix} Z & 1 \\ \text{dR2}^\dagger & 2 \\ \text{dR2} & 3 \end{pmatrix} \qquad \frac{1}{3}i\text{gpv2Z}\delta_{i_2,i_3}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_+\right)_{s_2,s_3}$$

$$\begin{pmatrix} Z & 1 \\ \text{eR1}^\dagger & 2 \\ \text{eR1} & 3 \end{pmatrix} \qquad \frac{1}{2}i\text{gtv1Z}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_+\right)_{s_2,s_3} + \frac{1}{2}i\text{gpv2Z}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_+\right)_{s_2,s_3}$$

$$\begin{pmatrix} Z & 1 \\ \text{eR2}^\dagger & 2 \\ \text{eR2} & 3 \end{pmatrix} \qquad i\text{gpv2Z}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_+\right)_{s_2,s_3}$$

$$\begin{pmatrix} Z & 1 \\ \text{nR1}^\dagger & 2 \\ \text{nR1} & 3 \end{pmatrix} \qquad -\frac{1}{2}i\text{gtv1Z}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_+\right)_{s_2,s_3} + \frac{1}{2}i\text{gpv2Z}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_+\right)_{s_2,s_3}$$

$$\begin{pmatrix} Z & 1 \\ \text{uR1}^\dagger & 2 \\ \text{uR1} & 3 \end{pmatrix} \quad -\tfrac{1}{2}i\text{gtv1Z}\delta_{i_2,i_3}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_+\right)_{s_2,s_3} - \tfrac{1}{6}i\text{gpv2Z}\delta_{i_2,i_3}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_+\right)_{s_2,s_3}$$

$$\begin{pmatrix} Z & 1 \\ \text{uR2}^\dagger & 2 \\ \text{uR2} & 3 \end{pmatrix} \quad -\tfrac{2}{3}i\text{gpv2Z}\delta_{i_2,i_3}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_+\right)_{s_2,s_3}$$

$$\begin{pmatrix} \text{ZP} & 1 \\ \text{dR1}^\dagger & 2 \\ \text{dR1} & 3 \end{pmatrix} \quad \tfrac{1}{2}i\text{gtv1ZP}\delta_{i_2,i_3}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_+\right)_{s_2,s_3} - \tfrac{1}{6}i\text{gpv2ZP}\delta_{i_2,i_3}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_+\right)_{s_2,s_3}$$

$$\begin{pmatrix} \text{ZP} & 1 \\ \text{dR2}^\dagger & 2 \\ \text{dR2} & 3 \end{pmatrix} \quad \tfrac{1}{3}i\text{gpv2ZP}\delta_{i_2,i_3}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_+\right)_{s_2,s_3}$$

$$\begin{pmatrix} \text{ZP} & 1 \\ \text{eR1}^\dagger & 2 \\ \text{eR1} & 3 \end{pmatrix} \quad \tfrac{1}{2}i\text{gtv1ZP}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_+\right)_{s_2,s_3} + \tfrac{1}{2}i\text{gpv2ZP}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_+\right)_{s_2,s_3}$$

$$\begin{pmatrix} \text{ZP} & 1 \\ \text{eR2}^\dagger & 2 \\ \text{eR2} & 3 \end{pmatrix} \quad i\text{gpv2ZP}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_+\right)_{s_2,s_3}$$

$$\begin{pmatrix} \text{ZP} & 1 \\ \text{nR1}^\dagger & 2 \\ \text{nR1} & 3 \end{pmatrix} \quad -\tfrac{1}{2}i\text{gtv1ZP}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_+\right)_{s_2,s_3} + \tfrac{1}{2}i\text{gpv2ZP}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_+\right)_{s_2,s_3}$$

$$\begin{pmatrix} \text{ZP} & 1 \\ \text{uR1}^\dagger & 2 \\ \text{uR1} & 3 \end{pmatrix} \quad -\tfrac{1}{2}i\text{gtv1ZP}\delta_{i_2,i_3}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_+\right)_{s_2,s_3} - \tfrac{1}{6}i\text{gpv2ZP}\delta_{i_2,i_3}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_+\right)_{s_2,s_3}$$

$$\begin{pmatrix} \text{ZP} & 1 \\ \text{uR2}^\dagger & 2 \\ \text{uR2} & 3 \end{pmatrix} \quad -\tfrac{2}{3}i\text{gpv2ZP}\delta_{i_2,i_3}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_+\right)_{s_2,s_3}$$

$$\begin{pmatrix} A & 1 \\ \text{dR1}^\dagger & 2 \\ \text{dR1} & 3 \end{pmatrix} \quad \tfrac{1}{3}i\text{EE}\delta_{i_2,i_3}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_+\right)_{s_2,s_3}$$

$$\begin{pmatrix} A & 1 \\ \text{dR2}^\dagger & 2 \\ \text{dR2} & 3 \end{pmatrix} \quad \tfrac{1}{3}i\text{EE}\delta_{i_2,i_3}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_+\right)_{s_2,s_3}$$

$$\begin{pmatrix} A & 1 \\ \text{eR1}^\dagger & 2 \\ \text{eR1} & 3 \end{pmatrix} \quad i\text{EE}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_+\right)_{s_2,s_3}$$

$$\begin{pmatrix} A & 1 \\ \text{eR2}^\dagger & 2 \\ \text{eR2} & 3 \end{pmatrix} \quad i\text{EE}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_+\right)_{s_2,s_3}$$

$$\begin{pmatrix} A & 1 \\ \text{uR1}^\dagger & 2 \\ \text{uR1} & 3 \end{pmatrix} \quad -\tfrac{2}{3}i\text{EE}\delta_{i_2,i_3}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_+\right)_{s_2,s_3}$$

$$\begin{pmatrix} A & 1 \\ \text{uR2}^\dagger & 2 \\ \text{uR2} & 3 \end{pmatrix} \quad -\tfrac{2}{3}i\text{EE}\delta_{i_2,i_3}\delta_{f_2,f_3}\left(\gamma^{\mu_1}.P_+\right)_{s_2,s_3}$$

$$\begin{pmatrix} W & 1 \\ nR1^\dagger & 2 \\ eR1 & 3 \end{pmatrix} \qquad -\frac{i\mathrm{gtv1W}\delta_{f_2,f_3}(\gamma^{\mu_1}.P_+)_{s_2,s_3}}{\sqrt{2}}$$

$$\begin{pmatrix} W & 1 \\ uR1^\dagger & 2 \\ dR1 & 3 \end{pmatrix} \qquad -\frac{i\mathrm{gtv1W}\delta_{i_2,i_3}\delta_{f_2,f_3}(\gamma^{\mu_1}.P_+)_{s_2,s_3}}{\sqrt{2}}$$

$$\begin{pmatrix} W^\dagger & 1 \\ dR1^\dagger & 2 \\ uR1 & 3 \end{pmatrix} \qquad -\frac{i\mathrm{gtv1W}\delta_{i_2,i_3}\delta_{f_2,f_3}(\gamma^{\mu_1}.P_+)_{s_2,s_3}}{\sqrt{2}}$$

$$\begin{pmatrix} W^\dagger & 1 \\ eR1^\dagger & 2 \\ nR1 & 3 \end{pmatrix} \qquad -\frac{i\mathrm{gtv1W}\delta_{f_2,f_3}(\gamma^{\mu_1}.P_+)_{s_2,s_3}}{\sqrt{2}}$$

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$$\begin{pmatrix} \mathrm{piW} & 1 \\ \mathrm{piW}^\dagger & 2 \\ A & 3 \\ A & 4 \end{pmatrix} \qquad 2i\mathrm{EE}^2\mathrm{v0pi}^2\eta_{\mu_3,\mu_4} + 2i\mathrm{EE}^2\mathrm{v1pi}^2\eta_{\mu_3,\mu_4}$$

$$\begin{pmatrix} \mathrm{piW}^\dagger & 1 \\ \mathrm{piWP} & 2 \\ A & 3 \\ A & 4 \end{pmatrix} \qquad 2i\mathrm{EE}^2\mathrm{v0piv0piP}\eta_{\mu_3,\mu_4} + 2i\mathrm{EE}^2\mathrm{v1piv1piP}\eta_{\mu_3,\mu_4}$$

$$\begin{pmatrix} \mathrm{piW} & 1 \\ \mathrm{piWP}^\dagger & 2 \\ A & 3 \\ A & 4 \end{pmatrix} \qquad 2i\mathrm{EE}^2\mathrm{v0piv0piP}\eta_{\mu_3,\mu_4} + 2i\mathrm{EE}^2\mathrm{v1piv1piP}\eta_{\mu_3,\mu_4}$$

$$\begin{pmatrix} \mathrm{piWP} & 1 \\ \mathrm{piWP}^\dagger & 2 \\ A & 3 \\ A & 4 \end{pmatrix} \qquad 2i\mathrm{EE}^2\mathrm{v0piP}^2\eta_{\mu_3,\mu_4} + 2i\mathrm{EE}^2\mathrm{v1piP}^2\eta_{\mu_3,\mu_4}$$

$$\begin{pmatrix} \mathrm{piW}^\dagger & 1 \\ A & 2 \\ \mathrm{piW} & 3 \end{pmatrix} \qquad i\mathrm{EEv0pi}^2 p_1^{\mu_2} + i\mathrm{EEv1pi}^2 p_1^{\mu_2} - i\mathrm{EEv0pi}^2 p_3^{\mu_2} - i\mathrm{EEv1pi}^2 p_3^{\mu_2}$$

$$\begin{pmatrix} \mathrm{piWP}^\dagger & 1 \\ A & 2 \\ \mathrm{piW} & 3 \end{pmatrix} \qquad i\mathrm{EEv0piv0piP}\, p_1^{\mu_2} + i\mathrm{EEv1piv1piP}\, p_1^{\mu_2} - i\mathrm{EEv0piv0piP}\, p_3^{\mu_2} - i\mathrm{EEv1piv1piP}\, p_3^{\mu_2}$$

$$\begin{pmatrix} \mathrm{piW}^\dagger & 1 \\ \mathrm{piW}^\dagger & 2 \\ \mathrm{piW} & 3 \\ \mathrm{piW} & 4 \end{pmatrix} \qquad \begin{aligned} &-\frac{2i\mathrm{v0pi}^4 p_1.p_2}{3\mathrm{fpi}^2} - \frac{2i\mathrm{v1pi}^4 p_1.p_2}{3\mathrm{fpi}^2} + \frac{i\mathrm{v0pi}^4 p_1.p_3}{3\mathrm{fpi}^2} + \frac{i\mathrm{v1pi}^4 p_1.p_3}{3\mathrm{fpi}^2} + \frac{i\mathrm{v0pi}^4 p_1.p_4}{3\mathrm{fpi}^2} + \frac{i\mathrm{v1pi}^4 p_1.p_4}{3\mathrm{fpi}^2} + \frac{i\mathrm{v0pi}^4 p_2.p_3}{3\mathrm{fpi}^2} + \\ &\frac{i\mathrm{v1pi}^4 p_2.p_3}{3\mathrm{fpi}^2} + \frac{i\mathrm{v0pi}^4 p_2.p_4}{3\mathrm{fpi}^2} + \frac{i\mathrm{v1pi}^4 p_2.p_4}{3\mathrm{fpi}^2} - \frac{2i\mathrm{v0pi}^4 p_3.p_4}{3\mathrm{fpi}^2} - \frac{2i\mathrm{v1pi}^4 p_3.p_4}{3\mathrm{fpi}^2} \end{aligned}$$

$$\begin{pmatrix} \mathrm{piW}^\dagger & 1 \\ \mathrm{piWP}^\dagger & 2 \\ \mathrm{piW} & 3 \\ \mathrm{piW} & 4 \end{pmatrix} \qquad \begin{aligned} &-\frac{2i\mathrm{v0pi}^3\mathrm{v0piP}\, p_1.p_2}{3\mathrm{fpi}^2} - \frac{2i\mathrm{v1pi}^3\mathrm{v1piP}\, p_1.p_2}{3\mathrm{fpi}^2} + \frac{i\mathrm{v0pi}^3\mathrm{v0piP}\, p_1.p_3}{3\mathrm{fpi}^2} + \frac{i\mathrm{v1pi}^3\mathrm{v1piP}\, p_1.p_3}{3\mathrm{fpi}^2} + \frac{i\mathrm{v0pi}^3\mathrm{v0piP}\, p_1.p_4}{3\mathrm{fpi}^2} + \\ &\frac{i\mathrm{v1pi}^3\mathrm{v1piP}\, p_1.p_4}{3\mathrm{fpi}^2} + \frac{i\mathrm{v0pi}^3\mathrm{v0piP}\, p_2.p_3}{3\mathrm{fpi}^2} + \frac{i\mathrm{v1pi}^3\mathrm{v1piP}\, p_2.p_3}{3\mathrm{fpi}^2} + \frac{i\mathrm{v0pi}^3\mathrm{v0piP}\, p_2.p_4}{3\mathrm{fpi}^2} + \frac{i\mathrm{v1pi}^3\mathrm{v1piP}\, p_2.p_4}{3\mathrm{fpi}^2} - \\ &\frac{2i\mathrm{v0pi}^3\mathrm{v0piP}\, p_3.p_4}{3\mathrm{fpi}^2} - \frac{2i\mathrm{v1pi}^3\mathrm{v1piP}\, p_3.p_4}{3\mathrm{fpi}^2} \end{aligned}$$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piWP}^\dagger & 2 \\ \text{piW} & 3 \\ \text{piW} & 4 \end{pmatrix}$$

$-\frac{2iv0\text{pi}^2\text{v0piP}^2 p_1.p_2}{3\text{fpi}^2} - \frac{2iv1\text{pi}^2\text{v1piP}^2 p_1.p_2}{3\text{fpi}^2} + \frac{iv0\text{pi}^2\text{v0piP}^2 p_1.p_3}{3\text{fpi}^2} + \frac{iv1\text{pi}^2\text{v1piP}^2 p_1.p_3}{3\text{fpi}^2} + \frac{iv0\text{pi}^2\text{v0piP}^2 p_1.p_4}{3\text{fpi}^2} + \frac{iv1\text{pi}^2\text{v1piP}^2 p_1.p_4}{3\text{fpi}^2} + \frac{iv0\text{pi}^2\text{v0piP}^2 p_2.p_3}{3\text{fpi}^2} + \frac{iv1\text{pi}^2\text{v1piP}^2 p_2.p_3}{3\text{fpi}^2} + \frac{iv0\text{pi}^2\text{v0piP}^2 p_2.p_4}{3\text{fpi}^2} + \frac{iv1\text{pi}^2\text{v1piP}^2 p_2.p_4}{3\text{fpi}^2} - \frac{2iv0\text{pi}^2\text{v0piP}^2 p_3.p_4}{3\text{fpi}^2} - \frac{2iv1\text{pi}^2\text{v1piP}^2 p_3.p_4}{3\text{fpi}^2}$

$$\begin{pmatrix} \text{piWP} & 1 \\ A & 2 \\ \text{piW}^\dagger & 3 \end{pmatrix}$$

$-i\text{EEv0piv0piP}p_1^{\mu_2} - i\text{EEv1piv1piP}p_1^{\mu_2} + i\text{EEv0piv0piP}p_3^{\mu_2} + i\text{EEv1piv1piP}p_3^{\mu_2}$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ \text{piW} & 3 \\ \text{piW}^\dagger & 4 \end{pmatrix}$$

$\frac{2iv0\text{pi}^2\text{v0pi0}^2 p_1.p_2}{3\text{fpi}^2} + \frac{2iv1\text{pi}^2\text{v1pi0}^2 p_1.p_2}{3\text{fpi}^2} - \frac{iv0\text{pi}^2\text{v0pi0}^2 p_1.p_3}{3\text{fpi}^2} - \frac{iv1\text{pi}^2\text{v1pi0}^2 p_1.p_3}{3\text{fpi}^2} - \frac{iv0\text{pi}^2\text{v0pi0}^2 p_1.p_4}{3\text{fpi}^2} - \frac{iv1\text{pi}^2\text{v1pi0}^2 p_1.p_4}{3\text{fpi}^2} - \frac{iv0\text{pi}^2\text{v0pi0}^2 p_2.p_3}{3\text{fpi}^2} - \frac{iv1\text{pi}^2\text{v1pi0}^2 p_2.p_3}{3\text{fpi}^2} - \frac{iv0\text{pi}^2\text{v0pi0}^2 p_2.p_4}{3\text{fpi}^2} - \frac{iv1\text{pi}^2\text{v1pi0}^2 p_2.p_4}{3\text{fpi}^2} + \frac{2iv0\text{pi}^2\text{v0pi0}^2 p_3.p_4}{3\text{fpi}^2} + \frac{2iv1\text{pi}^2\text{v1pi0}^2 p_3.p_4}{3\text{fpi}^2}$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZP} & 2 \\ \text{piW} & 3 \\ \text{piW}^\dagger & 4 \end{pmatrix}$$

$\frac{2iv0\text{pi}^2\text{v0pi0v0pi0P}p_1.p_2}{3\text{fpi}^2} + \frac{2iv1\text{pi}^2\text{v1pi0v1pi0P}p_1.p_2}{3\text{fpi}^2} - \frac{iv0\text{pi}^2\text{v0pi0v0pi0P}p_1.p_3}{3\text{fpi}^2} - \frac{iv1\text{pi}^2\text{v1pi0v1pi0P}p_1.p_3}{3\text{fpi}^2} - \frac{iv0\text{pi}^2\text{v0pi0v0pi0P}p_1.p_4}{3\text{fpi}^2} - \frac{iv1\text{pi}^2\text{v1pi0v1pi0P}p_1.p_4}{3\text{fpi}^2} - \frac{iv0\text{pi}^2\text{v0pi0v0pi0P}p_2.p_3}{3\text{fpi}^2} - \frac{iv1\text{pi}^2\text{v1pi0v1pi0P}p_2.p_3}{3\text{fpi}^2} - \frac{iv0\text{pi}^2\text{v0pi0v0pi0P}p_2.p_4}{3\text{fpi}^2} - \frac{iv1\text{pi}^2\text{v1pi0v1pi0P}p_2.p_4}{3\text{fpi}^2} + \frac{2iv0\text{pi}^2\text{v0pi0v0pi0P}p_3.p_4}{3\text{fpi}^2} + \frac{2iv1\text{pi}^2\text{v1pi0v1pi0P}p_3.p_4}{3\text{fpi}^2}$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piZP} & 2 \\ \text{piW} & 3 \\ \text{piW}^\dagger & 4 \end{pmatrix}$$

$\frac{2iv0\text{pi}^2\text{v0pi0P}^2 p_1.p_2}{3\text{fpi}^2} + \frac{2iv1\text{pi}^2\text{v1pi0P}^2 p_1.p_2}{3\text{fpi}^2} - \frac{iv0\text{pi}^2\text{v0pi0P}^2 p_1.p_3}{3\text{fpi}^2} - \frac{iv1\text{pi}^2\text{v1pi0P}^2 p_1.p_3}{3\text{fpi}^2} - \frac{iv0\text{pi}^2\text{v0pi0P}^2 p_1.p_4}{3\text{fpi}^2} - \frac{iv1\text{pi}^2\text{v1pi0P}^2 p_1.p_4}{3\text{fpi}^2} - \frac{iv0\text{pi}^2\text{v0pi0P}^2 p_2.p_3}{3\text{fpi}^2} - \frac{iv1\text{pi}^2\text{v1pi0P}^2 p_2.p_3}{3\text{fpi}^2} - \frac{iv0\text{pi}^2\text{v0pi0P}^2 p_2.p_4}{3\text{fpi}^2} - \frac{iv1\text{pi}^2\text{v1pi0P}^2 p_2.p_4}{3\text{fpi}^2} + \frac{2iv0\text{pi}^2\text{v0pi0P}^2 p_3.p_4}{3\text{fpi}^2} + \frac{2iv1\text{pi}^2\text{v1pi0P}^2 p_3.p_4}{3\text{fpi}^2}$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP} & 2 \\ \text{piW} & 3 \\ \text{piW}^\dagger & 4 \end{pmatrix}$$

$\frac{iv0\text{pi}^3\text{v0piP}p_1.p_2}{3\text{fpi}^2} + \frac{iv1\text{pi}^3\text{v1piP}p_1.p_2}{3\text{fpi}^2} + \frac{iv0\text{pi}^3\text{v0piP}p_1.p_3}{3\text{fpi}^2} + \frac{iv1\text{pi}^3\text{v1piP}p_1.p_3}{3\text{fpi}^2} - \frac{2iv0\text{pi}^3\text{v0piP}p_1.p_4}{3\text{fpi}^2} - \frac{2iv1\text{pi}^3\text{v1piP}p_1.p_4}{3\text{fpi}^2} - \frac{2iv0\text{pi}^3\text{v0piP}p_2.p_3}{3\text{fpi}^2} - \frac{2iv1\text{pi}^3\text{v1piP}p_2.p_3}{3\text{fpi}^2} + \frac{iv0\text{pi}^3\text{v0piP}p_2.p_4}{3\text{fpi}^2} + \frac{iv1\text{pi}^3\text{v1piP}p_2.p_4}{3\text{fpi}^2} + \frac{iv0\text{pi}^3\text{v0piP}p_3.p_4}{3\text{fpi}^2} + \frac{iv1\text{pi}^3\text{v1piP}p_3.p_4}{3\text{fpi}^2}$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{piW} & 3 \\ \text{piW}^\dagger & 4 \end{pmatrix}$$

$\frac{iv0\text{pi}^2\text{v0piP}^2 p_1.p_2}{3\text{fpi}^2} + \frac{iv1\text{pi}^2\text{v1piP}^2 p_1.p_2}{3\text{fpi}^2} - \frac{2iv0\text{pi}^2\text{v0piP}^2 p_1.p_3}{3\text{fpi}^2} - \frac{2iv1\text{pi}^2\text{v1piP}^2 p_1.p_3}{3\text{fpi}^2} + \frac{iv0\text{pi}^2\text{v0piP}^2 p_1.p_4}{3\text{fpi}^2} + \frac{iv1\text{pi}^2\text{v1piP}^2 p_1.p_4}{3\text{fpi}^2} + \frac{iv0\text{pi}^2\text{v0piP}^2 p_2.p_3}{3\text{fpi}^2} + \frac{iv1\text{pi}^2\text{v1piP}^2 p_2.p_3}{3\text{fpi}^2} - \frac{2iv0\text{pi}^2\text{v0piP}^2 p_2.p_4}{3\text{fpi}^2} - \frac{2iv1\text{pi}^2\text{v1piP}^2 p_2.p_4}{3\text{fpi}^2} + \frac{iv0\text{pi}^2\text{v0piP}^2 p_3.p_4}{3\text{fpi}^2} + \frac{iv1\text{pi}^2\text{v1piP}^2 p_3.p_4}{3\text{fpi}^2}$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP} & 2 \\ \text{piW}^\dagger & 3 \\ \text{piW}^\dagger & 4 \end{pmatrix}$$

$-\frac{2iv0\text{pi}^2\text{v0piP}^2 p_1.p_2}{3\text{fpi}^2} - \frac{2iv1\text{pi}^2\text{v1piP}^2 p_1.p_2}{3\text{fpi}^2} + \frac{iv0\text{pi}^2\text{v0piP}^2 p_1.p_3}{3\text{fpi}^2} + \frac{iv1\text{pi}^2\text{v1piP}^2 p_1.p_3}{3\text{fpi}^2} + \frac{iv0\text{pi}^2\text{v0piP}^2 p_1.p_4}{3\text{fpi}^2} + \frac{iv1\text{pi}^2\text{v1piP}^2 p_1.p_4}{3\text{fpi}^2} + \frac{iv0\text{pi}^2\text{v0piP}^2 p_2.p_3}{3\text{fpi}^2} + \frac{iv1\text{pi}^2\text{v1piP}^2 p_2.p_3}{3\text{fpi}^2} + \frac{iv0\text{pi}^2\text{v0piP}^2 p_2.p_4}{3\text{fpi}^2} + \frac{iv1\text{pi}^2\text{v1piP}^2 p_2.p_4}{3\text{fpi}^2} - \frac{2iv0\text{pi}^2\text{v0piP}^2 p_3.p_4}{3\text{fpi}^2} - \frac{2iv1\text{pi}^2\text{v1piP}^2 p_3.p_4}{3\text{fpi}^2}$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ A & 2 \\ \text{piWP} & 3 \end{pmatrix}$$

$i\text{EEv0piP}^2 p_1^{\mu_2} + i\text{EEv1piP}^2 p_1^{\mu_2} - i\text{EEv0piP}^2 p_3^{\mu_2} - i\text{EEv1piP}^2 p_3^{\mu_2}$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piWP}^\dagger & 2 \\ \text{piW} & 3 \\ \text{piWP} & 4 \end{pmatrix}$$

$-\frac{2iv0\text{piv0piP}^3 p_1.p_2}{3\text{fpi}^2} - \frac{2iv1\text{piv1piP}^3 p_1.p_2}{3\text{fpi}^2} + \frac{iv0\text{piv0piP}^3 p_1.p_3}{3\text{fpi}^2} + \frac{iv1\text{piv1piP}^3 p_1.p_3}{3\text{fpi}^2} + \frac{iv0\text{piv0piP}^3 p_1.p_4}{3\text{fpi}^2} + \frac{iv1\text{piv1piP}^3 p_1.p_4}{3\text{fpi}^2} + \frac{iv0\text{piv0piP}^3 p_2.p_3}{3\text{fpi}^2} + \frac{iv1\text{piv1piP}^3 p_2.p_3}{3\text{fpi}^2} + \frac{iv0\text{piv0piP}^3 p_2.p_4}{3\text{fpi}^2} + \frac{iv1\text{piv1piP}^3 p_2.p_4}{3\text{fpi}^2} - \frac{2iv0\text{piv0piP}^3 p_3.p_4}{3\text{fpi}^2} - \frac{2iv1\text{piv1piP}^3 p_3.p_4}{3\text{fpi}^2}$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ \text{piW}^\dagger & 3 \\ \text{piWP} & 4 \end{pmatrix}$$

$\frac{2iv0\text{piv0pi0}^2\text{v0piP}p_1.p_2}{3\text{fpi}^2} + \frac{2iv1\text{piv1pi0}^2\text{v1piP}p_1.p_2}{3\text{fpi}^2} - \frac{iv0\text{piv0pi0}^2\text{v0piP}p_1.p_3}{3\text{fpi}^2} - \frac{iv1\text{piv1pi0}^2\text{v1piP}p_1.p_3}{3\text{fpi}^2} - \frac{iv0\text{piv0pi0}^2\text{v0piP}p_1.p_4}{3\text{fpi}^2} - \frac{iv1\text{piv1pi0}^2\text{v1piP}p_1.p_4}{3\text{fpi}^2} - \frac{iv0\text{piv0pi0}^2\text{v0piP}p_2.p_3}{3\text{fpi}^2} - \frac{iv1\text{piv1pi0}^2\text{v1piP}p_2.p_3}{3\text{fpi}^2} - \frac{iv0\text{piv0pi0}^2\text{v0piP}p_2.p_4}{3\text{fpi}^2} - \frac{iv1\text{piv1pi0}^2\text{v1piP}p_2.p_4}{3\text{fpi}^2} + \frac{2iv0\text{piv0pi0}^2\text{v0piP}p_3.p_4}{3\text{fpi}^2} + \frac{2iv1\text{piv1pi0}^2\text{v1piP}p_3.p_4}{3\text{fpi}^2}$

$$\left(\begin{array}{cc} \mathrm{piZ} & 1 \\ \mathrm{piZP} & 2 \\ \mathrm{piW}^\dagger & 3 \\ \mathrm{piWP} & 4 \end{array}\right) \quad \begin{aligned} &\frac{2iv0piv0pi0v0pi0Pv0piP\,p_1.p_2}{3\mathrm{fpi}^2} + \frac{2iv1piv1pi0v1pi0Pv1piP\,p_1.p_2}{3\mathrm{fpi}^2} - \frac{iv0piv0pi0v0pi0Pv0piP\,p_1.p_3}{3\mathrm{fpi}^2} - \\ &\frac{iv1piv1pi0v1pi0Pv1piP\,p_1.p_3}{3\mathrm{fpi}^2} - \frac{iv0piv0pi0v0pi0Pv0piP\,p_1.p_4}{3\mathrm{fpi}^2} - \frac{iv1piv1pi0v1pi0Pv1piP\,p_1.p_4}{3\mathrm{fpi}^2} - \\ &\frac{iv0piv0pi0v0pi0Pv0piP\,p_2.p_3}{3\mathrm{fpi}^2} - \frac{iv1piv1pi0v1pi0Pv1piP\,p_2.p_3}{3\mathrm{fpi}^2} - \frac{iv0piv0pi0v0pi0Pv0piP\,p_2.p_4}{3\mathrm{fpi}^2} - \\ &\frac{iv1piv1pi0v1pi0Pv1piP\,p_2.p_4}{3\mathrm{fpi}^2} + \frac{2iv0piv0pi0v0pi0Pv0piP\,p_3.p_4}{3\mathrm{fpi}^2} + \frac{2iv1piv1pi0v1pi0Pv1piP\,p_3.p_4}{3\mathrm{fpi}^2} \end{aligned}$$

$$\left(\begin{array}{cc} \mathrm{piZP} & 1 \\ \mathrm{piZP} & 2 \\ \mathrm{piW}^\dagger & 3 \\ \mathrm{piWP} & 4 \end{array}\right) \quad \begin{aligned} &\frac{2iv0piv0pi0P^2v0piP\,p_1.p_2}{3\mathrm{fpi}^2} + \frac{2iv1piv1pi0P^2v1piP\,p_1.p_2}{3\mathrm{fpi}^2} - \frac{iv0piv0pi0P^2v0piP\,p_1.p_3}{3\mathrm{fpi}^2} - \frac{iv1piv1pi0P^2v1piP\,p_1.p_3}{3\mathrm{fpi}^2} - \\ &\frac{iv0piv0pi0P^2v0piP\,p_1.p_4}{3\mathrm{fpi}^2} - \frac{iv1piv1pi0P^2v1piP\,p_1.p_4}{3\mathrm{fpi}^2} - \frac{iv0piv0pi0P^2v0piP\,p_2.p_3}{3\mathrm{fpi}^2} - \frac{iv1piv1pi0P^2v1piP\,p_2.p_3}{3\mathrm{fpi}^2} - \\ &\frac{iv0piv0pi0P^2v0piP\,p_2.p_4}{3\mathrm{fpi}^2} - \frac{iv1piv1pi0P^2v1piP\,p_2.p_4}{3\mathrm{fpi}^2} + \frac{2iv0piv0pi0P^2v0piP\,p_3.p_4}{3\mathrm{fpi}^2} + \frac{2iv1piv1pi0P^2v1piP\,p_3.p_4}{3\mathrm{fpi}^2} \end{aligned}$$

$$\left(\begin{array}{cc} \mathrm{piWP} & 1 \\ \mathrm{piWP}^\dagger & 2 \\ \mathrm{piW}^\dagger & 3 \\ \mathrm{piWP} & 4 \end{array}\right) \quad \begin{aligned} &\frac{iv0piv0piP^3\,p_1.p_2}{3\mathrm{fpi}^2} + \frac{iv1piv1piP^3\,p_1.p_2}{3\mathrm{fpi}^2} + \frac{iv0piv0piP^3\,p_1.p_3}{3\mathrm{fpi}^2} + \frac{iv1piv1piP^3\,p_1.p_3}{3\mathrm{fpi}^2} - \frac{2iv0piv0piP^3\,p_1.p_4}{3\mathrm{fpi}^2} - \frac{2iv1piv1piP^3\,p_1.p_4}{3\mathrm{fpi}^2} - \\ &\frac{2iv0piv0piP^3\,p_2.p_3}{3\mathrm{fpi}^2} - \frac{2iv1piv1piP^3\,p_2.p_3}{3\mathrm{fpi}^2} + \frac{iv0piv0piP^3\,p_2.p_4}{3\mathrm{fpi}^2} + \frac{iv1piv1piP^3\,p_2.p_4}{3\mathrm{fpi}^2} + \frac{iv0piv0piP^3\,p_3.p_4}{3\mathrm{fpi}^2} + \frac{iv1piv1piP^3\,p_3.p_4}{3\mathrm{fpi}^2} \end{aligned}$$

$$\left(\begin{array}{cc} \mathrm{piWP}^\dagger & 1 \\ \mathrm{piWP}^\dagger & 2 \\ \mathrm{piWP} & 3 \\ \mathrm{piWP} & 4 \end{array}\right) \quad \begin{aligned} &-\frac{2iv0piP^4\,p_1.p_2}{3\mathrm{fpi}^2} - \frac{2iv1piP^4\,p_1.p_2}{3\mathrm{fpi}^2} + \frac{iv0piP^4\,p_1.p_3}{3\mathrm{fpi}^2} + \frac{iv1piP^4\,p_1.p_3}{3\mathrm{fpi}^2} + \frac{iv0piP^4\,p_1.p_4}{3\mathrm{fpi}^2} + \frac{iv1piP^4\,p_1.p_4}{3\mathrm{fpi}^2} + \frac{iv0piP^4\,p_2.p_3}{3\mathrm{fpi}^2} + \\ &\frac{iv1piP^4\,p_2.p_3}{3\mathrm{fpi}^2} + \frac{iv0piP^4\,p_2.p_4}{3\mathrm{fpi}^2} + \frac{iv1piP^4\,p_2.p_4}{3\mathrm{fpi}^2} - \frac{2iv0piP^4\,p_3.p_4}{3\mathrm{fpi}^2} - \frac{2iv1piP^4\,p_3.p_4}{3\mathrm{fpi}^2} \end{aligned}$$

$$\left(\begin{array}{cc} \mathrm{piZ} & 1 \\ \mathrm{piZ} & 2 \\ \mathrm{piW} & 3 \\ \mathrm{piWP}^\dagger & 4 \end{array}\right) \quad \begin{aligned} &\frac{2iv0piv0pi0^2v0piP\,p_1.p_2}{3\mathrm{fpi}^2} + \frac{2iv1piv1pi0^2v1piP\,p_1.p_2}{3\mathrm{fpi}^2} - \frac{iv0piv0pi0^2v0piP\,p_1.p_3}{3\mathrm{fpi}^2} - \frac{iv1piv1pi0^2v1piP\,p_1.p_3}{3\mathrm{fpi}^2} - \\ &\frac{iv0piv0pi0^2v0piP\,p_1.p_4}{3\mathrm{fpi}^2} - \frac{iv1piv1pi0^2v1piP\,p_1.p_4}{3\mathrm{fpi}^2} - \frac{iv0piv0pi0^2v0piP\,p_2.p_3}{3\mathrm{fpi}^2} - \frac{iv1piv1pi0^2v1piP\,p_2.p_3}{3\mathrm{fpi}^2} - \\ &\frac{iv0piv0pi0^2v0piP\,p_2.p_4}{3\mathrm{fpi}^2} - \frac{iv1piv1pi0^2v1piP\,p_2.p_4}{3\mathrm{fpi}^2} + \frac{2iv0piv0pi0^2v0piP\,p_3.p_4}{3\mathrm{fpi}^2} + \frac{2iv1piv1pi0^2v1piP\,p_3.p_4}{3\mathrm{fpi}^2} \end{aligned}$$

$$\left(\begin{array}{cc} \mathrm{piZ} & 1 \\ \mathrm{piZP} & 2 \\ \mathrm{piW} & 3 \\ \mathrm{piWP}^\dagger & 4 \end{array}\right) \quad \begin{aligned} &\frac{2iv0piv0pi0v0pi0Pv0piP\,p_1.p_2}{3\mathrm{fpi}^2} + \frac{2iv1piv1pi0v1pi0Pv1piP\,p_1.p_2}{3\mathrm{fpi}^2} - \frac{iv0piv0pi0v0pi0Pv0piP\,p_1.p_3}{3\mathrm{fpi}^2} - \\ &\frac{iv1piv1pi0v1pi0Pv1piP\,p_1.p_3}{3\mathrm{fpi}^2} - \frac{iv0piv0pi0v0pi0Pv0piP\,p_1.p_4}{3\mathrm{fpi}^2} - \frac{iv1piv1pi0v1pi0Pv1piP\,p_1.p_4}{3\mathrm{fpi}^2} - \\ &\frac{iv0piv0pi0v0pi0Pv0piP\,p_2.p_3}{3\mathrm{fpi}^2} - \frac{iv1piv1pi0v1pi0Pv1piP\,p_2.p_3}{3\mathrm{fpi}^2} - \frac{iv0piv0pi0v0pi0Pv0piP\,p_2.p_4}{3\mathrm{fpi}^2} - \\ &\frac{iv1piv1pi0v1pi0Pv1piP\,p_2.p_4}{3\mathrm{fpi}^2} + \frac{2iv0piv0pi0v0pi0Pv0piP\,p_3.p_4}{3\mathrm{fpi}^2} + \frac{2iv1piv1pi0v1pi0Pv1piP\,p_3.p_4}{3\mathrm{fpi}^2} \end{aligned}$$

$$\left(\begin{array}{cc} \mathrm{piZP} & 1 \\ \mathrm{piZP} & 2 \\ \mathrm{piW} & 3 \\ \mathrm{piWP}^\dagger & 4 \end{array}\right) \quad \begin{aligned} &\frac{2iv0piv0pi0P^2v0piP\,p_1.p_2}{3\mathrm{fpi}^2} + \frac{2iv1piv1pi0P^2v1piP\,p_1.p_2}{3\mathrm{fpi}^2} - \frac{iv0piv0pi0P^2v0piP\,p_1.p_3}{3\mathrm{fpi}^2} - \frac{iv1piv1pi0P^2v1piP\,p_1.p_3}{3\mathrm{fpi}^2} - \\ &\frac{iv0piv0pi0P^2v0piP\,p_1.p_4}{3\mathrm{fpi}^2} - \frac{iv1piv1pi0P^2v1piP\,p_1.p_4}{3\mathrm{fpi}^2} - \frac{iv0piv0pi0P^2v0piP\,p_2.p_3}{3\mathrm{fpi}^2} - \frac{iv1piv1pi0P^2v1piP\,p_2.p_3}{3\mathrm{fpi}^2} - \\ &\frac{iv0piv0pi0P^2v0piP\,p_2.p_4}{3\mathrm{fpi}^2} - \frac{iv1piv1pi0P^2v1piP\,p_2.p_4}{3\mathrm{fpi}^2} + \frac{2iv0piv0pi0P^2v0piP\,p_3.p_4}{3\mathrm{fpi}^2} + \frac{2iv1piv1pi0P^2v1piP\,p_3.p_4}{3\mathrm{fpi}^2} \end{aligned}$$

$$\left(\begin{array}{cc} \mathrm{piZ} & 1 \\ \mathrm{piZ} & 2 \\ \mathrm{piWP} & 3 \\ \mathrm{piWP}^\dagger & 4 \end{array}\right) \quad \begin{aligned} &\frac{2iv0pi0^2v0piP^2\,p_1.p_2}{3\mathrm{fpi}^2} + \frac{2iv1pi0^2v1piP^2\,p_1.p_2}{3\mathrm{fpi}^2} - \frac{iv0pi0^2v0piP^2\,p_1.p_3}{3\mathrm{fpi}^2} - \frac{iv1pi0^2v1piP^2\,p_1.p_3}{3\mathrm{fpi}^2} - \frac{iv0pi0^2v0piP^2\,p_1.p_4}{3\mathrm{fpi}^2} - \\ &\frac{iv1pi0^2v1piP^2\,p_1.p_4}{3\mathrm{fpi}^2} - \frac{iv0pi0^2v0piP^2\,p_2.p_3}{3\mathrm{fpi}^2} - \frac{iv1pi0^2v1piP^2\,p_2.p_3}{3\mathrm{fpi}^2} - \frac{iv0pi0^2v0piP^2\,p_2.p_4}{3\mathrm{fpi}^2} - \frac{iv1pi0^2v1piP^2\,p_2.p_4}{3\mathrm{fpi}^2} + \\ &\frac{2iv0pi0^2v0piP^2\,p_3.p_4}{3\mathrm{fpi}^2} + \frac{2iv1pi0^2v1piP^2\,p_3.p_4}{3\mathrm{fpi}^2} \end{aligned}$$

$$\left(\begin{array}{cc} \mathrm{piZ} & 1 \\ \mathrm{piZP} & 2 \\ \mathrm{piWP} & 3 \\ \mathrm{piWP}^\dagger & 4 \end{array}\right) \quad \begin{aligned} &\frac{2iv0pi0v0pi0Pv0piP^2\,p_1.p_2}{3\mathrm{fpi}^2} + \frac{2iv1pi0v1pi0Pv1piP^2\,p_1.p_2}{3\mathrm{fpi}^2} - \frac{iv0pi0v0pi0Pv0piP^2\,p_1.p_3}{3\mathrm{fpi}^2} - \frac{iv1pi0v1pi0Pv1piP^2\,p_1.p_3}{3\mathrm{fpi}^2} - \\ &\frac{iv0pi0v0pi0Pv0piP^2\,p_1.p_4}{3\mathrm{fpi}^2} - \frac{iv1pi0v1pi0Pv1piP^2\,p_1.p_4}{3\mathrm{fpi}^2} - \frac{iv0pi0v0pi0Pv0piP^2\,p_2.p_3}{3\mathrm{fpi}^2} - \frac{iv1pi0v1pi0Pv1piP^2\,p_2.p_3}{3\mathrm{fpi}^2} - \\ &\frac{iv0pi0v0pi0Pv0piP^2\,p_2.p_4}{3\mathrm{fpi}^2} - \frac{iv1pi0v1pi0Pv1piP^2\,p_2.p_4}{3\mathrm{fpi}^2} + \frac{2iv0pi0v0pi0Pv0piP^2\,p_3.p_4}{3\mathrm{fpi}^2} + \frac{2iv1pi0v1pi0Pv1piP^2\,p_3.p_4}{3\mathrm{fpi}^2} \end{aligned}$$

$$\left(\begin{array}{cc} \mathrm{piZP} & 1 \\ \mathrm{piZP} & 2 \\ \mathrm{piWP} & 3 \\ \mathrm{piWP}^\dagger & 4 \end{array}\right) \quad \begin{aligned} &\frac{2iv0pi0P^2v0piP^2\,p_1.p_2}{3\mathrm{fpi}^2} + \frac{2iv1pi0P^2v1piP^2\,p_1.p_2}{3\mathrm{fpi}^2} - \frac{iv0pi0P^2v0piP^2\,p_1.p_3}{3\mathrm{fpi}^2} - \frac{iv1pi0P^2v1piP^2\,p_1.p_3}{3\mathrm{fpi}^2} - \\ &\frac{iv0pi0P^2v0piP^2\,p_1.p_4}{3\mathrm{fpi}^2} - \frac{iv1pi0P^2v1piP^2\,p_1.p_4}{3\mathrm{fpi}^2} - \frac{iv0pi0P^2v0piP^2\,p_2.p_3}{3\mathrm{fpi}^2} - \frac{iv1pi0P^2v1piP^2\,p_2.p_3}{3\mathrm{fpi}^2} - \\ &\frac{iv0pi0P^2v0piP^2\,p_2.p_4}{3\mathrm{fpi}^2} - \frac{iv1pi0P^2v1piP^2\,p_2.p_4}{3\mathrm{fpi}^2} + \frac{2iv0pi0P^2v0piP^2\,p_3.p_4}{3\mathrm{fpi}^2} + \frac{2iv1pi0P^2v1piP^2\,p_3.p_4}{3\mathrm{fpi}^2} \end{aligned}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ A & 2 \\ W & 3 \end{pmatrix}$$

$\frac{1}{2}\text{EEfpi}g\text{v0piv0W}\eta_{\mu_2,\mu_3} - \frac{1}{2}\text{EEfpigtv0piv1W}\eta_{\mu_2,\mu_3} + \frac{1}{2}\text{EEfpigtv1piv1W}\eta_{\mu_2,\mu_3}$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piZ} & 2 \\ A & 3 \\ W & 4 \end{pmatrix}$$

$-\frac{1}{2}i\text{EE}g\text{v0piv0pi0v0W}\eta_{\mu_3,\mu_4} - \frac{1}{2}i\text{EEgtv0piv0pi0v1W}\eta_{\mu_3,\mu_4} - \frac{1}{2}i\text{EEgtv1piv1pi0v1W}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piZP} & 2 \\ A & 3 \\ W & 4 \end{pmatrix}$$

$-\frac{1}{2}i\text{EE}g\text{v0piv0pi0Pv0W}\eta_{\mu_3,\mu_4} - \frac{1}{2}i\text{EEgtv0piv0pi0Pv1W}\eta_{\mu_3,\mu_4} - \frac{1}{2}i\text{EEgtv1piv1pi0Pv1W}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ A & 2 \\ W & 3 \end{pmatrix}$$

$\frac{1}{2}\text{EEfpi}g\text{v0piPv0W}\eta_{\mu_2,\mu_3} - \frac{1}{2}\text{EEfpigtv0piPv1W}\eta_{\mu_2,\mu_3} + \frac{1}{2}\text{EEfpigtv1piPv1W}\eta_{\mu_2,\mu_3}$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piZ} & 2 \\ A & 3 \\ W & 4 \end{pmatrix}$$

$-\frac{1}{2}i\text{EE}g\text{v0pi0v0piPv0W}\eta_{\mu_3,\mu_4} - \frac{1}{2}i\text{EEgtv0pi0v0piPv1W}\eta_{\mu_3,\mu_4} - \frac{1}{2}i\text{EEgtv1pi0v1piPv1W}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piZP} & 2 \\ A & 3 \\ W & 4 \end{pmatrix}$$

$-\frac{1}{2}i\text{EE}g\text{v0pi0Pv0piPv0W}\eta_{\mu_3,\mu_4} - \frac{1}{2}i\text{EEgtv0pi0Pv0piPv1W}\eta_{\mu_3,\mu_4} - \frac{1}{2}i\text{EEgtv1pi0Pv1piPv1W}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piW}^\dagger & 2 \\ \text{piW} & 3 \\ W & 4 \end{pmatrix}$$

$-\frac{g\text{v0pi}^3\text{v0W}p_1^{\mu_4}}{3\text{fpi}} + \frac{\text{gtv0pi}^3\text{v1W}p_1^{\mu_4}}{3\text{fpi}} - \frac{\text{gtv1pi}^3\text{v1W}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{v0pi}^3\text{v0W}p_2^{\mu_4}}{3\text{fpi}} + \frac{\text{gtv0pi}^3\text{v1W}p_2^{\mu_4}}{3\text{fpi}} - \frac{\text{gtv1pi}^3\text{v1W}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{v0pi}^3\text{v0W}p_3^{\mu_4}}{3\text{fpi}} - \frac{2\text{gtv0pi}^3\text{v1W}p_3^{\mu_4}}{3\text{fpi}} + \frac{2\text{gtv1pi}^3\text{v1W}p_3^{\mu_4}}{3\text{fpi}}$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP}^\dagger & 2 \\ \text{piW} & 3 \\ W & 4 \end{pmatrix}$$

$-\frac{g\text{v0pi}^2\text{v0piPv0W}p_1^{\mu_4}}{3\text{fpi}} + \frac{\text{gtv0pi}^2\text{v0piPv1W}p_1^{\mu_4}}{3\text{fpi}} - \frac{\text{gtv1pi}^2\text{v1piPv1W}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{v0pi}^2\text{v0piPv0W}p_2^{\mu_4}}{3\text{fpi}} + \frac{\text{gtv0pi}^2\text{v0piPv1W}p_2^{\mu_4}}{3\text{fpi}} - \frac{\text{gtv1pi}^2\text{v1piPv1W}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{v0pi}^2\text{v0piPv0W}p_3^{\mu_4}}{3\text{fpi}} - \frac{2\text{gtv0pi}^2\text{v0piPv1W}p_3^{\mu_4}}{3\text{fpi}} + \frac{2\text{gtv1pi}^2\text{v1piPv1W}p_3^{\mu_4}}{3\text{fpi}}$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piWP}^\dagger & 2 \\ \text{piW} & 3 \\ W & 4 \end{pmatrix}$$

$-\frac{g\text{v0piv0piP}^2\text{v0W}p_1^{\mu_4}}{3\text{fpi}} + \frac{\text{gtv0piv0piP}^2\text{v1W}p_1^{\mu_4}}{3\text{fpi}} - \frac{\text{gtv1piv1piP}^2\text{v1W}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{v0piv0piP}^2\text{v0W}p_2^{\mu_4}}{3\text{fpi}} + \frac{\text{gtv0piv0piP}^2\text{v1W}p_2^{\mu_4}}{3\text{fpi}} - \frac{\text{gtv1piv1piP}^2\text{v1W}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{v0piv0piP}^2\text{v0W}p_3^{\mu_4}}{3\text{fpi}} - \frac{2\text{gtv0piv0piP}^2\text{v1W}p_3^{\mu_4}}{3\text{fpi}} + \frac{2\text{gtv1piv1piP}^2\text{v1W}p_3^{\mu_4}}{3\text{fpi}}$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piW}^\dagger & 2 \\ W & 3 \end{pmatrix}$$

$\frac{1}{2}ig\text{v0piv0pi0v0W}p_1^{\mu_3} + \frac{1}{2}i\text{gtv0piv0pi0v1W}p_1^{\mu_3} + \frac{1}{2}i\text{gtv1piv1pi0v1W}p_1^{\mu_3} - \frac{1}{2}ig\text{v0piv0pi0v0W}p_2^{\mu_3} - \frac{1}{2}i\text{gtv0piv0pi0v1W}p_2^{\mu_3} - \frac{1}{2}i\text{gtv1piv1pi0v1W}p_2^{\mu_3}$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ \text{piW}^\dagger & 3 \\ W & 4 \end{pmatrix}$$

$\frac{g\text{v0piv0pi0}^2\text{v0W}p_1^{\mu_4}}{3\text{fpi}} - \frac{\text{gtv0piv0pi0}^2\text{v1W}p_1^{\mu_4}}{3\text{fpi}} + \frac{\text{gtv1piv1pi0}^2\text{v1W}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{v0piv0pi0}^2\text{v0W}p_2^{\mu_4}}{3\text{fpi}} - \frac{\text{gtv0piv0pi0}^2\text{v1W}p_2^{\mu_4}}{3\text{fpi}} + \frac{\text{gtv1piv1pi0}^2\text{v1W}p_2^{\mu_4}}{3\text{fpi}} - \frac{2g\text{v0piv0pi0}^2\text{v0W}p_3^{\mu_4}}{3\text{fpi}} + \frac{2\text{gtv0piv0pi0}^2\text{v1W}p_3^{\mu_4}}{3\text{fpi}} - \frac{2\text{gtv1piv1pi0}^2\text{v1W}p_3^{\mu_4}}{3\text{fpi}}$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piW}^\dagger & 2 \\ W & 3 \end{pmatrix}$$

$\frac{1}{2}ig\text{v0piv0pi0Pv0W}p_1^{\mu_3} + \frac{1}{2}i\text{gtv0piv0pi0Pv1W}p_1^{\mu_3} + \frac{1}{2}i\text{gtv1piv1pi0Pv1W}p_1^{\mu_3} - \frac{1}{2}ig\text{v0piv0pi0Pv0W}p_2^{\mu_3} - \frac{1}{2}i\text{gtv0piv0pi0Pv1W}p_2^{\mu_3} - \frac{1}{2}i\text{gtv1piv1pi0Pv1W}p_2^{\mu_3}$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZP} & 2 \\ \text{piW}^\dagger & 3 \\ W & 4 \end{pmatrix}$$
$\frac{g\text{v0piv0pi0v0pi0Pv0W}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0piv0pi0v0pi0Pv1W}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1piv1pi0v1pi0Pv1W}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{v0piv0pi0v0pi0Pv0W}p_2^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0piv0pi0v0pi0Pv1W}p_2^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1piv1pi0v1pi0Pv1W}p_2^{\mu_4}}{3\text{fpi}} - \frac{2g\text{v0piv0pi0v0pi0Pv0W}p_3^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv0piv0pi0v0pi0Pv1W}p_3^{\mu_4}}{3\text{fpi}} - \frac{2g\text{tv1piv1pi0v1pi0Pv1W}p_3^{\mu_4}}{3\text{fpi}}$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piZP} & 2 \\ \text{piW}^\dagger & 3 \\ W & 4 \end{pmatrix}$$
$\frac{g\text{v0piv0pi0P}^2\text{v0W}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0piv0pi0P}^2\text{v1W}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1piv1pi0P}^2\text{v1W}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{v0piv0pi0P}^2\text{v0W}p_2^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0piv0pi0P}^2\text{v1W}p_2^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1piv1pi0P}^2\text{v1W}p_2^{\mu_4}}{3\text{fpi}} - \frac{2g\text{v0piv0pi0P}^2\text{v0W}p_3^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv0piv0pi0P}^2\text{v1W}p_3^{\mu_4}}{3\text{fpi}} - \frac{2g\text{tv1piv1pi0P}^2\text{v1W}p_3^{\mu_4}}{3\text{fpi}}$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP} & 2 \\ \text{piW}^\dagger & 3 \\ W & 4 \end{pmatrix}$$
$-\frac{g\text{v0pi}^2\text{v0piPv0W}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv0pi}^2\text{v0piPv1W}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv1pi}^2\text{v1piPv1W}p_1^{\mu_4}}{3\text{fpi}} + \frac{2g\text{v0pi}^2\text{v0piPv0W}p_2^{\mu_4}}{3\text{fpi}} - \frac{2g\text{tv0pi}^2\text{v0piPv1W}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv1pi}^2\text{v1piPv1W}p_2^{\mu_4}}{3\text{fpi}} - \frac{g\text{v0pi}^2\text{v0piPv0W}p_3^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv0pi}^2\text{v0piPv1W}p_3^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv1pi}^2\text{v1piPv1W}p_3^{\mu_4}}{3\text{fpi}}$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{piW}^\dagger & 3 \\ W & 4 \end{pmatrix}$$
$\frac{2g\text{v0piv0piP}^2\text{v0W}p_1^{\mu_4}}{3\text{fpi}} - \frac{2g\text{tv0piv0piP}^2\text{v1W}p_1^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv1piv1piP}^2\text{v1W}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{v0piv0piP}^2\text{v0W}p_2^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv0piv0piP}^2\text{v1W}p_2^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv1piv1piP}^2\text{v1W}p_2^{\mu_4}}{3\text{fpi}} - \frac{g\text{v0piv0piP}^2\text{v0W}p_3^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv0piv0piP}^2\text{v1W}p_3^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv1piv1piP}^2\text{v1W}p_3^{\mu_4}}{3\text{fpi}}$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piWP}^\dagger & 2 \\ \text{piWP} & 3 \\ W & 4 \end{pmatrix}$$
$-\frac{g\text{v0piP}^3\text{v0W}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv0piP}^3\text{v1W}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv1piP}^3\text{v1W}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{v0piP}^3\text{v0W}p_2^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv0piP}^3\text{v1W}p_2^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv1piP}^3\text{v1W}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{v0piP}^3\text{v0W}p_3^{\mu_4}}{3\text{fpi}} - \frac{2g\text{tv0piP}^3\text{v1W}p_3^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv1piP}^3\text{v1W}p_3^{\mu_4}}{3\text{fpi}}$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piWP}^\dagger & 2 \\ W & 3 \end{pmatrix}$$
$\frac{1}{2}ig\text{v0pi0v0piPv0W}p_1^{\mu_3} + \frac{1}{2}ig\text{tv0pi0v0piPv1W}p_1^{\mu_3} + \frac{1}{2}ig\text{tv1pi0v1piPv1W}p_1^{\mu_3} - \frac{1}{2}ig\text{v0pi0v0piPv0W}p_2^{\mu_3} - \frac{1}{2}ig\text{tv0pi0v0piPv1W}p_2^{\mu_3} - \frac{1}{2}ig\text{tv1pi0v1piPv1W}p_2^{\mu_3}$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ \text{piWP}^\dagger & 3 \\ W & 4 \end{pmatrix}$$
$\frac{g\text{v0pi0}^2\text{v0piPv0W}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0pi0}^2\text{v0piPv1W}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1pi0}^2\text{v1piPv1W}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{v0pi0}^2\text{v0piPv0W}p_2^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0pi0}^2\text{v0piPv1W}p_2^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1pi0}^2\text{v1piPv1W}p_2^{\mu_4}}{3\text{fpi}} - \frac{2g\text{v0pi0}^2\text{v0piPv0W}p_3^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv0pi0}^2\text{v0piPv1W}p_3^{\mu_4}}{3\text{fpi}} - \frac{2g\text{tv1pi0}^2\text{v1piPv1W}p_3^{\mu_4}}{3\text{fpi}}$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piWP}^\dagger & 2 \\ W & 3 \end{pmatrix}$$
$\frac{1}{2}ig\text{v0pi0Pv0piPv0W}p_1^{\mu_3} + \frac{1}{2}ig\text{tv0pi0Pv0piPv1W}p_1^{\mu_3} + \frac{1}{2}ig\text{tv1pi0Pv1piPv1W}p_1^{\mu_3} - \frac{1}{2}ig\text{v0pi0Pv0piPv0W}p_2^{\mu_3} - \frac{1}{2}ig\text{tv0pi0Pv0piPv1W}p_2^{\mu_3} - \frac{1}{2}ig\text{tv1pi0Pv1piPv1W}p_2^{\mu_3}$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZP} & 2 \\ \text{piWP}^\dagger & 3 \\ W & 4 \end{pmatrix}$$
$\frac{g\text{v0pi0v0pi0Pv0piPv0W}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0pi0v0pi0Pv0piPv1W}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1pi0v1pi0Pv1piPv1W}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{v0pi0v0pi0Pv0piPv0W}p_2^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0pi0v0pi0Pv0piPv1W}p_2^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1pi0v1pi0Pv1piPv1W}p_2^{\mu_4}}{3\text{fpi}} - \frac{2g\text{v0pi0v0pi0Pv0piPv0W}p_3^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv0pi0v0pi0Pv0piPv1W}p_3^{\mu_4}}{3\text{fpi}} - \frac{2g\text{tv1pi0v1pi0Pv1piPv1W}p_3^{\mu_4}}{3\text{fpi}}$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piZP} & 2 \\ \text{piWP}^\dagger & 3 \\ W & 4 \end{pmatrix}$$
$\frac{g\text{v0pi0P}^2\text{v0piPv0W}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0pi0P}^2\text{v0piPv1W}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1pi0P}^2\text{v1piPv1W}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{v0pi0P}^2\text{v0piPv0W}p_2^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0pi0P}^2\text{v0piPv1W}p_2^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1pi0P}^2\text{v1piPv1W}p_2^{\mu_4}}{3\text{fpi}} - \frac{2g\text{v0pi0P}^2\text{v0piPv0W}p_3^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv0pi0P}^2\text{v0piPv1W}p_3^{\mu_4}}{3\text{fpi}} - \frac{2g\text{tv1pi0P}^2\text{v1piPv1W}p_3^{\mu_4}}{3\text{fpi}}$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piW}^\dagger & 2 \\ W & 3 \\ W & 4 \end{pmatrix}$$
$-2igg\text{tv0pi}^2\text{v0Wv1W}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \mathrm{piW}^\dagger & 1 \\ \mathrm{piWP}^\dagger & 2 \\ W & 3 \\ W & 4 \end{pmatrix}$$
$$-2ig g\mathrm{tv0piv0piPv0Wv1W}\eta_{\mu_3,\mu_4}$$

$$\begin{pmatrix} \mathrm{piWP}^\dagger & 1 \\ \mathrm{piWP}^\dagger & 2 \\ W & 3 \\ W & 4 \end{pmatrix}$$
$$-2ig g\mathrm{tv0piP}^2\mathrm{v0Wv1W}\eta_{\mu_3,\mu_4}$$

$$\begin{pmatrix} \mathrm{piW} & 1 \\ A & 2 \\ W^\dagger & 3 \end{pmatrix}$$
$$-\tfrac{1}{2}\mathrm{EEfpi}g\mathrm{v0piv0W}\eta_{\mu_2,\mu_3} + \tfrac{1}{2}\mathrm{EEfpigtv0piv1W}\eta_{\mu_2,\mu_3} - \tfrac{1}{2}\mathrm{EEfpigtv1piv1W}\eta_{\mu_2,\mu_3}$$

$$\begin{pmatrix} \mathrm{piW} & 1 \\ \mathrm{piZ} & 2 \\ A & 3 \\ W^\dagger & 4 \end{pmatrix}$$
$$-\tfrac{1}{2}i\mathrm{EE}g\mathrm{v0piv0pi0v0W}\eta_{\mu_3,\mu_4} - \tfrac{1}{2}i\mathrm{EEgtv0piv0pi0v1W}\eta_{\mu_3,\mu_4} - \tfrac{1}{2}i\mathrm{EEgtv1piv1pi0v1W}\eta_{\mu_3,\mu_4}$$

$$\begin{pmatrix} \mathrm{piW} & 1 \\ \mathrm{piZP} & 2 \\ A & 3 \\ W^\dagger & 4 \end{pmatrix}$$
$$-\tfrac{1}{2}i\mathrm{EE}g\mathrm{v0piv0pi0Pv0W}\eta_{\mu_3,\mu_4} - \tfrac{1}{2}i\mathrm{EEgtv0piv0pi0Pv1W}\eta_{\mu_3,\mu_4} - \tfrac{1}{2}i\mathrm{EEgtv1piv1pi0Pv1W}\eta_{\mu_3,\mu_4}$$

$$\begin{pmatrix} \mathrm{piWP} & 1 \\ A & 2 \\ W^\dagger & 3 \end{pmatrix}$$
$$-\tfrac{1}{2}\mathrm{EEfpi}g\mathrm{v0piPv0W}\eta_{\mu_2,\mu_3} + \tfrac{1}{2}\mathrm{EEfpigtv0piPv1W}\eta_{\mu_2,\mu_3} - \tfrac{1}{2}\mathrm{EEfpigtv1piPv1W}\eta_{\mu_2,\mu_3}$$

$$\begin{pmatrix} \mathrm{piWP} & 1 \\ \mathrm{piZ} & 2 \\ A & 3 \\ W^\dagger & 4 \end{pmatrix}$$
$$-\tfrac{1}{2}i\mathrm{EE}g\mathrm{v0pi0v0piPv0W}\eta_{\mu_3,\mu_4} - \tfrac{1}{2}i\mathrm{EEgtv0pi0v0piPv1W}\eta_{\mu_3,\mu_4} - \tfrac{1}{2}i\mathrm{EEgtv1pi0v1piPv1W}\eta_{\mu_3,\mu_4}$$

$$\begin{pmatrix} \mathrm{piWP} & 1 \\ \mathrm{piZP} & 2 \\ A & 3 \\ W^\dagger & 4 \end{pmatrix}$$
$$-\tfrac{1}{2}i\mathrm{EE}g\mathrm{v0pi0Pv0piPv0W}\eta_{\mu_3,\mu_4} - \tfrac{1}{2}i\mathrm{EEgtv0pi0Pv0piPv1W}\eta_{\mu_3,\mu_4} - \tfrac{1}{2}i\mathrm{EEgtv1pi0Pv1piPv1W}\eta_{\mu_3,\mu_4}$$

$$\begin{pmatrix} \mathrm{piW} & 1 \\ \mathrm{piW}^\dagger & 2 \\ \mathrm{piW} & 3 \\ W^\dagger & 4 \end{pmatrix}$$
$$-\frac{g\mathrm{v0pi}^3\mathrm{v0W}p_1^{\mu_4}}{3\mathrm{fpi}} + \frac{\mathrm{gtv0pi}^3\mathrm{v1W}p_1^{\mu_4}}{3\mathrm{fpi}} - \frac{\mathrm{gtv1pi}^3\mathrm{v1W}p_1^{\mu_4}}{3\mathrm{fpi}} + \frac{2g\mathrm{v0pi}^3\mathrm{v0W}p_2^{\mu_4}}{3\mathrm{fpi}} - \frac{2\mathrm{gtv0pi}^3\mathrm{v1W}p_2^{\mu_4}}{3\mathrm{fpi}} + \frac{2\mathrm{gtv1pi}^3\mathrm{v1W}p_2^{\mu_4}}{3\mathrm{fpi}} - \frac{g\mathrm{v0pi}^3\mathrm{v0W}p_3^{\mu_4}}{3\mathrm{fpi}} + \frac{\mathrm{gtv0pi}^3\mathrm{v1W}p_3^{\mu_4}}{3\mathrm{fpi}} - \frac{\mathrm{gtv1pi}^3\mathrm{v1W}p_3^{\mu_4}}{3\mathrm{fpi}}$$

$$\begin{pmatrix} \mathrm{piZ} & 1 \\ \mathrm{piW} & 2 \\ W^\dagger & 3 \end{pmatrix}$$
$$-\tfrac{1}{2}ig\mathrm{v0piv0pi0v0W}p_1^{\mu_3} - \tfrac{1}{2}i\mathrm{gtv0piv0pi0v1W}p_1^{\mu_3} - \tfrac{1}{2}i\mathrm{gtv1piv1pi0v1W}p_1^{\mu_3} + \tfrac{1}{2}ig\mathrm{v0piv0pi0v0W}p_2^{\mu_3} + \tfrac{1}{2}i\mathrm{gtv0piv0pi0v1W}p_2^{\mu_3} + \tfrac{1}{2}i\mathrm{gtv1piv1pi0v1W}p_2^{\mu_3}$$

$$\begin{pmatrix} \mathrm{piZ} & 1 \\ \mathrm{piZ} & 2 \\ \mathrm{piW} & 3 \\ W^\dagger & 4 \end{pmatrix}$$
$$\frac{g\mathrm{v0piv0pi0}^2\mathrm{v0W}p_1^{\mu_4}}{3\mathrm{fpi}} - \frac{\mathrm{gtv0piv0pi0}^2\mathrm{v1W}p_1^{\mu_4}}{3\mathrm{fpi}} + \frac{\mathrm{gtv1piv1pi0}^2\mathrm{v1W}p_1^{\mu_4}}{3\mathrm{fpi}} + \frac{g\mathrm{v0piv0pi0}^2\mathrm{v0W}p_2^{\mu_4}}{3\mathrm{fpi}} - \frac{\mathrm{gtv0piv0pi0}^2\mathrm{v1W}p_2^{\mu_4}}{3\mathrm{fpi}} + \frac{\mathrm{gtv1piv1pi0}^2\mathrm{v1W}p_2^{\mu_4}}{3\mathrm{fpi}} - \frac{2g\mathrm{v0piv0pi0}^2\mathrm{v0W}p_3^{\mu_4}}{3\mathrm{fpi}} + \frac{2\mathrm{gtv0piv0pi0}^2\mathrm{v1W}p_3^{\mu_4}}{3\mathrm{fpi}} - \frac{2\mathrm{gtv1piv1pi0}^2\mathrm{v1W}p_3^{\mu_4}}{3\mathrm{fpi}}$$

$$\begin{pmatrix} \mathrm{piZP} & 1 \\ \mathrm{piW} & 2 \\ W^\dagger & 3 \end{pmatrix}$$
$$-\tfrac{1}{2}ig\mathrm{v0piv0pi0Pv0W}p_1^{\mu_3} - \tfrac{1}{2}i\mathrm{gtv0piv0pi0Pv1W}p_1^{\mu_3} - \tfrac{1}{2}i\mathrm{gtv1piv1pi0Pv1W}p_1^{\mu_3} + \tfrac{1}{2}ig\mathrm{v0piv0pi0Pv0W}p_2^{\mu_3} + \tfrac{1}{2}i\mathrm{gtv0piv0pi0Pv1W}p_2^{\mu_3} + \tfrac{1}{2}i\mathrm{gtv1piv1pi0Pv1W}p_2^{\mu_3}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZP} & 2 \\ \text{piW} & 3 \\ W^\dagger & 4 \end{pmatrix}$$

$\frac{g\text{v0piv0pi0v0pi0Pv0W}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0piv0pi0v0pi0Pv1W}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1piv1pi0v1pi0Pv1W}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{v0piv0pi0v0pi0Pv0W}p_2^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0piv0pi0v0pi0Pv1W}p_2^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1piv1pi0v1pi0Pv1W}p_2^{\mu_4}}{3\text{fpi}} - \frac{2g\text{v0piv0pi0v0pi0Pv0W}p_3^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv0piv0pi0v0pi0Pv1W}p_3^{\mu_4}}{3\text{fpi}} - \frac{2g\text{tv1piv1pi0v1pi0Pv1W}p_3^{\mu_4}}{3\text{fpi}}$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piZP} & 2 \\ \text{piW} & 3 \\ W^\dagger & 4 \end{pmatrix}$$

$\frac{g\text{v0piv0pi0P}^2\text{v0W}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0piv0pi0P}^2\text{v1W}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1piv1pi0P}^2\text{v1W}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{v0piv0pi0P}^2\text{v0W}p_2^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0piv0pi0P}^2\text{v1W}p_2^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1piv1pi0P}^2\text{v1W}p_2^{\mu_4}}{3\text{fpi}} - \frac{2g\text{v0piv0pi0P}^2\text{v0W}p_3^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv0piv0pi0P}^2\text{v1W}p_3^{\mu_4}}{3\text{fpi}} - \frac{2g\text{tv1piv1pi0P}^2\text{v1W}p_3^{\mu_4}}{3\text{fpi}}$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP} & 2 \\ \text{piW} & 3 \\ W^\dagger & 4 \end{pmatrix}$$

$\frac{2g\text{v0pi}^2\text{v0piPv0W}p_1^{\mu_4}}{3\text{fpi}} - \frac{2g\text{tv0pi}^2\text{v0piPv1W}p_1^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv1pi}^2\text{v1piPv1W}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{v0pi}^2\text{v0piPv0W}p_2^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv0pi}^2\text{v0piPv1W}p_2^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv1pi}^2\text{v1piPv1W}p_2^{\mu_4}}{3\text{fpi}} - \frac{g\text{v0pi}^2\text{v0piPv0W}p_3^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv0pi}^2\text{v0piPv1W}p_3^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv1pi}^2\text{v1piPv1W}p_3^{\mu_4}}{3\text{fpi}}$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{piW} & 3 \\ W^\dagger & 4 \end{pmatrix}$$

$-\frac{g\text{v0pi}^2\text{v0piPv0W}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv0pi}^2\text{v0piPv1W}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv1pi}^2\text{v1piPv1W}p_1^{\mu_4}}{3\text{fpi}} + \frac{2g\text{v0pi}^2\text{v0piPv0W}p_2^{\mu_4}}{3\text{fpi}} - \frac{2g\text{tv0pi}^2\text{v0piPv1W}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv1pi}^2\text{v1piPv1W}p_2^{\mu_4}}{3\text{fpi}} - \frac{g\text{v0pi}^2\text{v0piPv0W}p_3^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv0pi}^2\text{v0piPv1W}p_3^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv1pi}^2\text{v1piPv1W}p_3^{\mu_4}}{3\text{fpi}}$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{piW} & 3 \\ W^\dagger & 4 \end{pmatrix}$$

$-\frac{g\text{v0piv0piP}^2\text{v0W}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv0piv0piP}^2\text{v1W}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv1piv1piP}^2\text{v1W}p_1^{\mu_4}}{3\text{fpi}} + \frac{2g\text{v0piv0piP}^2\text{v0W}p_2^{\mu_4}}{3\text{fpi}} - \frac{2g\text{tv0piv0piP}^2\text{v1W}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv1piv1piP}^2\text{v1W}p_2^{\mu_4}}{3\text{fpi}} - \frac{g\text{v0piv0piP}^2\text{v0W}p_3^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv0piv0piP}^2\text{v1W}p_3^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv1piv1piP}^2\text{v1W}p_3^{\mu_4}}{3\text{fpi}}$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP} & 2 \\ \text{piW}^\dagger & 3 \\ W^\dagger & 4 \end{pmatrix}$$

$-\frac{g\text{v0piv0piP}^2\text{v0W}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv0piv0piP}^2\text{v1W}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv1piv1piP}^2\text{v1W}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{v0piv0piP}^2\text{v0W}p_2^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv0piv0piP}^2\text{v1W}p_2^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv1piv1piP}^2\text{v1W}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{v0piv0piP}^2\text{v0W}p_3^{\mu_4}}{3\text{fpi}} - \frac{2g\text{tv0piv0piP}^2\text{v1W}p_3^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv1piv1piP}^2\text{v1W}p_3^{\mu_4}}{3\text{fpi}}$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piWP} & 2 \\ W^\dagger & 3 \end{pmatrix}$$

$-\frac{1}{2}ig\text{v0pi0v0piPv0W}p_1^{\mu_3} - \frac{1}{2}ig\text{tv0pi0v0piPv1W}p_1^{\mu_3} - \frac{1}{2}ig\text{tv1pi0v1piPv1W}p_1^{\mu_3} + \frac{1}{2}ig\text{v0pi0v0piPv0W}p_2^{\mu_3} + \frac{1}{2}ig\text{tv0pi0v0piPv1W}p_2^{\mu_3} + \frac{1}{2}ig\text{tv1pi0v1piPv1W}p_2^{\mu_3}$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ \text{piWP} & 3 \\ W^\dagger & 4 \end{pmatrix}$$

$\frac{g\text{v0pi0}^2\text{v0piPv0W}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0pi0}^2\text{v0piPv1W}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1pi0}^2\text{v1piPv1W}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{v0pi0}^2\text{v0piPv0W}p_2^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0pi0}^2\text{v0piPv1W}p_2^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1pi0}^2\text{v1piPv1W}p_2^{\mu_4}}{3\text{fpi}} - \frac{2g\text{v0pi0}^2\text{v0piPv0W}p_3^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv0pi0}^2\text{v0piPv1W}p_3^{\mu_4}}{3\text{fpi}} - \frac{2g\text{tv1pi0}^2\text{v1piPv1W}p_3^{\mu_4}}{3\text{fpi}}$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piWP} & 2 \\ W^\dagger & 3 \end{pmatrix}$$

$-\frac{1}{2}ig\text{v0pi0Pv0piPv0W}p_1^{\mu_3} - \frac{1}{2}ig\text{tv0pi0Pv0piPv1W}p_1^{\mu_3} - \frac{1}{2}ig\text{tv1pi0Pv1piPv1W}p_1^{\mu_3} + \frac{1}{2}ig\text{v0pi0Pv0piPv0W}p_2^{\mu_3} + \frac{1}{2}ig\text{tv0pi0Pv0piPv1W}p_2^{\mu_3} + \frac{1}{2}ig\text{tv1pi0Pv1piPv1W}p_2^{\mu_3}$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZP} & 2 \\ \text{piWP} & 3 \\ W^\dagger & 4 \end{pmatrix}$$

$\frac{g\text{v0pi0v0pi0Pv0piPv0W}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0pi0v0pi0Pv0piPv1W}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1pi0v1pi0Pv1piPv1W}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{v0pi0v0pi0Pv0piPv0W}p_2^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0pi0v0pi0Pv0piPv1W}p_2^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1pi0v1pi0Pv1piPv1W}p_2^{\mu_4}}{3\text{fpi}} - \frac{2g\text{v0pi0v0pi0Pv0piPv0W}p_3^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv0pi0v0pi0Pv0piPv1W}p_3^{\mu_4}}{3\text{fpi}} - \frac{2g\text{tv1pi0v1pi0Pv1piPv1W}p_3^{\mu_4}}{3\text{fpi}}$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piZP} & 2 \\ \text{piWP} & 3 \\ W^\dagger & 4 \end{pmatrix}$$

$\frac{g\text{v0pi0P}^2\text{v0piPv0W}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0pi0P}^2\text{v0piPv1W}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1pi0P}^2\text{v1piPv1W}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{v0pi0P}^2\text{v0piPv0W}p_2^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0pi0P}^2\text{v0piPv1W}p_2^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1pi0P}^2\text{v1piPv1W}p_2^{\mu_4}}{3\text{fpi}} - \frac{2g\text{v0pi0P}^2\text{v0piPv0W}p_3^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv0pi0P}^2\text{v0piPv1W}p_3^{\mu_4}}{3\text{fpi}} - \frac{2g\text{tv1pi0P}^2\text{v1piPv1W}p_3^{\mu_4}}{3\text{fpi}}$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{piWP} & 3 \\ W^\dagger & 4 \end{pmatrix} \qquad -\frac{g\text{v0piP}^3\text{v0W}p_1^{\mu_4}}{3\text{fpi}} + \frac{\text{gtv0piP}^3\text{v1W}p_1^{\mu_4}}{3\text{fpi}} - \frac{\text{gtv1piP}^3\text{v1W}p_1^{\mu_4}}{3\text{fpi}} + \frac{2g\text{v0piP}^3\text{v0W}p_2^{\mu_4}}{3\text{fpi}} - \frac{2\text{gtv0piP}^3\text{v1W}p_2^{\mu_4}}{3\text{fpi}} +$$
$$\frac{2\text{gtv1piP}^3\text{v1W}p_2^{\mu_4}}{3\text{fpi}} - \frac{g\text{v0piP}^3\text{v0W}p_3^{\mu_4}}{3\text{fpi}} + \frac{\text{gtv0piP}^3\text{v1W}p_3^{\mu_4}}{3\text{fpi}} - \frac{\text{gtv1piP}^3\text{v1W}p_3^{\mu_4}}{3\text{fpi}}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ W & 3 \\ W^\dagger & 4 \end{pmatrix} \qquad ig\text{gtv0pi}^2\text{v0Wv1W}\eta_{\mu_3,\mu_4}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ W & 3 \\ W^\dagger & 4 \end{pmatrix} \qquad 2ig\text{gtv0pi0}^2\text{v0Wv1W}\eta_{\mu_3,\mu_4}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZP} & 2 \\ W & 3 \\ W^\dagger & 4 \end{pmatrix} \qquad 2ig\text{gtv0pi0v0pi0Pv0Wv1W}\eta_{\mu_3,\mu_4}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piZP} & 2 \\ W & 3 \\ W^\dagger & 4 \end{pmatrix} \qquad 2ig\text{gtv0pi0P}^2\text{v0Wv1W}\eta_{\mu_3,\mu_4}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP} & 2 \\ W & 3 \\ W^\dagger & 4 \end{pmatrix} \qquad ig\text{gtv0piv0piPv0Wv1W}\eta_{\mu_3,\mu_4}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piWP}^\dagger & 2 \\ W & 3 \\ W^\dagger & 4 \end{pmatrix} \qquad ig\text{gtv0piv0piPv0Wv1W}\eta_{\mu_3,\mu_4}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP}^\dagger & 2 \\ W & 3 \\ W^\dagger & 4 \end{pmatrix} \qquad ig\text{gtv0piP}^2\text{v0Wv1W}\eta_{\mu_3,\mu_4}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW} & 2 \\ W^\dagger & 3 \\ W^\dagger & 4 \end{pmatrix} \qquad -2ig\text{gtv0pi}^2\text{v0Wv1W}\eta_{\mu_3,\mu_4}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piWP} & 2 \\ W^\dagger & 3 \\ W^\dagger & 4 \end{pmatrix} \qquad -2ig\text{gtv0piv0piPv0Wv1W}\eta_{\mu_3,\mu_4}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP} & 2 \\ W^\dagger & 3 \\ W^\dagger & 4 \end{pmatrix} \qquad -2ig\text{gtv0piP}^2\text{v0Wv1W}\eta_{\mu_3,\mu_4}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ A & 2 \\ \text{WP} & 3 \end{pmatrix}$$
$\frac{1}{2}\text{EEfpi}g\text{v0piv0WP}\eta_{\mu_2,\mu_3} - \frac{1}{2}\text{EEfpigtv0piv1WP}\eta_{\mu_2,\mu_3} + \frac{1}{2}\text{EEfpigtv1piv1WP}\eta_{\mu_2,\mu_3}$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piZ} & 2 \\ A & 3 \\ \text{WP} & 4 \end{pmatrix}$$
$-\frac{1}{2}i\text{EE}g\text{v0piv0pi0v0WP}\eta_{\mu_3,\mu_4} - \frac{1}{2}i\text{EEgtv0piv0pi0v1WP}\eta_{\mu_3,\mu_4} - \frac{1}{2}i\text{EEgtv1piv1pi0v1WP}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piZP} & 2 \\ A & 3 \\ \text{WP} & 4 \end{pmatrix}$$
$-\frac{1}{2}i\text{EE}g\text{v0piv0pi0Pv0WP}\eta_{\mu_3,\mu_4} - \frac{1}{2}i\text{EEgtv0piv0pi0Pv1WP}\eta_{\mu_3,\mu_4} - \frac{1}{2}i\text{EEgtv1piv1pi0Pv1WP}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ A & 2 \\ \text{WP} & 3 \end{pmatrix}$$
$\frac{1}{2}\text{EEfpi}g\text{v0piPv0WP}\eta_{\mu_2,\mu_3} - \frac{1}{2}\text{EEfpigtv0piPv1WP}\eta_{\mu_2,\mu_3} + \frac{1}{2}\text{EEfpigtv1piPv1WP}\eta_{\mu_2,\mu_3}$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piZ} & 2 \\ A & 3 \\ \text{WP} & 4 \end{pmatrix}$$
$-\frac{1}{2}i\text{EE}g\text{v0pi0v0piPv0WP}\eta_{\mu_3,\mu_4} - \frac{1}{2}i\text{EEgtv0pi0v0piPv1WP}\eta_{\mu_3,\mu_4} - \frac{1}{2}i\text{EEgtv1pi0v1piPv1WP}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piZP} & 2 \\ A & 3 \\ \text{WP} & 4 \end{pmatrix}$$
$-\frac{1}{2}i\text{EE}g\text{v0pi0Pv0piPv0WP}\eta_{\mu_3,\mu_4} - \frac{1}{2}i\text{EEgtv0pi0Pv0piPv1WP}\eta_{\mu_3,\mu_4} - \frac{1}{2}i\text{EEgtv1pi0Pv1piPv1WP}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piW}^\dagger & 2 \\ \text{piW} & 3 \\ \text{WP} & 4 \end{pmatrix}$$
$-\frac{g\text{v0pi}^3\text{v0WP}p_1^{\mu_4}}{3\text{fpi}} + \frac{\text{gtv0pi}^3\text{v1WP}p_1^{\mu_4}}{3\text{fpi}} - \frac{\text{gtv1pi}^3\text{v1WP}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{v0pi}^3\text{v0WP}p_2^{\mu_4}}{3\text{fpi}} + \frac{\text{gtv0pi}^3\text{v1WP}p_2^{\mu_4}}{3\text{fpi}} - \frac{\text{gtv1pi}^3\text{v1WP}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{v0pi}^3\text{v0WP}p_3^{\mu_4}}{3\text{fpi}} - \frac{2\text{gtv0pi}^3\text{v1WP}p_3^{\mu_4}}{3\text{fpi}} + \frac{2\text{gtv1pi}^3\text{v1WP}p_3^{\mu_4}}{3\text{fpi}}$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP}^\dagger & 2 \\ \text{piW} & 3 \\ \text{WP} & 4 \end{pmatrix}$$
$-\frac{g\text{v0pi}^2\text{v0piPv0WP}p_1^{\mu_4}}{3\text{fpi}} + \frac{\text{gtv0pi}^2\text{v0piPv1WP}p_1^{\mu_4}}{3\text{fpi}} - \frac{\text{gtv1pi}^2\text{v1piPv1WP}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{v0pi}^2\text{v0piPv0WP}p_2^{\mu_4}}{3\text{fpi}} + \frac{\text{gtv0pi}^2\text{v0piPv1WP}p_2^{\mu_4}}{3\text{fpi}} - \frac{\text{gtv1pi}^2\text{v1piPv1WP}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{v0pi}^2\text{v0piPv0WP}p_3^{\mu_4}}{3\text{fpi}} - \frac{2\text{gtv0pi}^2\text{v0piPv1WP}p_3^{\mu_4}}{3\text{fpi}} + \frac{2\text{gtv1pi}^2\text{v1piPv1WP}p_3^{\mu_4}}{3\text{fpi}}$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piWP}^\dagger & 2 \\ \text{piW} & 3 \\ \text{WP} & 4 \end{pmatrix}$$
$-\frac{g\text{v0piv0piP}^2\text{v0WP}p_1^{\mu_4}}{3\text{fpi}} + \frac{\text{gtv0piv0piP}^2\text{v1WP}p_1^{\mu_4}}{3\text{fpi}} - \frac{\text{gtv1piv1piP}^2\text{v1WP}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{v0piv0piP}^2\text{v0WP}p_2^{\mu_4}}{3\text{fpi}} + \frac{\text{gtv0piv0piP}^2\text{v1WP}p_2^{\mu_4}}{3\text{fpi}} - \frac{\text{gtv1piv1piP}^2\text{v1WP}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{v0piv0piP}^2\text{v0WP}p_3^{\mu_4}}{3\text{fpi}} - \frac{2\text{gtv0piv0piP}^2\text{v1WP}p_3^{\mu_4}}{3\text{fpi}} + \frac{2\text{gtv1piv1piP}^2\text{v1WP}p_3^{\mu_4}}{3\text{fpi}}$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piW}^\dagger & 2 \\ \text{WP} & 3 \end{pmatrix}$$
$\frac{1}{2}i g\text{v0piv0pi0v0WP}p_1^{\mu_3} + \frac{1}{2}i\text{gtv0piv0pi0v1WP}p_1^{\mu_3} + \frac{1}{2}i\text{gtv1piv1pi0v1WP}p_1^{\mu_3} - \frac{1}{2}i g\text{v0piv0pi0v0WP}p_2^{\mu_3} - \frac{1}{2}i\text{gtv0piv0pi0v1WP}p_2^{\mu_3} - \frac{1}{2}i\text{gtv1piv1pi0v1WP}p_2^{\mu_3}$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ \text{piW}^\dagger & 3 \\ \text{WP} & 4 \end{pmatrix}$$
$\frac{g\text{v0piv0pi0}^2\text{v0WP}p_1^{\mu_4}}{3\text{fpi}} - \frac{\text{gtv0piv0pi0}^2\text{v1WP}p_1^{\mu_4}}{3\text{fpi}} + \frac{\text{gtv1piv1pi0}^2\text{v1WP}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{v0piv0pi0}^2\text{v0WP}p_2^{\mu_4}}{3\text{fpi}} - \frac{\text{gtv0piv0pi0}^2\text{v1WP}p_2^{\mu_4}}{3\text{fpi}} + \frac{\text{gtv1piv1pi0}^2\text{v1WP}p_2^{\mu_4}}{3\text{fpi}} - \frac{2g\text{v0piv0pi0}^2\text{v0WP}p_3^{\mu_4}}{3\text{fpi}} + \frac{2\text{gtv0piv0pi0}^2\text{v1WP}p_3^{\mu_4}}{3\text{fpi}} - \frac{2\text{gtv1piv1pi0}^2\text{v1WP}p_3^{\mu_4}}{3\text{fpi}}$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piW}^\dagger & 2 \\ \text{WP} & 3 \end{pmatrix}$$
$\frac{1}{2}i g\text{v0piv0pi0Pv0WP}p_1^{\mu_3} + \frac{1}{2}i\text{gtv0piv0pi0Pv1WP}p_1^{\mu_3} + \frac{1}{2}i\text{gtv1piv1pi0Pv1WP}p_1^{\mu_3} - \frac{1}{2}i g\text{v0piv0pi0Pv0WP}p_2^{\mu_3} - \frac{1}{2}i\text{gtv0piv0pi0Pv1WP}p_2^{\mu_3} - \frac{1}{2}i\text{gtv1piv1pi0Pv1WP}p_2^{\mu_3}$

$$
\begin{pmatrix}
\text{piZ} & 1 \\
\text{piZP} & 2 \\
\text{piW}^\dagger & 3 \\
\text{WP} & 4
\end{pmatrix}
\quad
\begin{aligned}
&\frac{g\text{v0piv0pi0v0pi0Pv0WP}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0piv0pi0v0pi0Pv1WP}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1piv1pi0v1pi0Pv1WP}p_1^{\mu_4}}{3\text{fpi}} + \\
&\frac{g\text{v0piv0pi0v0pi0Pv0WP}p_2^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0piv0pi0v0pi0Pv1WP}p_2^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1piv1pi0v1pi0Pv1WP}p_2^{\mu_4}}{3\text{fpi}} - \\
&\frac{2g\text{v0piv0pi0v0pi0Pv0WP}p_3^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv0piv0pi0v0pi0Pv1WP}p_3^{\mu_4}}{3\text{fpi}} - \frac{2g\text{tv1piv1pi0v1pi0Pv1WP}p_3^{\mu_4}}{3\text{fpi}}
\end{aligned}
$$

$$
\begin{pmatrix}
\text{piZP} & 1 \\
\text{piZP} & 2 \\
\text{piW}^\dagger & 3 \\
\text{WP} & 4
\end{pmatrix}
\quad
\begin{aligned}
&\frac{g\text{v0piv0pi0P}^2\text{v0WP}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0piv0pi0P}^2\text{v1WP}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1piv1pi0P}^2\text{v1WP}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{v0piv0pi0P}^2\text{v0WP}p_2^{\mu_4}}{3\text{fpi}} - \\
&\frac{g\text{tv0piv0pi0P}^2\text{v1WP}p_2^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1piv1pi0P}^2\text{v1WP}p_2^{\mu_4}}{3\text{fpi}} - \frac{2g\text{v0piv0pi0P}^2\text{v0WP}p_3^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv0piv0pi0P}^2\text{v1WP}p_3^{\mu_4}}{3\text{fpi}} - \\
&\frac{2g\text{tv1piv1pi0P}^2\text{v1WP}p_3^{\mu_4}}{3\text{fpi}}
\end{aligned}
$$

$$
\begin{pmatrix}
\text{piW}^\dagger & 1 \\
\text{piWP} & 2 \\
\text{piW}^\dagger & 3 \\
\text{WP} & 4
\end{pmatrix}
\quad
\begin{aligned}
&-\frac{g\text{v0pi}^2\text{v0piPv0WP}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv0pi}^2\text{v0piPv1WP}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv1pi}^2\text{v1piPv1WP}p_1^{\mu_4}}{3\text{fpi}} + \frac{2g\text{v0pi}^2\text{v0piPv0WP}p_2^{\mu_4}}{3\text{fpi}} - \\
&\frac{2g\text{tv0pi}^2\text{v0piPv1WP}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv1pi}^2\text{v1piPv1WP}p_2^{\mu_4}}{3\text{fpi}} - \frac{g\text{v0pi}^2\text{v0piPv0WP}p_3^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv0pi}^2\text{v0piPv1WP}p_3^{\mu_4}}{3\text{fpi}} - \\
&\frac{g\text{tv1pi}^2\text{v1piPv1WP}p_3^{\mu_4}}{3\text{fpi}}
\end{aligned}
$$

$$
\begin{pmatrix}
\text{piWP} & 1 \\
\text{piWP}^\dagger & 2 \\
\text{piW}^\dagger & 3 \\
\text{WP} & 4
\end{pmatrix}
\quad
\begin{aligned}
&\frac{2g\text{v0piv0piP}^2\text{v0WP}p_1^{\mu_4}}{3\text{fpi}} - \frac{2g\text{tv0piv0piP}^2\text{v1WP}p_1^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv1piv1piP}^2\text{v1WP}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{v0piv0piP}^2\text{v0WP}p_2^{\mu_4}}{3\text{fpi}} + \\
&\frac{g\text{tv0piv0piP}^2\text{v1WP}p_2^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv1piv1piP}^2\text{v1WP}p_2^{\mu_4}}{3\text{fpi}} - \frac{g\text{v0piv0piP}^2\text{v0WP}p_3^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv0piv0piP}^2\text{v1WP}p_3^{\mu_4}}{3\text{fpi}} - \\
&\frac{g\text{tv1piv1piP}^2\text{v1WP}p_3^{\mu_4}}{3\text{fpi}}
\end{aligned}
$$

$$
\begin{pmatrix}
\text{piWP}^\dagger & 1 \\
\text{piWP}^\dagger & 2 \\
\text{piWP} & 3 \\
\text{WP} & 4
\end{pmatrix}
\quad
\begin{aligned}
&-\frac{g\text{v0piP}^3\text{v0WP}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv0piP}^3\text{v1WP}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv1piP}^3\text{v1WP}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{v0piP}^3\text{v0WP}p_2^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv0piP}^3\text{v1WP}p_2^{\mu_4}}{3\text{fpi}} - \\
&\frac{g\text{tv1piP}^3\text{v1WP}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{v0piP}^3\text{v0WP}p_3^{\mu_4}}{3\text{fpi}} - \frac{2g\text{tv0piP}^3\text{v1WP}p_3^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv1piP}^3\text{v1WP}p_3^{\mu_4}}{3\text{fpi}}
\end{aligned}
$$

$$
\begin{pmatrix}
\text{piZ} & 1 \\
\text{piWP}^\dagger & 2 \\
\text{WP} & 3
\end{pmatrix}
\quad
\begin{aligned}
&\tfrac{1}{2}i g\text{v0pi0v0piPv0WP}p_1^{\mu_3} + \tfrac{1}{2}i g\text{tv0pi0v0piPv1WP}p_1^{\mu_3} + \tfrac{1}{2}i g\text{tv1pi0v1piPv1WP}p_1^{\mu_3} - \\
&\tfrac{1}{2}i g\text{v0pi0v0piPv0WP}p_2^{\mu_3} - \tfrac{1}{2}i g\text{tv0pi0v0piPv1WP}p_2^{\mu_3} - \tfrac{1}{2}i g\text{tv1pi0v1piPv1WP}p_2^{\mu_3}
\end{aligned}
$$

$$
\begin{pmatrix}
\text{piZ} & 1 \\
\text{piZ} & 2 \\
\text{piWP}^\dagger & 3 \\
\text{WP} & 4
\end{pmatrix}
\quad
\begin{aligned}
&\frac{g\text{v0pi0}^2\text{v0piPv0WP}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0pi0}^2\text{v0piPv1WP}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1pi0}^2\text{v1piPv1WP}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{v0pi0}^2\text{v0piPv0WP}p_2^{\mu_4}}{3\text{fpi}} - \\
&\frac{g\text{tv0pi0}^2\text{v0piPv1WP}p_2^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1pi0}^2\text{v1piPv1WP}p_2^{\mu_4}}{3\text{fpi}} - \frac{2g\text{v0pi0}^2\text{v0piPv0WP}p_3^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv0pi0}^2\text{v0piPv1WP}p_3^{\mu_4}}{3\text{fpi}} - \\
&\frac{2g\text{tv1pi0}^2\text{v1piPv1WP}p_3^{\mu_4}}{3\text{fpi}}
\end{aligned}
$$

$$
\begin{pmatrix}
\text{piZP} & 1 \\
\text{piWP}^\dagger & 2 \\
\text{WP} & 3
\end{pmatrix}
\quad
\begin{aligned}
&\tfrac{1}{2}i g\text{v0pi0Pv0piPv0WP}p_1^{\mu_3} + \tfrac{1}{2}i g\text{tv0pi0Pv0piPv1WP}p_1^{\mu_3} + \tfrac{1}{2}i g\text{tv1pi0Pv1piPv1WP}p_1^{\mu_3} - \\
&\tfrac{1}{2}i g\text{v0pi0Pv0piPv0WP}p_2^{\mu_3} - \tfrac{1}{2}i g\text{tv0pi0Pv0piPv1WP}p_2^{\mu_3} - \tfrac{1}{2}i g\text{tv1pi0Pv1piPv1WP}p_2^{\mu_3}
\end{aligned}
$$

$$
\begin{pmatrix}
\text{piZ} & 1 \\
\text{piZP} & 2 \\
\text{piWP}^\dagger & 3 \\
\text{WP} & 4
\end{pmatrix}
\quad
\begin{aligned}
&\frac{g\text{v0pi0v0pi0Pv0piPv0WP}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0pi0v0pi0Pv0piPv1WP}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1pi0v1pi0Pv1piPv1WP}p_1^{\mu_4}}{3\text{fpi}} + \\
&\frac{g\text{v0pi0v0pi0Pv0piPv0WP}p_2^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0pi0v0pi0Pv0piPv1WP}p_2^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1pi0v1pi0Pv1piPv1WP}p_2^{\mu_4}}{3\text{fpi}} - \\
&\frac{2g\text{v0pi0v0pi0Pv0piPv0WP}p_3^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv0pi0v0pi0Pv0piPv1WP}p_3^{\mu_4}}{3\text{fpi}} - \frac{2g\text{tv1pi0v1pi0Pv1piPv1WP}p_3^{\mu_4}}{3\text{fpi}}
\end{aligned}
$$

$$
\begin{pmatrix}
\text{piZP} & 1 \\
\text{piZP} & 2 \\
\text{piWP}^\dagger & 3 \\
\text{WP} & 4
\end{pmatrix}
\quad
\begin{aligned}
&\frac{g\text{v0pi0P}^2\text{v0piPv0WP}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0pi0P}^2\text{v0piPv1WP}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1pi0P}^2\text{v1piPv1WP}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{v0pi0P}^2\text{v0piPv0WP}p_2^{\mu_4}}{3\text{fpi}} - \\
&\frac{g\text{tv0pi0P}^2\text{v0piPv1WP}p_2^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1pi0P}^2\text{v1piPv1WP}p_2^{\mu_4}}{3\text{fpi}} - \frac{2g\text{v0pi0P}^2\text{v0piPv0WP}p_3^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv0pi0P}^2\text{v0piPv1WP}p_3^{\mu_4}}{3\text{fpi}} - \\
&\frac{2g\text{tv1pi0P}^2\text{v1piPv1WP}p_3^{\mu_4}}{3\text{fpi}}
\end{aligned}
$$

$$
\begin{pmatrix}
\text{piW}^\dagger & 1 \\
\text{piW}^\dagger & 2 \\
W & 3 \\
\text{WP} & 4
\end{pmatrix}
\quad
-i g g\text{tv0pi}^2\text{v0WPv1W}\eta_{\mu_3,\mu_4} - i g g\text{tv0pi}^2\text{v0Wv1WP}\eta_{\mu_3,\mu_4}
$$

$$
\begin{pmatrix}
\text{piW}^\dagger & 1 \\
\text{piWP}^\dagger & 2 \\
W & 3 \\
\text{WP} & 4
\end{pmatrix}
\qquad
-ig\text{gtv0piv0piPv0WPv1W}\eta_{\mu_3,\mu_4} - ig\text{gtv0piv0piPv0Wv1WP}\eta_{\mu_3,\mu_4}
$$

$$
\begin{pmatrix}
\text{piWP}^\dagger & 1 \\
\text{piWP}^\dagger & 2 \\
W & 3 \\
\text{WP} & 4
\end{pmatrix}
\qquad
-ig\text{gtv0piP}^2\text{v0WPv1W}\eta_{\mu_3,\mu_4} - ig\text{gtv0piP}^2\text{v0Wv1WP}\eta_{\mu_3,\mu_4}
$$

$$
\begin{pmatrix}
\text{piW} & 1 \\
\text{piW}^\dagger & 2 \\
W^\dagger & 3 \\
\text{WP} & 4
\end{pmatrix}
\qquad
\tfrac{1}{2}ig\text{gtv0pi}^2\text{v0WPv1W}\eta_{\mu_3,\mu_4} + \tfrac{1}{2}ig\text{gtv0pi}^2\text{v0Wv1WP}\eta_{\mu_3,\mu_4}
$$

$$
\begin{pmatrix}
\text{piZ} & 1 \\
W^\dagger & 2 \\
\text{WP} & 3
\end{pmatrix}
\qquad
-\tfrac{1}{2}\text{fpi}gg\text{tv0pi0v0WPv1W}\eta_{\mu_2,\mu_3} + \tfrac{1}{2}\text{fpi}gg\text{tv0pi0v0Wv1WP}\eta_{\mu_2,\mu_3}
$$

$$
\begin{pmatrix}
\text{piZ} & 1 \\
\text{piZ} & 2 \\
W^\dagger & 3 \\
\text{WP} & 4
\end{pmatrix}
\qquad
ig\text{gtv0pi0}^2\text{v0WPv1W}\eta_{\mu_3,\mu_4} + ig\text{gtv0pi0}^2\text{v0Wv1WP}\eta_{\mu_3,\mu_4}
$$

$$
\begin{pmatrix}
\text{piZP} & 1 \\
W^\dagger & 2 \\
\text{WP} & 3
\end{pmatrix}
\qquad
-\tfrac{1}{2}\text{fpi}gg\text{tv0pi0Pv0WPv1W}\eta_{\mu_2,\mu_3} + \tfrac{1}{2}\text{fpi}gg\text{tv0pi0Pv0Wv1WP}\eta_{\mu_2,\mu_3}
$$

$$
\begin{pmatrix}
\text{piZ} & 1 \\
\text{piZP} & 2 \\
W^\dagger & 3 \\
\text{WP} & 4
\end{pmatrix}
\qquad
ig\text{gtv0pi0v0pi0Pv0WPv1W}\eta_{\mu_3,\mu_4} + ig\text{gtv0pi0v0pi0Pv0Wv1WP}\eta_{\mu_3,\mu_4}
$$

$$
\begin{pmatrix}
\text{piZP} & 1 \\
\text{piZP} & 2 \\
W^\dagger & 3 \\
\text{WP} & 4
\end{pmatrix}
\qquad
ig\text{gtv0pi0P}^2\text{v0WPv1W}\eta_{\mu_3,\mu_4} + ig\text{gtv0pi0P}^2\text{v0Wv1WP}\eta_{\mu_3,\mu_4}
$$

$$
\begin{pmatrix}
\text{piW}^\dagger & 1 \\
\text{piWP} & 2 \\
W^\dagger & 3 \\
\text{WP} & 4
\end{pmatrix}
\qquad
\tfrac{1}{2}ig\text{gtv0piv0piPv0WPv1W}\eta_{\mu_3,\mu_4} + \tfrac{1}{2}ig\text{gtv0piv0piPv0Wv1WP}\eta_{\mu_3,\mu_4}
$$

$$
\begin{pmatrix}
\text{piW} & 1 \\
\text{piWP}^\dagger & 2 \\
W^\dagger & 3 \\
\text{WP} & 4
\end{pmatrix}
\qquad
\tfrac{1}{2}ig\text{gtv0piv0piPv0WPv1W}\eta_{\mu_3,\mu_4} + \tfrac{1}{2}ig\text{gtv0piv0piPv0Wv1WP}\eta_{\mu_3,\mu_4}
$$

$$
\begin{pmatrix}
\text{piWP} & 1 \\
\text{piWP}^\dagger & 2 \\
W^\dagger & 3 \\
\text{WP} & 4
\end{pmatrix}
\qquad
\tfrac{1}{2}ig\text{gtv0piP}^2\text{v0WPv1W}\eta_{\mu_3,\mu_4} + \tfrac{1}{2}ig\text{gtv0piP}^2\text{v0Wv1WP}\eta_{\mu_3,\mu_4}
$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piW}^\dagger & 2 \\ \text{WP} & 3 \\ \text{WP} & 4 \end{pmatrix} \qquad -2igg\text{tv0pi}^2\text{v0WPv1WP}\eta_{\mu_3,\mu_4}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP}^\dagger & 2 \\ \text{WP} & 3 \\ \text{WP} & 4 \end{pmatrix} \qquad -2igg\text{tv0piv0piPv0WPv1WP}\eta_{\mu_3,\mu_4}$$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piWP}^\dagger & 2 \\ \text{WP} & 3 \\ \text{WP} & 4 \end{pmatrix} \qquad -2igg\text{tv0piP}^2\text{v0WPv1WP}\eta_{\mu_3,\mu_4}$$

$$\begin{pmatrix} \text{piW} & 1 \\ A & 2 \\ \text{WP}^\dagger & 3 \end{pmatrix} \qquad -\tfrac{1}{2}\text{EEfpi}g\text{v0piv0WP}\eta_{\mu_2,\mu_3} + \tfrac{1}{2}\text{EEfpigtv0piv1WP}\eta_{\mu_2,\mu_3} - \tfrac{1}{2}\text{EEfpigtv1piv1WP}\eta_{\mu_2,\mu_3}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piZ} & 2 \\ A & 3 \\ \text{WP}^\dagger & 4 \end{pmatrix} \qquad -\tfrac{1}{2}i\text{EE}g\text{v0piv0pi0v0WP}\eta_{\mu_3,\mu_4} - \tfrac{1}{2}i\text{EEgtv0piv0pi0v1WP}\eta_{\mu_3,\mu_4} - \tfrac{1}{2}i\text{EEgtv1piv1pi0v1WP}\eta_{\mu_3,\mu_4}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piZP} & 2 \\ A & 3 \\ \text{WP}^\dagger & 4 \end{pmatrix} \qquad -\tfrac{1}{2}i\text{EE}g\text{v0piv0pi0Pv0WP}\eta_{\mu_3,\mu_4} - \tfrac{1}{2}i\text{EEgtv0piv0pi0Pv1WP}\eta_{\mu_3,\mu_4} - \tfrac{1}{2}i\text{EEgtv1piv1pi0Pv1WP}\eta_{\mu_3,\mu_4}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ A & 2 \\ \text{WP}^\dagger & 3 \end{pmatrix} \qquad -\tfrac{1}{2}\text{EEfpi}g\text{v0piPv0WP}\eta_{\mu_2,\mu_3} + \tfrac{1}{2}\text{EEfpigtv0piPv1WP}\eta_{\mu_2,\mu_3} - \tfrac{1}{2}\text{EEfpigtv1piPv1WP}\eta_{\mu_2,\mu_3}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piZ} & 2 \\ A & 3 \\ \text{WP}^\dagger & 4 \end{pmatrix} \qquad -\tfrac{1}{2}i\text{EE}g\text{v0pi0v0piPv0WP}\eta_{\mu_3,\mu_4} - \tfrac{1}{2}i\text{EEgtv0pi0v0piPv1WP}\eta_{\mu_3,\mu_4} - \tfrac{1}{2}i\text{EEgtv1pi0v1piPv1WP}\eta_{\mu_3,\mu_4}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piZP} & 2 \\ A & 3 \\ \text{WP}^\dagger & 4 \end{pmatrix} \qquad \begin{aligned} &-\tfrac{1}{2}i\text{EE}g\text{v0pi0Pv0piPv0WP}\eta_{\mu_3,\mu_4} - \tfrac{1}{2}i\text{EEgtv0pi0Pv0piPv1WP}\eta_{\mu_3,\mu_4} - \\ &\tfrac{1}{2}i\text{EEgtv1pi0Pv1piPv1WP}\eta_{\mu_3,\mu_4} \end{aligned}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ \text{piW} & 3 \\ \text{WP}^\dagger & 4 \end{pmatrix} \qquad \begin{aligned} &-\frac{g\text{v0pi}^3\text{v0WP}p_1^{\mu_4}}{3\text{fpi}} + \frac{\text{gtv0pi}^3\text{v1WP}p_1^{\mu_4}}{3\text{fpi}} - \frac{\text{gtv1pi}^3\text{v1WP}p_1^{\mu_4}}{3\text{fpi}} + \frac{2g\text{v0pi}^3\text{v0WP}p_2^{\mu_4}}{3\text{fpi}} - \frac{2\text{gtv0pi}^3\text{v1WP}p_2^{\mu_4}}{3\text{fpi}} + \\ &\frac{2\text{gtv1pi}^3\text{v1WP}p_2^{\mu_4}}{3\text{fpi}} - \frac{g\text{v0pi}^3\text{v0WP}p_3^{\mu_4}}{3\text{fpi}} + \frac{\text{gtv0pi}^3\text{v1WP}p_3^{\mu_4}}{3\text{fpi}} - \frac{\text{gtv1pi}^3\text{v1WP}p_3^{\mu_4}}{3\text{fpi}} \end{aligned}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piW} & 2 \\ \text{WP}^\dagger & 3 \end{pmatrix} \qquad \begin{aligned} &-\tfrac{1}{2}ig\text{v0piv0pi0v0WP}p_1^{\mu_3} - \tfrac{1}{2}i\text{gtv0piv0pi0v1WP}p_1^{\mu_3} - \tfrac{1}{2}i\text{gtv1piv1pi0v1WP}p_1^{\mu_3} + \\ &\tfrac{1}{2}ig\text{v0piv0pi0v0WP}p_2^{\mu_3} + \tfrac{1}{2}i\text{gtv0piv0pi0v1WP}p_2^{\mu_3} + \tfrac{1}{2}i\text{gtv1piv1pi0v1WP}p_2^{\mu_3} \end{aligned}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ \text{piW} & 3 \\ \text{WP}^\dagger & 4 \end{pmatrix} \qquad \begin{aligned} &\frac{g\text{v0piv0pi0}^2\text{v0WP}p_1^{\mu_4}}{3\text{fpi}} - \frac{\text{gtv0piv0pi0}^2\text{v1WP}p_1^{\mu_4}}{3\text{fpi}} + \frac{\text{gtv1piv1pi0}^2\text{v1WP}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{v0piv0pi0}^2\text{v0WP}p_2^{\mu_4}}{3\text{fpi}} - \\ &\frac{\text{gtv0piv0pi0}^2\text{v1WP}p_2^{\mu_4}}{3\text{fpi}} + \frac{\text{gtv1piv1pi0}^2\text{v1WP}p_2^{\mu_4}}{3\text{fpi}} - \frac{2g\text{v0piv0pi0}^2\text{v0WP}p_3^{\mu_4}}{3\text{fpi}} + \frac{2\text{gtv0piv0pi0}^2\text{v1WP}p_3^{\mu_4}}{3\text{fpi}} - \\ &\frac{2\text{gtv1piv1pi0}^2\text{v1WP}p_3^{\mu_4}}{3\text{fpi}} \end{aligned}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piW} & 2 \\ \text{WP}^\dagger & 3 \end{pmatrix} \qquad -\tfrac{1}{2}ig\text{v0piv0pi0Pv0WP}p_1^{\mu_3} - \tfrac{1}{2}ig\text{tv0piv0pi0Pv1WP}p_1^{\mu_3} - \tfrac{1}{2}ig\text{tv1piv1pi0Pv1WP}p_1^{\mu_3} + \\ \tfrac{1}{2}ig\text{v0piv0pi0Pv0WP}p_2^{\mu_3} + \tfrac{1}{2}ig\text{tv0piv0pi0Pv1WP}p_2^{\mu_3} + \tfrac{1}{2}ig\text{tv1piv1pi0Pv1WP}p_2^{\mu_3}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZP} & 2 \\ \text{piW} & 3 \\ \text{WP}^\dagger & 4 \end{pmatrix} \qquad \frac{g\text{v0piv0pi0v0pi0Pv0WP}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0piv0pi0v0pi0Pv1WP}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1piv1pi0v1pi0Pv1WP}p_1^{\mu_4}}{3\text{fpi}} + \\ \frac{g\text{v0piv0pi0v0pi0Pv0WP}p_2^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0piv0pi0v0pi0Pv1WP}p_2^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1piv1pi0v1pi0Pv1WP}p_2^{\mu_4}}{3\text{fpi}} - \\ \frac{2g\text{v0piv0pi0v0pi0Pv0WP}p_3^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv0piv0pi0v0pi0Pv1WP}p_3^{\mu_4}}{3\text{fpi}} - \frac{2g\text{tv1piv1pi0v1pi0Pv1WP}p_3^{\mu_4}}{3\text{fpi}}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piZP} & 2 \\ \text{piW} & 3 \\ \text{WP}^\dagger & 4 \end{pmatrix} \qquad \frac{g\text{v0piv0pi0P}^2\text{v0WP}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0piv0pi0P}^2\text{v1WP}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1piv1pi0P}^2\text{v1WP}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{v0piv0pi0P}^2\text{v0WP}p_2^{\mu_4}}{3\text{fpi}} - \\ \frac{g\text{tv0piv0pi0P}^2\text{v1WP}p_2^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1piv1pi0P}^2\text{v1WP}p_2^{\mu_4}}{3\text{fpi}} - \frac{2g\text{v0piv0pi0P}^2\text{v0WP}p_3^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv0piv0pi0P}^2\text{v1WP}p_3^{\mu_4}}{3\text{fpi}} - \\ \frac{2g\text{tv1piv1pi0P}^2\text{v1WP}p_3^{\mu_4}}{3\text{fpi}}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP} & 2 \\ \text{piW} & 3 \\ \text{WP}^\dagger & 4 \end{pmatrix} \qquad \frac{2g\text{v0pi}^2\text{v0piPv0WP}p_1^{\mu_4}}{3\text{fpi}} - \frac{2g\text{tv0pi}^2\text{v0piPv1WP}p_1^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv1pi}^2\text{v1piPv1WP}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{v0pi}^2\text{v0piPv0WP}p_2^{\mu_4}}{3\text{fpi}} + \\ \frac{g\text{tv0pi}^2\text{v0piPv1WP}p_2^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv1pi}^2\text{v1piPv1WP}p_2^{\mu_4}}{3\text{fpi}} - \frac{g\text{v0pi}^2\text{v0piPv0WP}p_3^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv0pi}^2\text{v0piPv1WP}p_3^{\mu_4}}{3\text{fpi}} - \\ \frac{g\text{tv1pi}^2\text{v1piPv1WP}p_3^{\mu_4}}{3\text{fpi}}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{piW} & 3 \\ \text{WP}^\dagger & 4 \end{pmatrix} \qquad -\frac{g\text{v0pi}^2\text{v0piPv0WP}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv0pi}^2\text{v0piPv1WP}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv1pi}^2\text{v1piPv1WP}p_1^{\mu_4}}{3\text{fpi}} + \frac{2g\text{v0pi}^2\text{v0piPv0WP}p_2^{\mu_4}}{3\text{fpi}} - \\ \frac{2g\text{tv0pi}^2\text{v0piPv1WP}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv1pi}^2\text{v1piPv1WP}p_2^{\mu_4}}{3\text{fpi}} - \frac{g\text{v0pi}^2\text{v0piPv0WP}p_3^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv0pi}^2\text{v0piPv1WP}p_3^{\mu_4}}{3\text{fpi}} - \\ \frac{g\text{tv1pi}^2\text{v1piPv1WP}p_3^{\mu_4}}{3\text{fpi}}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{piW} & 3 \\ \text{WP}^\dagger & 4 \end{pmatrix} \qquad -\frac{g\text{v0piv0piP}^2\text{v0WP}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv0piv0piP}^2\text{v1WP}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv1piv1piP}^2\text{v1WP}p_1^{\mu_4}}{3\text{fpi}} + \frac{2g\text{v0piv0piP}^2\text{v0WP}p_2^{\mu_4}}{3\text{fpi}} - \\ \frac{2g\text{tv0piv0piP}^2\text{v1WP}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv1piv1piP}^2\text{v1WP}p_2^{\mu_4}}{3\text{fpi}} - \frac{g\text{v0piv0piP}^2\text{v0WP}p_3^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv0piv0piP}^2\text{v1WP}p_3^{\mu_4}}{3\text{fpi}} - \\ \frac{g\text{tv1piv1piP}^2\text{v1WP}p_3^{\mu_4}}{3\text{fpi}}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP} & 2 \\ \text{piW}^\dagger & 3 \\ \text{WP}^\dagger & 4 \end{pmatrix} \qquad -\frac{g\text{v0piv0piP}^2\text{v0WP}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv0piv0piP}^2\text{v1WP}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv1piv1piP}^2\text{v1WP}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{v0piv0piP}^2\text{v0WP}p_2^{\mu_4}}{3\text{fpi}} + \\ \frac{g\text{tv0piv0piP}^2\text{v1WP}p_2^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv1piv1piP}^2\text{v1WP}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{v0piv0piP}^2\text{v0WP}p_3^{\mu_4}}{3\text{fpi}} - \frac{2g\text{tv0piv0piP}^2\text{v1WP}p_3^{\mu_4}}{3\text{fpi}} + \\ \frac{2g\text{tv1piv1piP}^2\text{v1WP}p_3^{\mu_4}}{3\text{fpi}}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piWP} & 2 \\ \text{WP}^\dagger & 3 \end{pmatrix} \qquad -\tfrac{1}{2}ig\text{v0pi0v0piPv0WP}p_1^{\mu_3} - \tfrac{1}{2}ig\text{tv0pi0v0piPv1WP}p_1^{\mu_3} - \tfrac{1}{2}ig\text{tv1pi0v1piPv1WP}p_1^{\mu_3} + \\ \tfrac{1}{2}ig\text{v0pi0v0piPv0WP}p_2^{\mu_3} + \tfrac{1}{2}ig\text{tv0pi0v0piPv1WP}p_2^{\mu_3} + \tfrac{1}{2}ig\text{tv1pi0v1piPv1WP}p_2^{\mu_3}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ \text{piWP} & 3 \\ \text{WP}^\dagger & 4 \end{pmatrix} \qquad \frac{g\text{v0pi0}^2\text{v0piPv0WP}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0pi0}^2\text{v0piPv1WP}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1pi0}^2\text{v1piPv1WP}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{v0pi0}^2\text{v0piPv0WP}p_2^{\mu_4}}{3\text{fpi}} - \\ \frac{g\text{tv0pi0}^2\text{v0piPv1WP}p_2^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1pi0}^2\text{v1piPv1WP}p_2^{\mu_4}}{3\text{fpi}} - \frac{2g\text{v0pi0}^2\text{v0piPv0WP}p_3^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv0pi0}^2\text{v0piPv1WP}p_3^{\mu_4}}{3\text{fpi}} - \\ \frac{2g\text{tv1pi0}^2\text{v1piPv1WP}p_3^{\mu_4}}{3\text{fpi}}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piWP} & 2 \\ \text{WP}^\dagger & 3 \end{pmatrix} \qquad -\tfrac{1}{2}ig\text{v0pi0Pv0piPv0WP}p_1^{\mu_3} - \tfrac{1}{2}ig\text{tv0pi0Pv0piPv1WP}p_1^{\mu_3} - \tfrac{1}{2}ig\text{tv1pi0Pv1piPv1WP}p_1^{\mu_3} + \\ \tfrac{1}{2}ig\text{v0pi0Pv0piPv0WP}p_2^{\mu_3} + \tfrac{1}{2}ig\text{tv0pi0Pv0piPv1WP}p_2^{\mu_3} + \tfrac{1}{2}ig\text{tv1pi0Pv1piPv1WP}p_2^{\mu_3}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZP} & 2 \\ \text{piWP} & 3 \\ \text{WP}^\dagger & 4 \end{pmatrix} \qquad \frac{g\text{v0pi0v0pi0Pv0piPv0WP}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0pi0v0pi0Pv0piPv1WP}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1pi0v1pi0Pv1piPv1WP}p_1^{\mu_4}}{3\text{fpi}} + \\ \frac{g\text{v0pi0v0pi0Pv0piPv0WP}p_2^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0pi0v0pi0Pv0piPv1WP}p_2^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1pi0v1pi0Pv1piPv1WP}p_2^{\mu_4}}{3\text{fpi}} - \\ \frac{2g\text{v0pi0v0pi0Pv0piPv0WP}p_3^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv0pi0v0pi0Pv0piPv1WP}p_3^{\mu_4}}{3\text{fpi}} - \frac{2g\text{tv1pi0v1pi0Pv1piPv1WP}p_3^{\mu_4}}{3\text{fpi}}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piZP} & 2 \\ \text{piWP} & 3 \\ \text{WP}^\dagger & 4 \end{pmatrix} \qquad \frac{g\text{v0pi0P}^2\text{v0piPv0WP}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0pi0P}^2\text{v0piPv1WP}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1pi0P}^2\text{v1piPv1WP}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{v0pi0P}^2\text{v0piPv0WP}p_2^{\mu_4}}{3\text{fpi}} - \\ \frac{g\text{tv0pi0P}^2\text{v0piPv1WP}p_2^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1pi0P}^2\text{v1piPv1WP}p_2^{\mu_4}}{3\text{fpi}} - \frac{2g\text{v0pi0P}^2\text{v0piPv0WP}p_3^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv0pi0P}^2\text{v0piPv1WP}p_3^{\mu_4}}{3\text{fpi}} - \\ \frac{2g\text{tv1pi0P}^2\text{v1piPv1WP}p_3^{\mu_4}}{3\text{fpi}}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{piWP} & 3 \\ \text{WP}^\dagger & 4 \end{pmatrix}$$
$-\frac{g\text{v0piP}^3\text{v0WP}p_1^{\mu_4}}{3\text{fpi}} + \frac{\text{gtv0piP}^3\text{v1WP}p_1^{\mu_4}}{3\text{fpi}} - \frac{\text{gtv1piP}^3\text{v1WP}p_1^{\mu_4}}{3\text{fpi}} + \frac{2g\text{v0piP}^3\text{v0WP}p_2^{\mu_4}}{3\text{fpi}} - \frac{2\text{gtv0piP}^3\text{v1WP}p_2^{\mu_4}}{3\text{fpi}} + \frac{2\text{gtv1piP}^3\text{v1WP}p_2^{\mu_4}}{3\text{fpi}} - \frac{g\text{v0piP}^3\text{v0WP}p_3^{\mu_4}}{3\text{fpi}} + \frac{\text{gtv0piP}^3\text{v1WP}p_3^{\mu_4}}{3\text{fpi}} - \frac{\text{gtv1piP}^3\text{v1WP}p_3^{\mu_4}}{3\text{fpi}}$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ W & 3 \\ \text{WP}^\dagger & 4 \end{pmatrix}$$
$\frac{1}{2}ig\text{gtv0pi}^2\text{v0WPv1W}\eta_{\mu_3,\mu_4} + \frac{1}{2}ig\text{gtv0pi}^2\text{v0Wv1WP}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piZ} & 1 \\ W & 2 \\ \text{WP}^\dagger & 3 \end{pmatrix}$$
$\frac{1}{2}\text{fpi}ig\text{gtv0pi0v0WPv1W}\eta_{\mu_2,\mu_3} - \frac{1}{2}\text{fpi}ig\text{gtv0pi0v0Wv1WP}\eta_{\mu_2,\mu_3}$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ W & 3 \\ \text{WP}^\dagger & 4 \end{pmatrix}$$
$ig\text{gtv0pi0}^2\text{v0WPv1W}\eta_{\mu_3,\mu_4} + ig\text{gtv0pi0}^2\text{v0Wv1WP}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piZP} & 1 \\ W & 2 \\ \text{WP}^\dagger & 3 \end{pmatrix}$$
$\frac{1}{2}\text{fpi}ig\text{gtv0pi0Pv0WPv1W}\eta_{\mu_2,\mu_3} - \frac{1}{2}\text{fpi}ig\text{gtv0pi0Pv0Wv1WP}\eta_{\mu_2,\mu_3}$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZP} & 2 \\ W & 3 \\ \text{WP}^\dagger & 4 \end{pmatrix}$$
$ig\text{gtv0pi0v0pi0Pv0WPv1W}\eta_{\mu_3,\mu_4} + ig\text{gtv0pi0v0pi0Pv0Wv1WP}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piZP} & 2 \\ W & 3 \\ \text{WP}^\dagger & 4 \end{pmatrix}$$
$ig\text{gtv0pi0P}^2\text{v0WPv1W}\eta_{\mu_3,\mu_4} + ig\text{gtv0pi0P}^2\text{v0Wv1WP}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP} & 2 \\ W & 3 \\ \text{WP}^\dagger & 4 \end{pmatrix}$$
$\frac{1}{2}ig\text{gtv0piv0piPv0WPv1W}\eta_{\mu_3,\mu_4} + \frac{1}{2}ig\text{gtv0piv0piPv0Wv1WP}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piWP}^\dagger & 2 \\ W & 3 \\ \text{WP}^\dagger & 4 \end{pmatrix}$$
$\frac{1}{2}ig\text{gtv0piv0piPv0WPv1W}\eta_{\mu_3,\mu_4} + \frac{1}{2}ig\text{gtv0piv0piPv0Wv1WP}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP}^\dagger & 2 \\ W & 3 \\ \text{WP}^\dagger & 4 \end{pmatrix}$$
$\frac{1}{2}ig\text{gtv0piP}^2\text{v0WPv1W}\eta_{\mu_3,\mu_4} + \frac{1}{2}ig\text{gtv0piP}^2\text{v0Wv1WP}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW} & 2 \\ W^\dagger & 3 \\ \text{WP}^\dagger & 4 \end{pmatrix}$$
$-ig\text{gtv0pi}^2\text{v0WPv1W}\eta_{\mu_3,\mu_4} - ig\text{gtv0pi}^2\text{v0Wv1WP}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piWP} & 2 \\ W^\dagger & 3 \\ \text{WP}^\dagger & 4 \end{pmatrix} \qquad -ig\text{gtv0piv0piPv0WPv1W}\eta_{\mu_3,\mu_4} - ig\text{gtv0piv0piPv0Wv1WP}\eta_{\mu_3,\mu_4}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP} & 2 \\ W^\dagger & 3 \\ \text{WP}^\dagger & 4 \end{pmatrix} \qquad -ig\text{gtv0piP}^2\text{v0WPv1W}\eta_{\mu_3,\mu_4} - ig\text{gtv0piP}^2\text{v0Wv1WP}\eta_{\mu_3,\mu_4}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ \text{WP} & 3 \\ \text{WP}^\dagger & 4 \end{pmatrix} \qquad ig\text{gtv0pi}^2\text{v0WPv1WP}\eta_{\mu_3,\mu_4}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ \text{WP} & 3 \\ \text{WP}^\dagger & 4 \end{pmatrix} \qquad 2ig\text{gtv0pi0}^2\text{v0WPv1WP}\eta_{\mu_3,\mu_4}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZP} & 2 \\ \text{WP} & 3 \\ \text{WP}^\dagger & 4 \end{pmatrix} \qquad 2ig\text{gtv0pi0v0pi0Pv0WPv1WP}\eta_{\mu_3,\mu_4}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piZP} & 2 \\ \text{WP} & 3 \\ \text{WP}^\dagger & 4 \end{pmatrix} \qquad 2ig\text{gtv0pi0P}^2\text{v0WPv1WP}\eta_{\mu_3,\mu_4}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP} & 2 \\ \text{WP} & 3 \\ \text{WP}^\dagger & 4 \end{pmatrix} \qquad ig\text{gtv0piv0piPv0WPv1WP}\eta_{\mu_3,\mu_4}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{WP} & 3 \\ \text{WP}^\dagger & 4 \end{pmatrix} \qquad ig\text{gtv0piv0piPv0WPv1WP}\eta_{\mu_3,\mu_4}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{WP} & 3 \\ \text{WP}^\dagger & 4 \end{pmatrix} \qquad ig\text{gtv0piP}^2\text{v0WPv1WP}\eta_{\mu_3,\mu_4}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW} & 2 \\ \text{WP}^\dagger & 3 \\ \text{WP}^\dagger & 4 \end{pmatrix} \qquad -2ig\text{gtv0pi}^2\text{v0WPv1WP}\eta_{\mu_3,\mu_4}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piWP} & 2 \\ \text{WP}^\dagger & 3 \\ \text{WP}^\dagger & 4 \end{pmatrix} \qquad -2ig\text{gtv0piv0piPv0WPv1WP}\eta_{\mu_3,\mu_4}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP} & 2 \\ \text{WP}^\dagger & 3 \\ \text{WP}^\dagger & 4 \end{pmatrix} \qquad -2ig g\text{tv0piP}^2\text{v0WPv1WP}\eta_{\mu_3,\mu_4}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ A & 3 \\ Z & 4 \end{pmatrix} \qquad i\text{EE}g\text{v0pi}^2\text{v0Z}\eta_{\mu_3,\mu_4} + i\text{EEgtv0pi}^2\text{v1Z}\eta_{\mu_3,\mu_4} + i\text{EEgtv1pi}^2\text{v1Z}\eta_{\mu_3,\mu_4} + i\text{EEgpv1pi}^2\text{v2Z}\eta_{\mu_3,\mu_4}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP} & 2 \\ A & 3 \\ Z & 4 \end{pmatrix} \qquad \begin{aligned} &i\text{EE}g\text{v0piv0piPv0Z}\eta_{\mu_3,\mu_4} + i\text{EEgtv0piv0piPv1Z}\eta_{\mu_3,\mu_4} + i\text{EEgtv1piv1piPv1Z}\eta_{\mu_3,\mu_4} + \\ &i\text{EEgpv1piv1piPv2Z}\eta_{\mu_3,\mu_4} \end{aligned}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piWP}^\dagger & 2 \\ A & 3 \\ Z & 4 \end{pmatrix} \qquad \begin{aligned} &i\text{EE}g\text{v0piv0piPv0Z}\eta_{\mu_3,\mu_4} + i\text{EEgtv0piv0piPv1Z}\eta_{\mu_3,\mu_4} + i\text{EEgtv1piv1piPv1Z}\eta_{\mu_3,\mu_4} + \\ &i\text{EEgpv1piv1piPv2Z}\eta_{\mu_3,\mu_4} \end{aligned}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP}^\dagger & 2 \\ A & 3 \\ Z & 4 \end{pmatrix} \qquad i\text{EE}g\text{v0piP}^2\text{v0Z}\eta_{\mu_3,\mu_4} + i\text{EEgtv0piP}^2\text{v1Z}\eta_{\mu_3,\mu_4} + i\text{EEgtv1piP}^2\text{v1Z}\eta_{\mu_3,\mu_4} + i\text{EEgpv1piP}^2\text{v2Z}\eta_{\mu_3,\mu_4}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piW} & 2 \\ Z & 3 \end{pmatrix} \qquad \begin{aligned} &\tfrac{1}{2}ig\text{v0pi}^2\text{v0Z}p_1^{\mu_3} + \tfrac{1}{2}ig\text{tv0pi}^2\text{v1Z}p_1^{\mu_3} + \tfrac{1}{2}ig\text{tv1pi}^2\text{v1Z}p_1^{\mu_3} + \tfrac{1}{2}ig\text{pv1pi}^2\text{v2Z}p_1^{\mu_3} - \tfrac{1}{2}ig\text{v0pi}^2\text{v0Z}p_2^{\mu_3} - \\ &\tfrac{1}{2}ig\text{tv0pi}^2\text{v1Z}p_2^{\mu_3} - \tfrac{1}{2}ig\text{tv1pi}^2\text{v1Z}p_2^{\mu_3} - \tfrac{1}{2}ig\text{pv1pi}^2\text{v2Z}p_2^{\mu_3} \end{aligned}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piZ} & 2 \\ \text{piW} & 3 \\ Z & 4 \end{pmatrix} \qquad \begin{aligned} &\frac{g\text{v0pi}^2\text{v0pi0v0Z}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0pi}^2\text{v0pi0v1Z}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1pi}^2\text{v1pi0v1Z}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{pv1pi}^2\text{v1pi0v2Z}p_1^{\mu_4}}{3\text{fpi}} - \frac{2g\text{v0pi}^2\text{v0pi0v0Z}p_2^{\mu_4}}{3\text{fpi}} + \\ &\frac{2g\text{tv0pi}^2\text{v0pi0v1Z}p_2^{\mu_4}}{3\text{fpi}} - \frac{2g\text{tv1pi}^2\text{v1pi0v1Z}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{pv1pi}^2\text{v1pi0v2Z}p_2^{\mu_4}}{3\text{fpi}} + \frac{g\text{v0pi}^2\text{v0pi0v0Z}p_3^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0pi}^2\text{v0pi0v1Z}p_3^{\mu_4}}{3\text{fpi}} + \\ &\frac{g\text{tv1pi}^2\text{v1pi0v1Z}p_3^{\mu_4}}{3\text{fpi}} - \frac{g\text{pv1pi}^2\text{v1pi0v2Z}p_3^{\mu_4}}{3\text{fpi}} \end{aligned}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piZP} & 2 \\ \text{piW} & 3 \\ Z & 4 \end{pmatrix} \qquad \begin{aligned} &\frac{g\text{v0pi}^2\text{v0pi0Pv0Z}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0pi}^2\text{v0pi0Pv1Z}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1pi}^2\text{v1pi0Pv1Z}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{pv1pi}^2\text{v1pi0Pv2Z}p_1^{\mu_4}}{3\text{fpi}} - \\ &\frac{2g\text{v0pi}^2\text{v0pi0Pv0Z}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv0pi}^2\text{v0pi0Pv1Z}p_2^{\mu_4}}{3\text{fpi}} - \frac{2g\text{tv1pi}^2\text{v1pi0Pv1Z}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{pv1pi}^2\text{v1pi0Pv2Z}p_2^{\mu_4}}{3\text{fpi}} + \\ &\frac{g\text{v0pi}^2\text{v0pi0Pv0Z}p_3^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0pi}^2\text{v0pi0Pv1Z}p_3^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1pi}^2\text{v1pi0Pv1Z}p_3^{\mu_4}}{3\text{fpi}} - \frac{g\text{pv1pi}^2\text{v1pi0Pv2Z}p_3^{\mu_4}}{3\text{fpi}} \end{aligned}$$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piW} & 2 \\ Z & 3 \end{pmatrix} \qquad \begin{aligned} &\tfrac{1}{2}ig\text{v0piv0piPv0Z}p_1^{\mu_3} + \tfrac{1}{2}ig\text{tv0piv0piPv1Z}p_1^{\mu_3} + \tfrac{1}{2}ig\text{tv1piv1piPv1Z}p_1^{\mu_3} + \tfrac{1}{2}ig\text{pv1piv1piPv2Z}p_1^{\mu_3} - \\ &\tfrac{1}{2}ig\text{v0piv0piPv0Z}p_2^{\mu_3} - \tfrac{1}{2}ig\text{tv0piv0piPv1Z}p_2^{\mu_3} - \tfrac{1}{2}ig\text{tv1piv1piPv1Z}p_2^{\mu_3} - \tfrac{1}{2}ig\text{pv1piv1piPv2Z}p_2^{\mu_3} \end{aligned}$$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piZ} & 2 \\ \text{piW} & 3 \\ Z & 4 \end{pmatrix} \qquad \begin{aligned} &\frac{g\text{v0piv0pi0v0piPv0Z}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0piv0pi0v0piPv1Z}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1piv1pi0v1piPv1Z}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{pv1piv1pi0v1piPv2Z}p_1^{\mu_4}}{3\text{fpi}} - \\ &\frac{2g\text{v0piv0pi0v0piPv0Z}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv0piv0pi0v0piPv1Z}p_2^{\mu_4}}{3\text{fpi}} - \frac{2g\text{tv1piv1pi0v1piPv1Z}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{pv1piv1pi0v1piPv2Z}p_2^{\mu_4}}{3\text{fpi}} + \\ &\frac{g\text{v0piv0pi0v0piPv0Z}p_3^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0piv0pi0v0piPv1Z}p_3^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1piv1pi0v1piPv1Z}p_3^{\mu_4}}{3\text{fpi}} - \frac{g\text{pv1piv1pi0v1piPv2Z}p_3^{\mu_4}}{3\text{fpi}} \end{aligned}$$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piZP} & 2 \\ \text{piW} & 3 \\ Z & 4 \end{pmatrix} \qquad \begin{aligned} &\frac{g\text{v0piv0pi0Pv0piPv0Z}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0piv0pi0Pv0piPv1Z}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1piv1pi0Pv1piPv1Z}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{pv1piv1pi0Pv1piPv2Z}p_1^{\mu_4}}{3\text{fpi}} - \\ &\frac{2g\text{v0piv0pi0Pv0piPv0Z}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv0piv0pi0Pv0piPv1Z}p_2^{\mu_4}}{3\text{fpi}} - \frac{2g\text{tv1piv1pi0Pv1piPv1Z}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{pv1piv1pi0Pv1piPv2Z}p_2^{\mu_4}}{3\text{fpi}} + \\ &\frac{g\text{v0piv0pi0Pv0piPv0Z}p_3^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0piv0pi0Pv0piPv1Z}p_3^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1piv1pi0Pv1piPv1Z}p_3^{\mu_4}}{3\text{fpi}} - \frac{g\text{pv1piv1pi0Pv1piPv2Z}p_3^{\mu_4}}{3\text{fpi}} + \end{aligned}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piW}^\dagger & 2 \\ Z & 3 \end{pmatrix}$$

$-\frac{1}{2}ig\text{v0piv0piPv0Z}p_1^{\mu_3} - \frac{1}{2}ig\text{tv0piv0piPv1Z}p_1^{\mu_3} - \frac{1}{2}ig\text{tv1piv1piPv1Z}p_1^{\mu_3} - \frac{1}{2}ig\text{pv1piv1piPv2Z}p_1^{\mu_3} + \frac{1}{2}ig\text{v0piv0piPv0Z}p_2^{\mu_3} + \frac{1}{2}ig\text{tv0piv0piPv1Z}p_2^{\mu_3} + \frac{1}{2}ig\text{tv1piv1piPv1Z}p_2^{\mu_3} + \frac{1}{2}ig\text{pv1piv1piPv2Z}p_2^{\mu_3}$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piZ} & 2 \\ \text{piW}^\dagger & 3 \\ Z & 4 \end{pmatrix}$$

$\frac{g\text{v0piv0pi0v0piPv0Z}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0piv0pi0v0piPv1Z}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1piv1pi0v1piPv1Z}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{pv1piv1pi0v1piPv2Z}p_1^{\mu_4}}{3\text{fpi}} - \frac{2g\text{v0piv0pi0v0piPv0Z}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv0piv0pi0v0piPv1Z}p_2^{\mu_4}}{3\text{fpi}} - \frac{2g\text{tv1piv1pi0v1piPv1Z}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{pv1piv1pi0v1piPv2Z}p_2^{\mu_4}}{3\text{fpi}} + \frac{g\text{v0piv0pi0v0piPv0Z}p_3^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0piv0pi0v0piPv1Z}p_3^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1piv1pi0v1piPv1Z}p_3^{\mu_4}}{3\text{fpi}} - \frac{g\text{pv1piv1pi0v1piPv2Z}p_3^{\mu_4}}{3\text{fpi}}$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piZP} & 2 \\ \text{piW}^\dagger & 3 \\ Z & 4 \end{pmatrix}$$

$\frac{g\text{v0piv0pi0Pv0piPv0Z}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0piv0pi0Pv0piPv1Z}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1piv1pi0Pv1piPv1Z}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{pv1piv1pi0Pv1piPv2Z}p_1^{\mu_4}}{3\text{fpi}} - \frac{2g\text{v0piv0pi0Pv0piPv0Z}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv0piv0pi0Pv0piPv1Z}p_2^{\mu_4}}{3\text{fpi}} - \frac{2g\text{tv1piv1pi0Pv1piPv1Z}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{pv1piv1pi0Pv1piPv2Z}p_2^{\mu_4}}{3\text{fpi}} + \frac{g\text{v0piv0pi0Pv0piPv0Z}p_3^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0piv0pi0Pv0piPv1Z}p_3^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1piv1pi0Pv1piPv1Z}p_3^{\mu_4}}{3\text{fpi}} - \frac{g\text{pv1piv1pi0Pv1piPv2Z}p_3^{\mu_4}}{3\text{fpi}}$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piWP} & 2 \\ Z & 3 \end{pmatrix}$$

$\frac{1}{2}ig\text{v0piP}^2\text{v0Z}p_1^{\mu_3} + \frac{1}{2}ig\text{tv0piP}^2\text{v1Z}p_1^{\mu_3} + \frac{1}{2}ig\text{tv1piP}^2\text{v1Z}p_1^{\mu_3} + \frac{1}{2}ig\text{pv1piP}^2\text{v2Z}p_1^{\mu_3} - \frac{1}{2}ig\text{v0piP}^2\text{v0Z}p_2^{\mu_3} - \frac{1}{2}ig\text{tv0piP}^2\text{v1Z}p_2^{\mu_3} - \frac{1}{2}ig\text{tv1piP}^2\text{v1Z}p_2^{\mu_3} - \frac{1}{2}ig\text{pv1piP}^2\text{v2Z}p_2^{\mu_3}$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piZ} & 2 \\ \text{piWP} & 3 \\ Z & 4 \end{pmatrix}$$

$\frac{g\text{v0pi0v0piP}^2\text{v0Z}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0pi0v0piP}^2\text{v1Z}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1pi0v1piP}^2\text{v1Z}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{pv1pi0v1piP}^2\text{v2Z}p_1^{\mu_4}}{3\text{fpi}} - \frac{2g\text{v0pi0v0piP}^2\text{v0Z}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv0pi0v0piP}^2\text{v1Z}p_2^{\mu_4}}{3\text{fpi}} - \frac{2g\text{tv1pi0v1piP}^2\text{v1Z}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{pv1pi0v1piP}^2\text{v2Z}p_2^{\mu_4}}{3\text{fpi}} + \frac{g\text{v0pi0v0piP}^2\text{v0Z}p_3^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0pi0v0piP}^2\text{v1Z}p_3^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1pi0v1piP}^2\text{v1Z}p_3^{\mu_4}}{3\text{fpi}} - \frac{g\text{pv1pi0v1piP}^2\text{v2Z}p_3^{\mu_4}}{3\text{fpi}}$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piZP} & 2 \\ \text{piWP} & 3 \\ Z & 4 \end{pmatrix}$$

$\frac{g\text{v0pi0Pv0piP}^2\text{v0Z}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0pi0Pv0piP}^2\text{v1Z}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1pi0Pv1piP}^2\text{v1Z}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{pv1pi0Pv1piP}^2\text{v2Z}p_1^{\mu_4}}{3\text{fpi}} - \frac{2g\text{v0pi0Pv0piP}^2\text{v0Z}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv0pi0Pv0piP}^2\text{v1Z}p_2^{\mu_4}}{3\text{fpi}} - \frac{2g\text{tv1pi0Pv1piP}^2\text{v1Z}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{pv1pi0Pv1piP}^2\text{v2Z}p_2^{\mu_4}}{3\text{fpi}} + \frac{g\text{v0pi0Pv0piP}^2\text{v0Z}p_3^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0pi0Pv0piP}^2\text{v1Z}p_3^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1pi0Pv1piP}^2\text{v1Z}p_3^{\mu_4}}{3\text{fpi}} - \frac{g\text{pv1pi0Pv1piP}^2\text{v2Z}p_3^{\mu_4}}{3\text{fpi}}$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ W & 2 \\ Z & 3 \end{pmatrix}$$

$-\frac{1}{2}\text{fpi}gg\text{tv0piv0Zv1W}\eta_{\mu_2,\mu_3} + \frac{1}{2}\text{fpi}gg\text{tv0piv0Wv1Z}\eta_{\mu_2,\mu_3} + \frac{1}{2}\text{fpigpgtv1piv1Wv2Z}\eta_{\mu_2,\mu_3}$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piZ} & 2 \\ W & 3 \\ Z & 4 \end{pmatrix}$$

$-\frac{1}{2}igg\text{tv0piv0pi0v0Zv1W}\eta_{\mu_3,\mu_4} - \frac{1}{2}igg\text{tv0piv0pi0v0Wv1Z}\eta_{\mu_3,\mu_4} - \frac{1}{2}ig\text{pgtv1piv1pi0v1Wv2Z}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piZP} & 2 \\ W & 3 \\ Z & 4 \end{pmatrix}$$

$-\frac{1}{2}igg\text{tv0piv0pi0Pv0Zv1W}\eta_{\mu_3,\mu_4} - \frac{1}{2}igg\text{tv0piv0pi0Pv0Wv1Z}\eta_{\mu_3,\mu_4} - \frac{1}{2}ig\text{pgtv1piv1pi0Pv1Wv2Z}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ W & 2 \\ Z & 3 \end{pmatrix}$$

$-\frac{1}{2}\text{fpi}gg\text{tv0piPv0Zv1W}\eta_{\mu_2,\mu_3} + \frac{1}{2}\text{fpi}gg\text{tv0piPv0Wv1Z}\eta_{\mu_2,\mu_3} + \frac{1}{2}\text{fpigpgtv1piPv1Wv2Z}\eta_{\mu_2,\mu_3}$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piZ} & 2 \\ W & 3 \\ Z & 4 \end{pmatrix}$$

$-\frac{1}{2}igg\text{tv0pi0v0piPv0Zv1W}\eta_{\mu_3,\mu_4} - \frac{1}{2}igg\text{tv0pi0v0piPv0Wv1Z}\eta_{\mu_3,\mu_4} - \frac{1}{2}ig\text{pgtv1pi0v1piPv1Wv2Z}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piZP} & 2 \\ W & 3 \\ Z & 4 \end{pmatrix}$$

$-\frac{1}{2}ig\text{gtv0pi0Pv0piPv0Zv1W}\eta_{\mu_3,\mu_4} - \frac{1}{2}ig\text{gtv0pi0Pv0piPv0Wv1Z}\eta_{\mu_3,\mu_4} - \frac{1}{2}i\text{gpgtv1pi0Pv1piPv1Wv2Z}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piW} & 1 \\ W^\dagger & 2 \\ Z & 3 \end{pmatrix}$$

$\frac{1}{2}\text{fpi}ig\text{gtv0piv0Zv1W}\eta_{\mu_2,\mu_3} - \frac{1}{2}\text{fpi}ig\text{gtv0piv0Wv1Z}\eta_{\mu_2,\mu_3} - \frac{1}{2}\text{fpigpgtv1piv1Wv2Z}\eta_{\mu_2,\mu_3}$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piZ} & 2 \\ W^\dagger & 3 \\ Z & 4 \end{pmatrix}$$

$-\frac{1}{2}ig\text{gtv0piv0pi0v0Zv1W}\eta_{\mu_3,\mu_4} - \frac{1}{2}ig\text{gtv0piv0pi0v0Wv1Z}\eta_{\mu_3,\mu_4} - \frac{1}{2}i\text{gpgtv1piv1pi0v1Wv2Z}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piZP} & 2 \\ W^\dagger & 3 \\ Z & 4 \end{pmatrix}$$

$-\frac{1}{2}ig\text{gtv0piv0pi0Pv0Zv1W}\eta_{\mu_3,\mu_4} - \frac{1}{2}ig\text{gtv0piv0pi0Pv0Wv1Z}\eta_{\mu_3,\mu_4} - \frac{1}{2}i\text{gpgtv1piv1pi0Pv1Wv2Z}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piWP} & 1 \\ W^\dagger & 2 \\ Z & 3 \end{pmatrix}$$

$\frac{1}{2}\text{fpi}ig\text{gtv0piPv0Zv1W}\eta_{\mu_2,\mu_3} - \frac{1}{2}\text{fpi}ig\text{gtv0piPv0Wv1Z}\eta_{\mu_2,\mu_3} - \frac{1}{2}\text{fpigpgtv1piPv1Wv2Z}\eta_{\mu_2,\mu_3}$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piZ} & 2 \\ W^\dagger & 3 \\ Z & 4 \end{pmatrix}$$

$-\frac{1}{2}ig\text{gtv0pi0v0piPv0Zv1W}\eta_{\mu_3,\mu_4} - \frac{1}{2}ig\text{gtv0pi0v0piPv0Wv1Z}\eta_{\mu_3,\mu_4} - \frac{1}{2}i\text{gpgtv1pi0v1piPv1Wv2Z}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piZP} & 2 \\ W^\dagger & 3 \\ Z & 4 \end{pmatrix}$$

$-\frac{1}{2}ig\text{gtv0pi0Pv0piPv0Zv1W}\eta_{\mu_3,\mu_4} - \frac{1}{2}ig\text{gtv0pi0Pv0piPv0Wv1Z}\eta_{\mu_3,\mu_4} - \frac{1}{2}i\text{gpgtv1pi0Pv1piPv1Wv2Z}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{WP} & 2 \\ Z & 3 \end{pmatrix}$$

$-\frac{1}{2}\text{fpi}ig\text{gtv0piv0Zv1WP}\eta_{\mu_2,\mu_3} + \frac{1}{2}\text{fpi}ig\text{gtv0piv0WPv1Z}\eta_{\mu_2,\mu_3} + \frac{1}{2}\text{fpigpgtv1piv1WPv2Z}\eta_{\mu_2,\mu_3}$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piZ} & 2 \\ \text{WP} & 3 \\ Z & 4 \end{pmatrix}$$

$-\frac{1}{2}ig\text{gtv0piv0pi0v0Zv1WP}\eta_{\mu_3,\mu_4} - \frac{1}{2}ig\text{gtv0piv0pi0v0WPv1Z}\eta_{\mu_3,\mu_4} - \frac{1}{2}i\text{gpgtv1piv1pi0v1WPv2Z}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piZP} & 2 \\ \text{WP} & 3 \\ Z & 4 \end{pmatrix}$$

$-\frac{1}{2}ig\text{gtv0piv0pi0Pv0Zv1WP}\eta_{\mu_3,\mu_4} - \frac{1}{2}ig\text{gtv0piv0pi0Pv0WPv1Z}\eta_{\mu_3,\mu_4} - \frac{1}{2}i\text{gpgtv1piv1pi0Pv1WPv2Z}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{WP} & 2 \\ Z & 3 \end{pmatrix}$$

$-\frac{1}{2}\text{fpi}ig\text{gtv0piPv0Zv1WP}\eta_{\mu_2,\mu_3} + \frac{1}{2}\text{fpi}ig\text{gtv0piPv0WPv1Z}\eta_{\mu_2,\mu_3} + \frac{1}{2}\text{fpigpgtv1piPv1WPv2Z}\eta_{\mu_2,\mu_3}$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piZ} & 2 \\ \text{WP} & 3 \\ Z & 4 \end{pmatrix}$$

$-\frac{1}{2}ig\text{gtv0pi0v0piPv0Zv1WP}\eta_{\mu_3,\mu_4} - \frac{1}{2}ig\text{gtv0pi0v0piPv0WPv1Z}\eta_{\mu_3,\mu_4} - \frac{1}{2}i\text{gpgtv1pi0v1piPv1WPv2Z}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piZP} & 2 \\ \text{WP} & 3 \\ Z & 4 \end{pmatrix}$$ $-\frac{1}{2}ig\text{ggtv0pi0Pv0piPv0Zv1WP}\eta_{\mu_3,\mu_4} - \frac{1}{2}ig\text{ggtv0pi0Pv0piPv0WPv1Z}\eta_{\mu_3,\mu_4} - \frac{1}{2}i\text{gpgtv1pi0Pv1piPv1WPv2Z}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{WP}^\dagger & 2 \\ Z & 3 \end{pmatrix}$$ $\frac{1}{2}\text{fpi}ig\text{ggtv0piv0Zv1WP}\eta_{\mu_2,\mu_3} - \frac{1}{2}\text{fpi}ig\text{ggtv0piv0WPv1Z}\eta_{\mu_2,\mu_3} - \frac{1}{2}\text{fpigpgtv1piv1WPv2Z}\eta_{\mu_2,\mu_3}$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piZ} & 2 \\ \text{WP}^\dagger & 3 \\ Z & 4 \end{pmatrix}$$ $-\frac{1}{2}ig\text{ggtv0piv0pi0v0Zv1WP}\eta_{\mu_3,\mu_4} - \frac{1}{2}ig\text{ggtv0piv0pi0v0WPv1Z}\eta_{\mu_3,\mu_4} - \frac{1}{2}i\text{gpgtv1piv1pi0v1WPv2Z}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piZP} & 2 \\ \text{WP}^\dagger & 3 \\ Z & 4 \end{pmatrix}$$ $-\frac{1}{2}ig\text{ggtv0piv0pi0Pv0Zv1WP}\eta_{\mu_3,\mu_4} - \frac{1}{2}ig\text{ggtv0piv0pi0Pv0WPv1Z}\eta_{\mu_3,\mu_4} - \frac{1}{2}i\text{gpgtv1piv1pi0Pv1WPv2Z}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{WP}^\dagger & 2 \\ Z & 3 \end{pmatrix}$$ $\frac{1}{2}\text{fpi}ig\text{ggtv0piPv0Zv1WP}\eta_{\mu_2,\mu_3} - \frac{1}{2}\text{fpi}ig\text{ggtv0piPv0WPv1Z}\eta_{\mu_2,\mu_3} - \frac{1}{2}\text{fpigpgtv1piPv1WPv2Z}\eta_{\mu_2,\mu_3}$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piZ} & 2 \\ \text{WP}^\dagger & 3 \\ Z & 4 \end{pmatrix}$$ $-\frac{1}{2}ig\text{ggtv0pi0v0piPv0Zv1WP}\eta_{\mu_3,\mu_4} - \frac{1}{2}ig\text{ggtv0pi0v0piPv0WPv1Z}\eta_{\mu_3,\mu_4} - \frac{1}{2}i\text{gpgtv1pi0v1piPv1WPv2Z}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piZP} & 2 \\ \text{WP}^\dagger & 3 \\ Z & 4 \end{pmatrix}$$ $-\frac{1}{2}ig\text{ggtv0pi0Pv0piPv0Zv1WP}\eta_{\mu_3,\mu_4} - \frac{1}{2}ig\text{ggtv0pi0Pv0piPv0WPv1Z}\eta_{\mu_3,\mu_4} - \frac{1}{2}i\text{gpgtv1pi0Pv1piPv1WPv2Z}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ Z & 3 \\ Z & 4 \end{pmatrix}$$ $2ig\text{ggtv0pi}^2\text{v0Zv1Z}\eta_{\mu_3,\mu_4} + 2i\text{gpgtv1pi}^2\text{v1Zv2Z}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP} & 2 \\ Z & 3 \\ Z & 4 \end{pmatrix}$$ $2ig\text{ggtv0piv0piPv0Zv1Z}\eta_{\mu_3,\mu_4} + 2i\text{gpgtv1piv1piPv1Zv2Z}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piWP}^\dagger & 2 \\ Z & 3 \\ Z & 4 \end{pmatrix}$$ $2ig\text{ggtv0piv0piPv0Zv1Z}\eta_{\mu_3,\mu_4} + 2i\text{gpgtv1piv1piPv1Zv2Z}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP}^\dagger & 2 \\ Z & 3 \\ Z & 4 \end{pmatrix}$$ $2ig\text{ggtv0piP}^2\text{v0Zv1Z}\eta_{\mu_3,\mu_4} + 2i\text{gpgtv1piP}^2\text{v1Zv2Z}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ A & 3 \\ \text{ZP} & 4 \end{pmatrix}$$

$i\text{EE}g\text{v0pi}^2\text{v0ZP}\eta_{\mu_3,\mu_4} + i\text{EE}g\text{tv0pi}^2\text{v1ZP}\eta_{\mu_3,\mu_4} + i\text{EE}g\text{tv1pi}^2\text{v1ZP}\eta_{\mu_3,\mu_4} + i\text{EE}g\text{pv1pi}^2\text{v2ZP}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP} & 2 \\ A & 3 \\ \text{ZP} & 4 \end{pmatrix}$$

$i\text{EE}g\text{v0piv0piPv0ZP}\eta_{\mu_3,\mu_4} + i\text{EE}g\text{tv0piv0piPv1ZP}\eta_{\mu_3,\mu_4} + i\text{EE}g\text{tv1piv1piPv1ZP}\eta_{\mu_3,\mu_4} + i\text{EE}g\text{pv1piv1piPv2ZP}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piWP}^\dagger & 2 \\ A & 3 \\ \text{ZP} & 4 \end{pmatrix}$$

$i\text{EE}g\text{v0piv0piPv0ZP}\eta_{\mu_3,\mu_4} + i\text{EE}g\text{tv0piv0piPv1ZP}\eta_{\mu_3,\mu_4} + i\text{EE}g\text{tv1piv1piPv1ZP}\eta_{\mu_3,\mu_4} + i\text{EE}g\text{pv1piv1piPv2ZP}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP}^\dagger & 2 \\ A & 3 \\ \text{ZP} & 4 \end{pmatrix}$$

$i\text{EE}g\text{v0piP}^2\text{v0ZP}\eta_{\mu_3,\mu_4} + i\text{EE}g\text{tv0piP}^2\text{v1ZP}\eta_{\mu_3,\mu_4} + i\text{EE}g\text{tv1piP}^2\text{v1ZP}\eta_{\mu_3,\mu_4} + i\text{EE}g\text{pv1piP}^2\text{v2ZP}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piW} & 2 \\ \text{ZP} & 3 \end{pmatrix}$$

$\frac{1}{2}ig\text{v0pi}^2\text{v0ZP}p_1^{\mu_3} + \frac{1}{2}ig\text{tv0pi}^2\text{v1ZP}p_1^{\mu_3} + \frac{1}{2}ig\text{tv1pi}^2\text{v1ZP}p_1^{\mu_3} + \frac{1}{2}ig\text{pv1pi}^2\text{v2ZP}p_1^{\mu_3} - \frac{1}{2}ig\text{v0pi}^2\text{v0ZP}p_2^{\mu_3} - \frac{1}{2}ig\text{tv0pi}^2\text{v1ZP}p_2^{\mu_3} - \frac{1}{2}ig\text{tv1pi}^2\text{v1ZP}p_2^{\mu_3} - \frac{1}{2}ig\text{pv1pi}^2\text{v2ZP}p_2^{\mu_3}$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piZ} & 2 \\ \text{piW} & 3 \\ \text{ZP} & 4 \end{pmatrix}$$

$\frac{g\text{v0pi}^2\text{v0pi0v0ZP}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0pi}^2\text{v0pi0v1ZP}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1pi}^2\text{v1pi0v1ZP}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{pv1pi}^2\text{v1pi0v2ZP}p_1^{\mu_4}}{3\text{fpi}} - \frac{2g\text{v0pi}^2\text{v0pi0v0ZP}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv0pi}^2\text{v0pi0v1ZP}p_2^{\mu_4}}{3\text{fpi}} - \frac{2g\text{tv1pi}^2\text{v1pi0v1ZP}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{pv1pi}^2\text{v1pi0v2ZP}p_2^{\mu_4}}{3\text{fpi}} + \frac{g\text{v0pi}^2\text{v0pi0v0ZP}p_3^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0pi}^2\text{v0pi0v1ZP}p_3^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1pi}^2\text{v1pi0v1ZP}p_3^{\mu_4}}{3\text{fpi}} - \frac{g\text{pv1pi}^2\text{v1pi0v2ZP}p_3^{\mu_4}}{3\text{fpi}}$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piZP} & 2 \\ \text{piW} & 3 \\ \text{ZP} & 4 \end{pmatrix}$$

$\frac{g\text{v0pi}^2\text{v0pi0Pv0ZP}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0pi}^2\text{v0pi0Pv1ZP}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1pi}^2\text{v1pi0Pv1ZP}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{pv1pi}^2\text{v1pi0Pv2ZP}p_1^{\mu_4}}{3\text{fpi}} - \frac{2g\text{v0pi}^2\text{v0pi0Pv0ZP}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv0pi}^2\text{v0pi0Pv1ZP}p_2^{\mu_4}}{3\text{fpi}} - \frac{2g\text{tv1pi}^2\text{v1pi0Pv1ZP}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{pv1pi}^2\text{v1pi0Pv2ZP}p_2^{\mu_4}}{3\text{fpi}} + \frac{g\text{v0pi}^2\text{v0pi0Pv0ZP}p_3^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0pi}^2\text{v0pi0Pv1ZP}p_3^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1pi}^2\text{v1pi0Pv1ZP}p_3^{\mu_4}}{3\text{fpi}} - \frac{g\text{pv1pi}^2\text{v1pi0Pv2ZP}p_3^{\mu_4}}{3\text{fpi}}$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piW} & 2 \\ \text{ZP} & 3 \end{pmatrix}$$

$\frac{1}{2}ig\text{v0piv0piPv0ZP}p_1^{\mu_3} + \frac{1}{2}ig\text{tv0piv0piPv1ZP}p_1^{\mu_3} + \frac{1}{2}ig\text{tv1piv1piPv1ZP}p_1^{\mu_3} + \frac{1}{2}ig\text{pv1piv1piPv2ZP}p_1^{\mu_3} - \frac{1}{2}ig\text{v0piv0piPv0ZP}p_2^{\mu_3} - \frac{1}{2}ig\text{tv0piv0piPv1ZP}p_2^{\mu_3} - \frac{1}{2}ig\text{tv1piv1piPv1ZP}p_2^{\mu_3} - \frac{1}{2}ig\text{pv1piv1piPv2ZP}p_2^{\mu_3}$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piZ} & 2 \\ \text{piW} & 3 \\ \text{ZP} & 4 \end{pmatrix}$$

$\frac{g\text{v0piv0pi0v0piPv0ZP}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0piv0pi0v0piPv1ZP}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1piv1pi0v1piPv1ZP}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{pv1piv1pi0v1piPv2ZP}p_1^{\mu_4}}{3\text{fpi}} - \frac{2g\text{v0piv0pi0v0piPv0ZP}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv0piv0pi0v0piPv1ZP}p_2^{\mu_4}}{3\text{fpi}} - \frac{2g\text{tv1piv1pi0v1piPv1ZP}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{pv1piv1pi0v1piPv2ZP}p_2^{\mu_4}}{3\text{fpi}} + \frac{g\text{v0piv0pi0v0piPv0ZP}p_3^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0piv0pi0v0piPv1ZP}p_3^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1piv1pi0v1piPv1ZP}p_3^{\mu_4}}{3\text{fpi}} - \frac{g\text{pv1piv1pi0v1piPv2ZP}p_3^{\mu_4}}{3\text{fpi}}$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piZP} & 2 \\ \text{piW} & 3 \\ \text{ZP} & 4 \end{pmatrix}$$

$\frac{g\text{v0piv0pi0Pv0piPv0ZP}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0piv0pi0Pv0piPv1ZP}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1piv1pi0Pv1piPv1ZP}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{pv1piv1pi0Pv1piPv2ZP}p_1^{\mu_4}}{3\text{fpi}} - \frac{2g\text{v0piv0pi0Pv0piPv0ZP}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv0piv0pi0Pv0piPv1ZP}p_2^{\mu_4}}{3\text{fpi}} - \frac{2g\text{tv1piv1pi0Pv1piPv1ZP}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{pv1piv1pi0Pv1piPv2ZP}p_2^{\mu_4}}{3\text{fpi}} + \frac{g\text{v0piv0pi0Pv0piPv0ZP}p_3^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0piv0pi0Pv0piPv1ZP}p_3^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1piv1pi0Pv1piPv1ZP}p_3^{\mu_4}}{3\text{fpi}} - \frac{g\text{pv1piv1pi0Pv1piPv2ZP}p_3^{\mu_4}}{3\text{fpi}}$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piW}^\dagger & 2 \\ \text{ZP} & 3 \end{pmatrix}$$

$-\frac{1}{2}ig\text{v0piv0piPv0ZP}p_1^{\mu_3} - \frac{1}{2}ig\text{tv0piv0piPv1ZP}p_1^{\mu_3} - \frac{1}{2}ig\text{tv1piv1piPv1ZP}p_1^{\mu_3} - \frac{1}{2}ig\text{pv1piv1piPv2ZP}p_1^{\mu_3} + \frac{1}{2}ig\text{v0piv0piPv0ZP}p_2^{\mu_3} + \frac{1}{2}ig\text{tv0piv0piPv1ZP}p_2^{\mu_3} + \frac{1}{2}ig\text{tv1piv1piPv1ZP}p_2^{\mu_3} + \frac{1}{2}ig\text{pv1piv1piPv2ZP}p_2^{\mu_3}$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piZ} & 2 \\ \text{piW}^\dagger & 3 \\ \text{ZP} & 4 \end{pmatrix} \quad \frac{g\text{v0piv0pi0v0piPv0ZP}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0piv0pi0v0piPv1ZP}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1piv1pi0v1piPv1ZP}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{pv1piv1pi0v1piPv2ZP}p_1^{\mu_4}}{3\text{fpi}} - \frac{2g\text{v0piv0pi0v0piPv0ZP}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv0piv0pi0v0piPv1ZP}p_2^{\mu_4}}{3\text{fpi}} - \frac{2g\text{tv1piv1pi0v1piPv1ZP}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{pv1piv1pi0v1piPv2ZP}p_2^{\mu_4}}{3\text{fpi}} + \frac{g\text{v0piv0pi0v0piPv0ZP}p_3^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0piv0pi0v0piPv1ZP}p_3^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1piv1pi0v1piPv1ZP}p_3^{\mu_4}}{3\text{fpi}} - \frac{g\text{pv1piv1pi0v1piPv2ZP}p_3^{\mu_4}}{3\text{fpi}}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piZP} & 2 \\ \text{piW}^\dagger & 3 \\ \text{ZP} & 4 \end{pmatrix} \quad \frac{g\text{v0piv0pi0Pv0piPv0ZP}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0piv0pi0Pv0piPv1ZP}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1piv1pi0Pv1piPv1ZP}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{pv1piv1pi0Pv1piPv2ZP}p_1^{\mu_4}}{3\text{fpi}} - \frac{2g\text{v0piv0pi0Pv0piPv0ZP}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv0piv0pi0Pv0piPv1ZP}p_2^{\mu_4}}{3\text{fpi}} - \frac{2g\text{tv1piv1pi0Pv1piPv1ZP}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{pv1piv1pi0Pv1piPv2ZP}p_2^{\mu_4}}{3\text{fpi}} + \frac{g\text{v0piv0pi0Pv0piPv0ZP}p_3^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0piv0pi0Pv0piPv1ZP}p_3^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1piv1pi0Pv1piPv1ZP}p_3^{\mu_4}}{3\text{fpi}} - \frac{g\text{pv1piv1pi0Pv1piPv2ZP}p_3^{\mu_4}}{3\text{fpi}}$$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piWP} & 2 \\ \text{ZP} & 3 \end{pmatrix} \quad \tfrac{1}{2}ig\text{v0piP}^2\text{v0ZP}p_1^{\mu_3} + \tfrac{1}{2}ig\text{tv0piP}^2\text{v1ZP}p_1^{\mu_3} + \tfrac{1}{2}ig\text{tv1piP}^2\text{v1ZP}p_1^{\mu_3} + \tfrac{1}{2}ig\text{pv1piP}^2\text{v2ZP}p_1^{\mu_3} - \tfrac{1}{2}ig\text{v0piP}^2\text{v0ZP}p_2^{\mu_3} - \tfrac{1}{2}ig\text{tv0piP}^2\text{v1ZP}p_2^{\mu_3} - \tfrac{1}{2}ig\text{tv1piP}^2\text{v1ZP}p_2^{\mu_3} - \tfrac{1}{2}ig\text{pv1piP}^2\text{v2ZP}p_2^{\mu_3}$$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piZ} & 2 \\ \text{piWP} & 3 \\ \text{ZP} & 4 \end{pmatrix} \quad \frac{g\text{v0pi0v0piP}^2\text{v0ZP}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0pi0v0piP}^2\text{v1ZP}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1pi0v1piP}^2\text{v1ZP}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{pv1pi0v1piP}^2\text{v2ZP}p_1^{\mu_4}}{3\text{fpi}} - \frac{2g\text{v0pi0v0piP}^2\text{v0ZP}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv0pi0v0piP}^2\text{v1ZP}p_2^{\mu_4}}{3\text{fpi}} - \frac{2g\text{tv1pi0v1piP}^2\text{v1ZP}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{pv1pi0v1piP}^2\text{v2ZP}p_2^{\mu_4}}{3\text{fpi}} + \frac{g\text{v0pi0v0piP}^2\text{v0ZP}p_3^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0pi0v0piP}^2\text{v1ZP}p_3^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1pi0v1piP}^2\text{v1ZP}p_3^{\mu_4}}{3\text{fpi}} - \frac{g\text{pv1pi0v1piP}^2\text{v2ZP}p_3^{\mu_4}}{3\text{fpi}}$$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piZP} & 2 \\ \text{piWP} & 3 \\ \text{ZP} & 4 \end{pmatrix} \quad \frac{g\text{v0pi0Pv0piP}^2\text{v0ZP}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0pi0Pv0piP}^2\text{v1ZP}p_1^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1pi0Pv1piP}^2\text{v1ZP}p_1^{\mu_4}}{3\text{fpi}} - \frac{g\text{pv1pi0Pv1piP}^2\text{v2ZP}p_1^{\mu_4}}{3\text{fpi}} - \frac{2g\text{v0pi0Pv0piP}^2\text{v0ZP}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{tv0pi0Pv0piP}^2\text{v1ZP}p_2^{\mu_4}}{3\text{fpi}} - \frac{2g\text{tv1pi0Pv1piP}^2\text{v1ZP}p_2^{\mu_4}}{3\text{fpi}} + \frac{2g\text{pv1pi0Pv1piP}^2\text{v2ZP}p_2^{\mu_4}}{3\text{fpi}} + \frac{g\text{v0pi0Pv0piP}^2\text{v0ZP}p_3^{\mu_4}}{3\text{fpi}} - \frac{g\text{tv0pi0Pv0piP}^2\text{v1ZP}p_3^{\mu_4}}{3\text{fpi}} + \frac{g\text{tv1pi0Pv1piP}^2\text{v1ZP}p_3^{\mu_4}}{3\text{fpi}} - \frac{g\text{pv1pi0Pv1piP}^2\text{v2ZP}p_3^{\mu_4}}{3\text{fpi}}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ W & 2 \\ \text{ZP} & 3 \end{pmatrix} \quad -\tfrac{1}{2}\text{fpi}gg\text{tv0piv0ZPv1W}\eta_{\mu_2,\mu_3} + \tfrac{1}{2}\text{fpi}gg\text{tv0piv0Wv1ZP}\eta_{\mu_2,\mu_3} + \tfrac{1}{2}\text{fpigpgtv1piv1Wv2ZP}\eta_{\mu_2,\mu_3}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piZ} & 2 \\ W & 3 \\ \text{ZP} & 4 \end{pmatrix} \quad -\tfrac{1}{2}igg\text{tv0piv0pi0v0ZPv1W}\eta_{\mu_3,\mu_4} - \tfrac{1}{2}igg\text{tv0piv0pi0v0Wv1ZP}\eta_{\mu_3,\mu_4} - \tfrac{1}{2}i\text{gpgtv1piv1pi0v1Wv2ZP}\eta_{\mu_3,\mu_4}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piZP} & 2 \\ W & 3 \\ \text{ZP} & 4 \end{pmatrix} \quad -\tfrac{1}{2}igg\text{tv0piv0pi0Pv0ZPv1W}\eta_{\mu_3,\mu_4} - \tfrac{1}{2}igg\text{tv0piv0pi0Pv0Wv1ZP}\eta_{\mu_3,\mu_4} - \tfrac{1}{2}i\text{gpgtv1piv1pi0Pv1Wv2ZP}\eta_{\mu_3,\mu_4}$$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ W & 2 \\ \text{ZP} & 3 \end{pmatrix} \quad -\tfrac{1}{2}\text{fpi}gg\text{tv0piPv0ZPv1W}\eta_{\mu_2,\mu_3} + \tfrac{1}{2}\text{fpi}gg\text{tv0piPv0Wv1ZP}\eta_{\mu_2,\mu_3} + \tfrac{1}{2}\text{fpigpgtv1piPv1Wv2ZP}\eta_{\mu_2,\mu_3}$$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piZ} & 2 \\ W & 3 \\ \text{ZP} & 4 \end{pmatrix} \quad -\tfrac{1}{2}igg\text{tv0pi0v0piPv0ZPv1W}\eta_{\mu_3,\mu_4} - \tfrac{1}{2}igg\text{tv0pi0v0piPv0Wv1ZP}\eta_{\mu_3,\mu_4} - \tfrac{1}{2}i\text{gpgtv1pi0v1piPv1Wv2ZP}\eta_{\mu_3,\mu_4}$$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piZP} & 2 \\ W & 3 \\ \text{ZP} & 4 \end{pmatrix} \quad -\tfrac{1}{2}igg\text{tv0pi0Pv0piPv0ZPv1W}\eta_{\mu_3,\mu_4} - \tfrac{1}{2}igg\text{tv0pi0Pv0piPv0Wv1ZP}\eta_{\mu_3,\mu_4} - \tfrac{1}{2}i\text{gpgtv1pi0Pv1piPv1Wv2ZP}\eta_{\mu_3,\mu_4}$$

$$\begin{pmatrix} \text{piW} & 1 \\ W^\dagger & 2 \\ \text{ZP} & 3 \end{pmatrix} \qquad \tfrac{1}{2}\text{fpi}g\text{gtv0piv0ZPv1W}\eta_{\mu_2,\mu_3} - \tfrac{1}{2}\text{fpi}g\text{gtv0piv0Wv1ZP}\eta_{\mu_2,\mu_3} - \tfrac{1}{2}\text{fpigpgtv1piv1Wv2ZP}\eta_{\mu_2,\mu_3}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piZ} & 2 \\ W^\dagger & 3 \\ \text{ZP} & 4 \end{pmatrix} \qquad \begin{aligned} &-\tfrac{1}{2}ig\text{gtv0piv0pi0v0ZPv1W}\eta_{\mu_3,\mu_4} - \tfrac{1}{2}ig\text{gtv0piv0pi0v0Wv1ZP}\eta_{\mu_3,\mu_4} - \\ &\tfrac{1}{2}i\text{gpgtv1piv1pi0v1Wv2ZP}\eta_{\mu_3,\mu_4} \end{aligned}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piZP} & 2 \\ W^\dagger & 3 \\ \text{ZP} & 4 \end{pmatrix} \qquad \begin{aligned} &-\tfrac{1}{2}ig\text{gtv0piv0pi0Pv0ZPv1W}\eta_{\mu_3,\mu_4} - \tfrac{1}{2}ig\text{gtv0piv0pi0Pv0Wv1ZP}\eta_{\mu_3,\mu_4} - \\ &\tfrac{1}{2}i\text{gpgtv1piv1pi0Pv1Wv2ZP}\eta_{\mu_3,\mu_4} \end{aligned}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ W^\dagger & 2 \\ \text{ZP} & 3 \end{pmatrix} \qquad \tfrac{1}{2}\text{fpi}g\text{gtv0piPv0ZPv1W}\eta_{\mu_2,\mu_3} - \tfrac{1}{2}\text{fpi}g\text{gtv0piPv0Wv1ZP}\eta_{\mu_2,\mu_3} - \tfrac{1}{2}\text{fpigpgtv1piPv1Wv2ZP}\eta_{\mu_2,\mu_3}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piZ} & 2 \\ W^\dagger & 3 \\ \text{ZP} & 4 \end{pmatrix} \qquad \begin{aligned} &-\tfrac{1}{2}ig\text{gtv0pi0v0piPv0ZPv1W}\eta_{\mu_3,\mu_4} - \tfrac{1}{2}ig\text{gtv0pi0v0piPv0Wv1ZP}\eta_{\mu_3,\mu_4} - \\ &\tfrac{1}{2}i\text{gpgtv1pi0v1piPv1Wv2ZP}\eta_{\mu_3,\mu_4} \end{aligned}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piZP} & 2 \\ W^\dagger & 3 \\ \text{ZP} & 4 \end{pmatrix} \qquad \begin{aligned} &-\tfrac{1}{2}ig\text{gtv0pi0Pv0piPv0ZPv1W}\eta_{\mu_3,\mu_4} - \tfrac{1}{2}ig\text{gtv0pi0Pv0piPv0Wv1ZP}\eta_{\mu_3,\mu_4} - \\ &\tfrac{1}{2}i\text{gpgtv1pi0Pv1piPv1Wv2ZP}\eta_{\mu_3,\mu_4} \end{aligned}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{WP} & 2 \\ \text{ZP} & 3 \end{pmatrix} \qquad -\tfrac{1}{2}\text{fpi}ig\text{gtv0piv0ZPv1WP}\eta_{\mu_2,\mu_3} + \tfrac{1}{2}\text{fpi}ig\text{gtv0piv0WPv1ZP}\eta_{\mu_2,\mu_3} + \tfrac{1}{2}\text{fpigpgtv1piv1WPv2ZP}\eta_{\mu_2,\mu_3}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piZ} & 2 \\ \text{WP} & 3 \\ \text{ZP} & 4 \end{pmatrix} \qquad \begin{aligned} &-\tfrac{1}{2}ig\text{gtv0piv0pi0v0ZPv1WP}\eta_{\mu_3,\mu_4} - \tfrac{1}{2}ig\text{gtv0piv0pi0v0WPv1ZP}\eta_{\mu_3,\mu_4} - \\ &\tfrac{1}{2}i\text{gpgtv1piv1pi0v1WPv2ZP}\eta_{\mu_3,\mu_4} \end{aligned}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piZP} & 2 \\ \text{WP} & 3 \\ \text{ZP} & 4 \end{pmatrix} \qquad \begin{aligned} &-\tfrac{1}{2}ig\text{gtv0piv0pi0Pv0ZPv1WP}\eta_{\mu_3,\mu_4} - \tfrac{1}{2}ig\text{gtv0piv0pi0Pv0WPv1ZP}\eta_{\mu_3,\mu_4} - \\ &\tfrac{1}{2}i\text{gpgtv1piv1pi0Pv1WPv2ZP}\eta_{\mu_3,\mu_4} \end{aligned}$$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{WP} & 2 \\ \text{ZP} & 3 \end{pmatrix} \qquad -\tfrac{1}{2}\text{fpi}ig\text{gtv0piPv0ZPv1WP}\eta_{\mu_2,\mu_3} + \tfrac{1}{2}\text{fpi}ig\text{gtv0piPv0WPv1ZP}\eta_{\mu_2,\mu_3} + \tfrac{1}{2}\text{fpigpgtv1piPv1WPv2ZP}\eta_{\mu_2,\mu_3}$$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piZ} & 2 \\ \text{WP} & 3 \\ \text{ZP} & 4 \end{pmatrix} \qquad \begin{aligned} &-\tfrac{1}{2}ig\text{gtv0pi0v0piPv0ZPv1WP}\eta_{\mu_3,\mu_4} - \tfrac{1}{2}ig\text{gtv0pi0v0piPv0WPv1ZP}\eta_{\mu_3,\mu_4} - \\ &\tfrac{1}{2}i\text{gpgtv1pi0v1piPv1WPv2ZP}\eta_{\mu_3,\mu_4} \end{aligned}$$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piZP} & 2 \\ \text{WP} & 3 \\ \text{ZP} & 4 \end{pmatrix} \qquad \begin{aligned} &-\tfrac{1}{2}ig\text{gtv0pi0Pv0piPv0ZPv1WP}\eta_{\mu_3,\mu_4} - \tfrac{1}{2}ig\text{gtv0pi0Pv0piPv0WPv1ZP}\eta_{\mu_3,\mu_4} - \\ &\tfrac{1}{2}i\text{gpgtv1pi0Pv1piPv1WPv2ZP}\eta_{\mu_3,\mu_4} \end{aligned}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{WP}^\dagger & 2 \\ \text{ZP} & 3 \end{pmatrix}$$
$\frac{1}{2}\text{fpi}gg\text{tv0piv0ZPv1WP}\eta_{\mu_2,\mu_3} - \frac{1}{2}\text{fpi}gg\text{tv0piv0WPv1ZP}\eta_{\mu_2,\mu_3} - \frac{1}{2}\text{fpigpgtv1piv1WPv2ZP}\eta_{\mu_2,\mu_3}$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piZ} & 2 \\ \text{WP}^\dagger & 3 \\ \text{ZP} & 4 \end{pmatrix}$$
$-\frac{1}{2}ig g\text{tv0piv0pi0v0ZPv1WP}\eta_{\mu_3,\mu_4} - \frac{1}{2}ig g\text{tv0piv0pi0v0WPv1ZP}\eta_{\mu_3,\mu_4} -$
$\frac{1}{2}i\text{gpgtv1piv1pi0v1WPv2ZP}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piZP} & 2 \\ \text{WP}^\dagger & 3 \\ \text{ZP} & 4 \end{pmatrix}$$
$-\frac{1}{2}ig g\text{tv0piv0pi0Pv0ZPv1WP}\eta_{\mu_3,\mu_4} - \frac{1}{2}ig g\text{tv0piv0pi0Pv0WPv1ZP}\eta_{\mu_3,\mu_4} -$
$\frac{1}{2}i\text{gpgtv1piv1pi0Pv1WPv2ZP}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{WP}^\dagger & 2 \\ \text{ZP} & 3 \end{pmatrix}$$
$\frac{1}{2}\text{fpi}gg\text{tv0piPv0ZPv1WP}\eta_{\mu_2,\mu_3} - \frac{1}{2}\text{fpi}gg\text{tv0piPv0WPv1ZP}\eta_{\mu_2,\mu_3} - \frac{1}{2}\text{fpigpgtv1piPv1WPv2ZP}\eta_{\mu_2,\mu_3}$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piZ} & 2 \\ \text{WP}^\dagger & 3 \\ \text{ZP} & 4 \end{pmatrix}$$
$-\frac{1}{2}ig g\text{tv0pi0v0piPv0ZPv1WP}\eta_{\mu_3,\mu_4} - \frac{1}{2}ig g\text{tv0pi0v0piPv0WPv1ZP}\eta_{\mu_3,\mu_4} -$
$\frac{1}{2}i\text{gpgtv1pi0v1piPv1WPv2ZP}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piZP} & 2 \\ \text{WP}^\dagger & 3 \\ \text{ZP} & 4 \end{pmatrix}$$
$-\frac{1}{2}ig g\text{tv0pi0Pv0piPv0ZPv1WP}\eta_{\mu_3,\mu_4} - \frac{1}{2}ig g\text{tv0pi0Pv0piPv0WPv1ZP}\eta_{\mu_3,\mu_4} -$
$\frac{1}{2}i\text{gpgtv1pi0Pv1piPv1WPv2ZP}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ Z & 3 \\ \text{ZP} & 4 \end{pmatrix}$$
$ig g\text{tv0pi}^2\text{v0ZPv1Z}\eta_{\mu_3,\mu_4} + ig g\text{tv0pi}^2\text{v0Zv1ZP}\eta_{\mu_3,\mu_4} + ig\text{pgtv1pi}^2\text{v1ZPv2Z}\eta_{\mu_3,\mu_4} +$
$ig\text{pgtv1pi}^2\text{v1Zv2ZP}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP} & 2 \\ Z & 3 \\ \text{ZP} & 4 \end{pmatrix}$$
$ig g\text{tv0piv0piPv0ZPv1Z}\eta_{\mu_3,\mu_4} + ig g\text{tv0piv0piPv0Zv1ZP}\eta_{\mu_3,\mu_4} + ig\text{pgtv1piv1piPv1ZPv2Z}\eta_{\mu_3,\mu_4} +$
$ig\text{pgtv1piv1piPv1Zv2ZP}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piWP}^\dagger & 2 \\ Z & 3 \\ \text{ZP} & 4 \end{pmatrix}$$
$ig g\text{tv0piv0piPv0ZPv1Z}\eta_{\mu_3,\mu_4} + ig g\text{tv0piv0piPv0Zv1ZP}\eta_{\mu_3,\mu_4} + ig\text{pgtv1piv1piPv1ZPv2Z}\eta_{\mu_3,\mu_4} +$
$ig\text{pgtv1piv1piPv1Zv2ZP}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP}^\dagger & 2 \\ Z & 3 \\ \text{ZP} & 4 \end{pmatrix}$$
$ig g\text{tv0piP}^2\text{v0ZPv1Z}\eta_{\mu_3,\mu_4} + ig g\text{tv0piP}^2\text{v0Zv1ZP}\eta_{\mu_3,\mu_4} + ig\text{pgtv1piP}^2\text{v1ZPv2Z}\eta_{\mu_3,\mu_4} +$
$ig\text{pgtv1piP}^2\text{v1Zv2ZP}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ \text{ZP} & 3 \\ \text{ZP} & 4 \end{pmatrix}$$
$2ig g\text{tv0pi}^2\text{v0ZPv1ZP}\eta_{\mu_3,\mu_4} + 2ig\text{pgtv1pi}^2\text{v1ZPv2ZP}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP} & 2 \\ \text{ZP} & 3 \\ \text{ZP} & 4 \end{pmatrix}$$
$2ig g\text{tv0piv0piPv0ZPv1ZP}\eta_{\mu_3,\mu_4} + 2ig\text{pgtv1piv1piPv1ZPv2ZP}\eta_{\mu_3,\mu_4}$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piWP}^{\dagger} & 2 \\ \text{ZP} & 3 \\ \text{ZP} & 4 \end{pmatrix} \qquad 2i g\text{gtv0piv0piPv0ZPv1ZP}\eta_{\mu_3,\mu_4} + 2i\text{gpgtv1piv1piPv1ZPv2ZP}\eta_{\mu_3,\mu_4}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP}^{\dagger} & 2 \\ \text{ZP} & 3 \\ \text{ZP} & 4 \end{pmatrix} \qquad 2i g\text{gtv0piP}^2\text{v0ZPv1ZP}\eta_{\mu_3,\mu_4} + 2i\text{gpgtv1piP}^2\text{v1ZPv2ZP}\eta_{\mu_3,\mu_4}$$

6.4 $V_{\textbf{Gold}-\textbf{Leptons}}$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^{\dagger} & 2 \\ \text{eR1}^{\dagger} & 3 \\ \text{eL0} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0pi}^2\delta_{f_3,f_4}(P_-)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{eR1}^{\dagger} & 2 \\ \text{eL0} & 3 \end{pmatrix} \qquad \frac{\text{EpLMFv0pi0}\delta_{f_2,f_3}(P_-)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ \text{eR1}^{\dagger} & 3 \\ \text{eL0} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0pi0}^2\delta_{f_3,f_4}(P_-)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{eR1}^{\dagger} & 2 \\ \text{eL0} & 3 \end{pmatrix} \qquad \frac{\text{EpLMFv0pi0P}\delta_{f_2,f_3}(P_-)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZP} & 2 \\ \text{eR1}^{\dagger} & 3 \\ \text{eL0} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0pi0v0pi0P}\delta_{f_3,f_4}(P_-)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piZP} & 2 \\ \text{eR1}^{\dagger} & 3 \\ \text{eL0} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0pi0P}^2\delta_{f_3,f_4}(P_-)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW}^{\dagger} & 1 \\ \text{piWP} & 2 \\ \text{eR1}^{\dagger} & 3 \\ \text{eL0} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0piv0piP}\delta_{f_3,f_4}(P_-)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piWP}^{\dagger} & 2 \\ \text{eR1}^{\dagger} & 3 \\ \text{eL0} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0piv0piP}\delta_{f_3,f_4}(P_-)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP}^{\dagger} & 2 \\ \text{eR1}^{\dagger} & 3 \\ \text{eL0} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0piP}^2\delta_{f_3,f_4}(P_-)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{eR1}^\dagger & 2 \\ \text{nL0} & 3 \end{pmatrix} \qquad -\frac{\sqrt{2}\text{EpLMFv0pi}\delta_{f_2,f_3}(P_-)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{eR1}^\dagger & 2 \\ \text{nL0} & 3 \end{pmatrix} \qquad -\frac{\sqrt{2}\text{EpLMFv0piP}\delta_{f_2,f_3}(P_-)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ \text{e2}^\dagger & 3 \\ \text{e2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRmuMFv1pi}^2\text{vL1muvR2mu}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ \text{e2}^\dagger & 3 \\ \text{he2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRmuMFv1pi}^2\text{vL1hMuvR2mu}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRmuMFv1pi}^2\text{vL1muvR2hMu}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ \text{he2}^\dagger & 3 \\ \text{e2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRmuMFv1pi}^2\text{vL1muvR2hMu}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRmuMFv1pi}^2\text{vL1hMuvR2mu}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ \text{he2}^\dagger & 3 \\ \text{he2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRmuMFv1pi}^2\text{vL1hMuvR2hMu}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{e2}^\dagger & 2 \\ \text{e2} & 3 \end{pmatrix} \qquad -\frac{\text{EpRmuMFv1pi0vL1muvR2mu}\gamma^5_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{e2}^\dagger & 2 \\ \text{he2} & 3 \end{pmatrix} \qquad \frac{\text{EpRmuMFv1pi0vL1hMuvR2mu}(P_-)_{s_2,s_3}}{\text{fpi}} - \frac{\text{EpRmuMFv1pi0vL1muvR2hMu}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{he2}^\dagger & 2 \\ \text{e2} & 3 \end{pmatrix} \qquad \frac{\text{EpRmuMFv1pi0vL1muvR2hMu}(P_-)_{s_2,s_3}}{\text{fpi}} - \frac{\text{EpRmuMFv1pi0vL1hMuvR2mu}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{he2}^\dagger & 2 \\ \text{he2} & 3 \end{pmatrix} \qquad -\frac{\text{EpRmuMFv1pi0vL1hMuvR2hMu}\gamma^5_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ \text{e2}^\dagger & 3 \\ \text{e2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRmuMFv1pi0}^2\text{vL1muvR2mu}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ \text{e2}^\dagger & 3 \\ \text{he2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRmuMFv1pi0}^2\text{vL1hMuvR2mu}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRmuMFv1pi0}^2\text{vL1muvR2hMu}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ \text{he2}^\dagger & 3 \\ \text{e2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRmuMFv1pi0}^2\text{vL1muvR2hMu}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRmuMFv1pi0}^2\text{vL1hMuvR2mu}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ \text{he2}^\dagger & 3 \\ \text{he2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRmuMFv1pi0}^2\text{vL1hMuvR2hMu}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{e2}^\dagger & 2 \\ \text{e2} & 3 \end{pmatrix} \qquad -\frac{\text{EpRmuMFv1pi0PvL1muvR2mu}\gamma^5_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{e2}^\dagger & 2 \\ \text{he2} & 3 \end{pmatrix} \qquad \frac{\text{EpRmuMFv1pi0PvL1hMuvR2mu}(P_-)_{s_2,s_3}}{\text{fpi}} - \frac{\text{EpRmuMFv1pi0PvL1muvR2hMu}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{he2}^\dagger & 2 \\ \text{e2} & 3 \end{pmatrix} \qquad \frac{\text{EpRmuMFv1pi0PvL1muvR2hMu}(P_-)_{s_2,s_3}}{\text{fpi}} - \frac{\text{EpRmuMFv1pi0PvL1hMuvR2mu}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{he2}^\dagger & 2 \\ \text{he2} & 3 \end{pmatrix} \qquad -\frac{\text{EpRmuMFv1pi0PvL1hMuvR2hMu}\gamma^5_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZP} & 2 \\ \text{e2}^\dagger & 3 \\ \text{e2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRmuMFv1pi0v1pi0PvL1muvR2mu}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZP} & 2 \\ \text{e2}^\dagger & 3 \\ \text{he2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRmuMFv1pi0v1pi0PvL1hMuvR2mu}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRmuMFv1pi0v1pi0PvL1muvR2hMu}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZP} & 2 \\ \text{he2}^\dagger & 3 \\ \text{e2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRmuMFv1pi0v1pi0PvL1muvR2hMu}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRmuMFv1pi0v1pi0PvL1hMuvR2mu}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZP} & 2 \\ \text{he2}^\dagger & 3 \\ \text{he2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRmuMFv1pi0v1pi0PvL1hMuvR2hMu}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piZP} & 2 \\ \text{e2}^\dagger & 3 \\ \text{e2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRmuMFv1pi0P}^2\text{vL1muvR2mu}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piZP} & 2 \\ \text{e2}^\dagger & 3 \\ \text{he2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRmuMFv1pi0P}^2\text{vL1hMuvR2mu}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRmuMFv1pi0P}^2\text{vL1muvR2hMu}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piZP} & 2 \\ \text{he2}^\dagger & 3 \\ \text{e2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRmuMFv1pi0P}^2\text{vL1muvR2hMu}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRmuMFv1pi0P}^2\text{vL1hMuvR2mu}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$
\begin{pmatrix}
\text{piZP} & 1 \\
\text{piZP} & 2 \\
\text{he2}^\dagger & 3 \\
\text{he2} & 4
\end{pmatrix}
\qquad
\frac{i\text{EpRmuMFv1pi0P}^2\text{vL1hMuvR2hMu}\delta_{s_3,s_4}}{\text{fpi}^2}
$$

$$
\begin{pmatrix}
\text{piW}^\dagger & 1 \\
\text{piWP} & 2 \\
\text{e2}^\dagger & 3 \\
\text{e2} & 4
\end{pmatrix}
\qquad
\frac{i\text{EpRmuMFv1piv1piPvL1muvR2mu}\delta_{s_3,s_4}}{\text{fpi}^2}
$$

$$
\begin{pmatrix}
\text{piW}^\dagger & 1 \\
\text{piWP} & 2 \\
\text{e2}^\dagger & 3 \\
\text{he2} & 4
\end{pmatrix}
\qquad
\frac{i\text{EpRmuMFv1piv1piPvL1hMuvR2mu}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRmuMFv1piv1piPvL1muvR2hMu}(P_+)_{s_3,s_4}}{\text{fpi}^2}
$$

$$
\begin{pmatrix}
\text{piW}^\dagger & 1 \\
\text{piWP} & 2 \\
\text{he2}^\dagger & 3 \\
\text{e2} & 4
\end{pmatrix}
\qquad
\frac{i\text{EpRmuMFv1piv1piPvL1muvR2hMu}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRmuMFv1piv1piPvL1hMuvR2mu}(P_+)_{s_3,s_4}}{\text{fpi}^2}
$$

$$
\begin{pmatrix}
\text{piW}^\dagger & 1 \\
\text{piWP} & 2 \\
\text{he2}^\dagger & 3 \\
\text{he2} & 4
\end{pmatrix}
\qquad
\frac{i\text{EpRmuMFv1piv1piPvL1hMuvR2hMu}\delta_{s_3,s_4}}{\text{fpi}^2}
$$

$$
\begin{pmatrix}
\text{piW} & 1 \\
\text{piWP}^\dagger & 2 \\
\text{e2}^\dagger & 3 \\
\text{e2} & 4
\end{pmatrix}
\qquad
\frac{i\text{EpRmuMFv1piv1piPvL1muvR2mu}\delta_{s_3,s_4}}{\text{fpi}^2}
$$

$$
\begin{pmatrix}
\text{piW} & 1 \\
\text{piWP}^\dagger & 2 \\
\text{e2}^\dagger & 3 \\
\text{he2} & 4
\end{pmatrix}
\qquad
\frac{i\text{EpRmuMFv1piv1piPvL1hMuvR2mu}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRmuMFv1piv1piPvL1muvR2hMu}(P_+)_{s_3,s_4}}{\text{fpi}^2}
$$

$$
\begin{pmatrix}
\text{piW} & 1 \\
\text{piWP}^\dagger & 2 \\
\text{he2}^\dagger & 3 \\
\text{e2} & 4
\end{pmatrix}
\qquad
\frac{i\text{EpRmuMFv1piv1piPvL1muvR2hMu}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRmuMFv1piv1piPvL1hMuvR2mu}(P_+)_{s_3,s_4}}{\text{fpi}^2}
$$

$$
\begin{pmatrix}
\text{piW} & 1 \\
\text{piWP}^\dagger & 2 \\
\text{he2}^\dagger & 3 \\
\text{he2} & 4
\end{pmatrix}
\qquad
\frac{i\text{EpRmuMFv1piv1piPvL1hMuvR2hMu}\delta_{s_3,s_4}}{\text{fpi}^2}
$$

$$
\begin{pmatrix}
\text{piWP} & 1 \\
\text{piWP}^\dagger & 2 \\
\text{e2}^\dagger & 3 \\
\text{e2} & 4
\end{pmatrix}
\qquad
\frac{i\text{EpRmuMFv1piP}^2\text{vL1muvR2mu}\delta_{s_3,s_4}}{\text{fpi}^2}
$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{e2}^\dagger & 3 \\ \text{he2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRmuMFv1piP}^2\text{vL1hMuvR2mu}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRmuMFv1piP}^2\text{vL1muvR2hMu}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{he2}^\dagger & 3 \\ \text{e2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRmuMFv1piP}^2\text{vL1muvR2hMu}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRmuMFv1piP}^2\text{vL1hMuvR2mu}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{he2}^\dagger & 3 \\ \text{he2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRmuMFv1piP}^2\text{vL1hMuvR2hMu}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{e2}^\dagger & 2 \\ \text{hn2} & 3 \end{pmatrix} \qquad -\frac{\sqrt{2}\text{EpRmuMFv1pivL1hNuvR2mu}(P_-)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{e2}^\dagger & 2 \\ \text{n2} & 3 \end{pmatrix} \qquad -\frac{\sqrt{2}\text{EpRmuMFv1pivL1nuvR2mu}(P_-)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{he2}^\dagger & 2 \\ \text{hn2} & 3 \end{pmatrix} \qquad -\frac{\sqrt{2}\text{EpRmuMFv1pivL1hNuvR2hMu}(P_-)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{he2}^\dagger & 2 \\ \text{n2} & 3 \end{pmatrix} \qquad -\frac{\sqrt{2}\text{EpRmuMFv1pivL1nuvR2hMu}(P_-)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{e2}^\dagger & 2 \\ \text{hn2} & 3 \end{pmatrix} \qquad -\frac{\sqrt{2}\text{EpRmuMFv1piPvL1hNuvR2mu}(P_-)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{e2}^\dagger & 2 \\ \text{n2} & 3 \end{pmatrix} \qquad -\frac{\sqrt{2}\text{EpRmuMFv1piPvL1nuvR2mu}(P_-)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{he2}^\dagger & 2 \\ \text{hn2} & 3 \end{pmatrix} \qquad -\frac{\sqrt{2}\text{EpRmuMFv1piPvL1hNuvR2hMu}(P_-)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{he2}^\dagger & 2 \\ \text{n2} & 3 \end{pmatrix} \qquad -\frac{\sqrt{2}\text{EpRmuMFv1piPvL1nuvR2hMu}(P_-)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{nR1}^\dagger & 2 \\ \text{eL0} & 3 \end{pmatrix} \qquad -\frac{\sqrt{2}\text{EpLMFv0pi}\delta_{f_2,f_3}(P_-)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{nR1}^\dagger & 2 \\ \text{eL0} & 3 \end{pmatrix} \qquad -\frac{\sqrt{2}\text{EpLMFv0piP}\delta_{f_2,f_3}(P_-)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ \text{nR1}^\dagger & 3 \\ \text{nL0} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0pi}^2\delta_{f_3,f_4}(P_-)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{nR1}^\dagger & 2 \\ \text{nL0} & 3 \end{pmatrix} \qquad -\frac{\text{EpLMFv0pi0}\delta_{f_2,f_3}(P_-)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ \text{nR1}^\dagger & 3 \\ \text{nL0} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0pi0}^2\delta_{f_3,f_4}(P_-)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{nR1}^\dagger & 2 \\ \text{nL0} & 3 \end{pmatrix} \qquad -\frac{\text{EpLMFv0pi0P}\delta_{f_2,f_3}(P_-)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZP} & 2 \\ \text{nR1}^\dagger & 3 \\ \text{nL0} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0pi0v0pi0P}\delta_{f_3,f_4}(P_-)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piZP} & 2 \\ \text{nR1}^\dagger & 3 \\ \text{nL0} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0pi0P}^2\delta_{f_3,f_4}(P_-)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP} & 2 \\ \text{nR1}^\dagger & 3 \\ \text{nL0} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0piv0piP}\delta_{f_3,f_4}(P_-)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{nR1}^\dagger & 3 \\ \text{nL0} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0piv0piP}\delta_{f_3,f_4}(P_-)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{nR1}^\dagger & 3 \\ \text{nL0} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0piP}^2\delta_{f_3,f_4}(P_-)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{e3}^\dagger & 2 \\ \text{hn3} & 3 \end{pmatrix} \qquad -\frac{\sqrt{2}\text{EpRtaMFv1pivL1hNuvR2ta}(P_-)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{e3}^\dagger & 2 \\ \text{n3} & 3 \end{pmatrix} \qquad -\frac{\sqrt{2}\text{EpRtaMFv1pivL1nuvR2ta}(P_-)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{he3}^\dagger & 2 \\ \text{hn3} & 3 \end{pmatrix} \qquad -\frac{\sqrt{2}\text{EpRtaMFv1pivL1hNuvR2hTa}(P_-)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{he3}^\dagger & 2 \\ \text{n3} & 3 \end{pmatrix} \qquad -\frac{\sqrt{2}\text{EpRtaMFv1pivL1nuvR2hTa}(P_-)_{s_2,s_3}}{\text{fpi}}$$

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$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{e3}^\dagger & 2 \\ \text{hn3} & 3 \end{pmatrix} \qquad -\frac{\sqrt{2}\text{EpRtaMFv1piPvL1hNuvR2ta}(P_-)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{e3}^\dagger & 2 \\ \text{n3} & 3 \end{pmatrix} \qquad -\frac{\sqrt{2}\text{EpRtaMFv1piPvL1nuvR2ta}(P_-)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{he3}^\dagger & 2 \\ \text{hn3} & 3 \end{pmatrix} \qquad -\frac{\sqrt{2}\text{EpRtaMFv1piPvL1hNuvR2hTa}(P_-)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{he3}^\dagger & 2 \\ \text{n3} & 3 \end{pmatrix} \qquad -\frac{\sqrt{2}\text{EpRtaMFv1piPvL1nuvR2hTa}(P_-)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ \text{e3}^\dagger & 3 \\ \text{e3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtaMFv1pi}^2\text{vL1tavR2ta}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ \text{e3}^\dagger & 3 \\ \text{he3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtaMFv1pi}^2\text{vL1hTavR2ta}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRtaMFv1pi}^2\text{vL1tavR2hTa}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ \text{he3}^\dagger & 3 \\ \text{e3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtaMFv1pi}^2\text{vL1tavR2hTa}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRtaMFv1pi}^2\text{vL1hTavR2ta}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ \text{he3}^\dagger & 3 \\ \text{he3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtaMFv1pi}^2\text{vL1hTavR2hTa}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{e3}^\dagger & 2 \\ \text{e3} & 3 \end{pmatrix} \qquad -\frac{\text{EpRtaMFv1pi0vL1tavR2ta}\gamma^5_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{e3}^\dagger & 2 \\ \text{he3} & 3 \end{pmatrix} \qquad \frac{\text{EpRtaMFv1pi0vL1hTavR2ta}(P_-)_{s_2,s_3}}{\text{fpi}} - \frac{\text{EpRtaMFv1pi0vL1tavR2hTa}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{he3}^\dagger & 2 \\ \text{e3} & 3 \end{pmatrix} \qquad \frac{\text{EpRtaMFv1pi0vL1tavR2hTa}(P_-)_{s_2,s_3}}{\text{fpi}} - \frac{\text{EpRtaMFv1pi0vL1hTavR2ta}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{he3}^\dagger & 2 \\ \text{he3} & 3 \end{pmatrix} \qquad -\frac{\text{EpRtaMFv1pi0vL1hTavR2hTa}\gamma^5_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ \text{e3}^\dagger & 3 \\ \text{e3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtaMFv1pi0}^2\text{vL1tavR2ta}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$
\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ \text{e3}^{\dagger} & 3 \\ \text{he3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtaMFv1pi0}^2\text{vL1hTavR2ta}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRtaMFv1pi0}^2\text{vL1tavR2hTa}(P_+)_{s_3,s_4}}{\text{fpi}^2}
$$

$$
\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ \text{he3}^{\dagger} & 3 \\ \text{e3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtaMFv1pi0}^2\text{vL1tavR2hTa}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRtaMFv1pi0}^2\text{vL1hTavR2ta}(P_+)_{s_3,s_4}}{\text{fpi}^2}
$$

$$
\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ \text{he3}^{\dagger} & 3 \\ \text{he3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtaMFv1pi0}^2\text{vL1hTavR2hTa}\delta_{s_3,s_4}}{\text{fpi}^2}
$$

$$
\begin{pmatrix} \text{piZP} & 1 \\ \text{e3}^{\dagger} & 2 \\ \text{e3} & 3 \end{pmatrix} \qquad -\frac{\text{EpRtaMFv1pi0PvL1tavR2ta}\gamma^5_{s_2,s_3}}{\text{fpi}}
$$

$$
\begin{pmatrix} \text{piZP} & 1 \\ \text{e3}^{\dagger} & 2 \\ \text{he3} & 3 \end{pmatrix} \qquad \frac{\text{EpRtaMFv1pi0PvL1hTavR2ta}(P_-)_{s_2,s_3}}{\text{fpi}} - \frac{\text{EpRtaMFv1pi0PvL1tavR2hTa}(P_+)_{s_2,s_3}}{\text{fpi}}
$$

$$
\begin{pmatrix} \text{piZP} & 1 \\ \text{he3}^{\dagger} & 2 \\ \text{e3} & 3 \end{pmatrix} \qquad \frac{\text{EpRtaMFv1pi0PvL1tavR2hTa}(P_-)_{s_2,s_3}}{\text{fpi}} - \frac{\text{EpRtaMFv1pi0PvL1hTavR2ta}(P_+)_{s_2,s_3}}{\text{fpi}}
$$

$$
\begin{pmatrix} \text{piZP} & 1 \\ \text{he3}^{\dagger} & 2 \\ \text{he3} & 3 \end{pmatrix} \qquad -\frac{\text{EpRtaMFv1pi0PvL1hTavR2hTa}\gamma^5_{s_2,s_3}}{\text{fpi}}
$$

$$
\begin{pmatrix} \text{piZ} & 1 \\ \text{piZP} & 2 \\ \text{e3}^{\dagger} & 3 \\ \text{e3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtaMFv1pi0v1pi0PvL1tavR2ta}\delta_{s_3,s_4}}{\text{fpi}^2}
$$

$$
\begin{pmatrix} \text{piZ} & 1 \\ \text{piZP} & 2 \\ \text{e3}^{\dagger} & 3 \\ \text{he3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtaMFv1pi0v1pi0PvL1hTavR2ta}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRtaMFv1pi0v1pi0PvL1tavR2hTa}(P_+)_{s_3,s_4}}{\text{fpi}^2}
$$

$$
\begin{pmatrix} \text{piZ} & 1 \\ \text{piZP} & 2 \\ \text{he3}^{\dagger} & 3 \\ \text{e3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtaMFv1pi0v1pi0PvL1tavR2hTa}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRtaMFv1pi0v1pi0PvL1hTavR2ta}(P_+)_{s_3,s_4}}{\text{fpi}^2}
$$

$$
\begin{pmatrix} \text{piZ} & 1 \\ \text{piZP} & 2 \\ \text{he3}^{\dagger} & 3 \\ \text{he3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtaMFv1pi0v1pi0PvL1hTavR2hTa}\delta_{s_3,s_4}}{\text{fpi}^2}
$$

$$
\begin{pmatrix} \text{piZP} & 1 \\ \text{piZP} & 2 \\ \text{e3}^{\dagger} & 3 \\ \text{e3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtaMFv1pi0P}^2\text{vL1tavR2ta}\delta_{s_3,s_4}}{\text{fpi}^2}
$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piZP} & 2 \\ \text{e3}^\dagger & 3 \\ \text{he3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtaMFv1pi0P}^2\text{vL1hTavR2ta}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRtaMFv1pi0P}^2\text{vL1tavR2hTa}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piZP} & 2 \\ \text{he3}^\dagger & 3 \\ \text{e3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtaMFv1pi0P}^2\text{vL1tavR2hTa}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRtaMFv1pi0P}^2\text{vL1hTavR2ta}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piZP} & 2 \\ \text{he3}^\dagger & 3 \\ \text{he3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtaMFv1pi0P}^2\text{vL1hTavR2hTa}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP} & 2 \\ \text{e3}^\dagger & 3 \\ \text{e3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtaMFv1piv1piPvL1tavR2ta}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP} & 2 \\ \text{e3}^\dagger & 3 \\ \text{he3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtaMFv1piv1piPvL1hTavR2ta}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRtaMFv1piv1piPvL1tavR2hTa}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP} & 2 \\ \text{he3}^\dagger & 3 \\ \text{e3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtaMFv1piv1piPvL1tavR2hTa}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRtaMFv1piv1piPvL1hTavR2ta}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP} & 2 \\ \text{he3}^\dagger & 3 \\ \text{he3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtaMFv1piv1piPvL1hTavR2hTa}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{e3}^\dagger & 3 \\ \text{e3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtaMFv1piv1piPvL1tavR2ta}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{e3}^\dagger & 3 \\ \text{he3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtaMFv1piv1piPvL1hTavR2ta}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRtaMFv1piv1piPvL1tavR2hTa}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{he3}^\dagger & 3 \\ \text{e3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtaMFv1piv1piPvL1tavR2hTa}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRtaMFv1piv1piPvL1hTavR2ta}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{he3}^\dagger & 3 \\ \text{he3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtaMFv1piv1piPvL1hTavR2hTa}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{e3}^\dagger & 3 \\ \text{e3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtaMFv1piP}^2\text{vL1tavR2ta}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{e3}^\dagger & 3 \\ \text{he3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtaMFv1piP}^2\text{vL1hTavR2ta}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRtaMFv1piP}^2\text{vL1tavR2hTa}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{he3}^\dagger & 3 \\ \text{e3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtaMFv1piP}^2\text{vL1tavR2hTa}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRtaMFv1piP}^2\text{vL1hTavR2ta}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{he3}^\dagger & 3 \\ \text{he3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtaMFv1piP}^2\text{vL1hTavR2hTa}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ \text{eL0}^\dagger & 3 \\ \text{eR1} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0pi}^2\delta_{f_3,f_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{eL0}^\dagger & 2 \\ \text{eR1} & 3 \end{pmatrix} \qquad -\frac{\text{EpLMFv0pi0}\delta_{f_2,f_3}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ \text{eL0}^\dagger & 3 \\ \text{eR1} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0pi0}^2\delta_{f_3,f_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{eL0}^\dagger & 2 \\ \text{eR1} & 3 \end{pmatrix} \qquad -\frac{\text{EpLMFv0pi0P}\delta_{f_2,f_3}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZP} & 2 \\ \text{eL0}^\dagger & 3 \\ \text{eR1} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0pi0v0pi0P}\delta_{f_3,f_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piZP} & 2 \\ \text{eL0}^\dagger & 3 \\ \text{eR1} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0pi0P}^2\delta_{f_3,f_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP} & 2 \\ \text{eL0}^\dagger & 3 \\ \text{eR1} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0piv0piP}\delta_{f_3,f_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$
\begin{pmatrix}
\text{piW} & 1 \\
\text{piWP}^{\dagger} & 2 \\
\text{eL0}^{\dagger} & 3 \\
\text{eR1} & 4
\end{pmatrix}
\qquad
\frac{i\text{EpLMFv0piv0piP}\delta_{f_3,f_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}
$$

$$
\begin{pmatrix}
\text{piWP} & 1 \\
\text{piWP}^{\dagger} & 2 \\
\text{eL0}^{\dagger} & 3 \\
\text{eR1} & 4
\end{pmatrix}
\qquad
\frac{i\text{EpLMFv0piP}^2\delta_{f_3,f_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}
$$

$$
\begin{pmatrix}
\text{piW}^{\dagger} & 1 \\
\text{eL0}^{\dagger} & 2 \\
\text{nR1} & 3
\end{pmatrix}
\qquad
\frac{\sqrt{2}\text{EpLMFv0pi}\delta_{f_2,f_3}(P_+)_{s_2,s_3}}{\text{fpi}}
$$

$$
\begin{pmatrix}
\text{piWP}^{\dagger} & 1 \\
\text{eL0}^{\dagger} & 2 \\
\text{nR1} & 3
\end{pmatrix}
\qquad
\frac{\sqrt{2}\text{EpLMFv0piP}\delta_{f_2,f_3}(P_+)_{s_2,s_3}}{\text{fpi}}
$$

$$
\begin{pmatrix}
\text{piW} & 1 \\
\text{hn2}^{\dagger} & 2 \\
\text{e2} & 3
\end{pmatrix}
\qquad
\frac{\sqrt{2}\text{EpRmuMFv1pivL1hNuvR2mu}(P_+)_{s_2,s_3}}{\text{fpi}}
$$

$$
\begin{pmatrix}
\text{piW} & 1 \\
\text{hn2}^{\dagger} & 2 \\
\text{he2} & 3
\end{pmatrix}
\qquad
\frac{\sqrt{2}\text{EpRmuMFv1pivL1hNuvR2hMu}(P_+)_{s_2,s_3}}{\text{fpi}}
$$

$$
\begin{pmatrix}
\text{piW} & 1 \\
\text{n2}^{\dagger} & 2 \\
\text{e2} & 3
\end{pmatrix}
\qquad
\frac{\sqrt{2}\text{EpRmuMFv1pivL1nuvR2mu}(P_+)_{s_2,s_3}}{\text{fpi}}
$$

$$
\begin{pmatrix}
\text{piW} & 1 \\
\text{n2}^{\dagger} & 2 \\
\text{he2} & 3
\end{pmatrix}
\qquad
\frac{\sqrt{2}\text{EpRmuMFv1pivL1nuvR2hMu}(P_+)_{s_2,s_3}}{\text{fpi}}
$$

$$
\begin{pmatrix}
\text{piWP} & 1 \\
\text{hn2}^{\dagger} & 2 \\
\text{e2} & 3
\end{pmatrix}
\qquad
\frac{\sqrt{2}\text{EpRmuMFv1piPvL1hNuvR2mu}(P_+)_{s_2,s_3}}{\text{fpi}}
$$

$$
\begin{pmatrix}
\text{piWP} & 1 \\
\text{hn2}^{\dagger} & 2 \\
\text{he2} & 3
\end{pmatrix}
\qquad
\frac{\sqrt{2}\text{EpRmuMFv1piPvL1hNuvR2hMu}(P_+)_{s_2,s_3}}{\text{fpi}}
$$

$$
\begin{pmatrix}
\text{piWP} & 1 \\
\text{n2}^{\dagger} & 2 \\
\text{e2} & 3
\end{pmatrix}
\qquad
\frac{\sqrt{2}\text{EpRmuMFv1piPvL1nuvR2mu}(P_+)_{s_2,s_3}}{\text{fpi}}
$$

$$
\begin{pmatrix}
\text{piWP} & 1 \\
\text{n2}^{\dagger} & 2 \\
\text{he2} & 3
\end{pmatrix}
\qquad
\frac{\sqrt{2}\text{EpRmuMFv1piPvL1nuvR2hMu}(P_+)_{s_2,s_3}}{\text{fpi}}
$$

$$
\begin{pmatrix}
\text{piW} & 1 \\
\text{hn3}^{\dagger} & 2 \\
\text{e3} & 3
\end{pmatrix}
\qquad
\frac{\sqrt{2}\text{EpRtaMFv1pivL1hNuvR2ta}(P_+)_{s_2,s_3}}{\text{fpi}}
$$

$$
\begin{pmatrix}
\text{piW} & 1 \\
\text{hn3}^{\dagger} & 2 \\
\text{he3} & 3
\end{pmatrix}
\qquad
\frac{\sqrt{2}\text{EpRtaMFv1pivL1hNuvR2hTa}(P_+)_{s_2,s_3}}{\text{fpi}}
$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{n3}^\dagger & 2 \\ \text{e3} & 3 \end{pmatrix} \qquad \frac{\sqrt{2}\text{EpRtaMFv1pivL1nuvR2ta}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{n3}^\dagger & 2 \\ \text{he3} & 3 \end{pmatrix} \qquad \frac{\sqrt{2}\text{EpRtaMFv1pivL1nuvR2hTa}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{hn3}^\dagger & 2 \\ \text{e3} & 3 \end{pmatrix} \qquad \frac{\sqrt{2}\text{EpRtaMFv1piPvL1hNuvR2ta}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{hn3}^\dagger & 2 \\ \text{he3} & 3 \end{pmatrix} \qquad \frac{\sqrt{2}\text{EpRtaMFv1piPvL1hNuvR2hTa}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{n3}^\dagger & 2 \\ \text{e3} & 3 \end{pmatrix} \qquad \frac{\sqrt{2}\text{EpRtaMFv1piPvL1nuvR2ta}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{n3}^\dagger & 2 \\ \text{he3} & 3 \end{pmatrix} \qquad \frac{\sqrt{2}\text{EpRtaMFv1piPvL1nuvR2hTa}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{nL0}^\dagger & 2 \\ \text{eR1} & 3 \end{pmatrix} \qquad \frac{\sqrt{2}\text{EpLMFv0pi}\delta_{f_2,f_3}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{nL0}^\dagger & 2 \\ \text{eR1} & 3 \end{pmatrix} \qquad \frac{\sqrt{2}\text{EpLMFv0piP}\delta_{f_2,f_3}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ \text{nL0}^\dagger & 3 \\ \text{nR1} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0pi}^2\delta_{f_3,f_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{nL0}^\dagger & 2 \\ \text{nR1} & 3 \end{pmatrix} \qquad \frac{\text{EpLMFv0pi0}\delta_{f_2,f_3}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ \text{nL0}^\dagger & 3 \\ \text{nR1} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0pi0}^2\delta_{f_3,f_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{nL0}^\dagger & 2 \\ \text{nR1} & 3 \end{pmatrix} \qquad \frac{\text{EpLMFv0pi0P}\delta_{f_2,f_3}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZP} & 2 \\ \text{nL0}^\dagger & 3 \\ \text{nR1} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0pi0v0pi0P}\delta_{f_3,f_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piZP} & 2 \\ \text{nL0}^\dagger & 3 \\ \text{nR1} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0pi0P}^2\delta_{f_3,f_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

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$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP} & 2 \\ \text{nL0}^\dagger & 3 \\ \text{nR1} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0piv0piP}\delta_{f_3,f_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{nL0}^\dagger & 3 \\ \text{nR1} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0piv0piP}\delta_{f_3,f_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{nL0}^\dagger & 3 \\ \text{nR1} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0piP}^2\delta_{f_3,f_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

6.5 $V_{\mathbf{Gold-Quarks}}$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ \text{d3}^\dagger & 3 \\ \text{d3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRboMFv1pi}^2\text{vL1bovR2bo}\delta_{i_3,i_4}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ \text{d3}^\dagger & 3 \\ \text{hd3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRboMFv1pi}^2\text{vL1hBovR2bo}\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRboMFv1pi}^2\text{vL1bovR2hBo}\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ \text{hd3}^\dagger & 3 \\ \text{d3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRboMFv1pi}^2\text{vL1bovR2hBo}\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRboMFv1pi}^2\text{vL1hBovR2bo}\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ \text{hd3}^\dagger & 3 \\ \text{hd3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRboMFv1pi}^2\text{vL1hBovR2hBo}\delta_{i_3,i_4}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{d3}^\dagger & 2 \\ \text{d3} & 3 \end{pmatrix} \qquad -\frac{\text{EpRboMFv1pi0vL1bovR2bo}\gamma^5_{s_2,s_3}\delta_{i_2,i_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{d3}^\dagger & 2 \\ \text{hd3} & 3 \end{pmatrix} \qquad \frac{\text{EpRboMFv1pi0vL1hBovR2bo}\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}} - \frac{\text{EpRboMFv1pi0vL1bovR2hBo}\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{hd3}^\dagger & 2 \\ \text{d3} & 3 \end{pmatrix} \qquad \frac{\text{EpRboMFv1pi0vL1bovR2hBo}\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}} - \frac{\text{EpRboMFv1pi0vL1hBovR2bo}\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{hd3}^\dagger & 2 \\ \text{hd3} & 3 \end{pmatrix} \qquad -\frac{\text{EpRboMFv1pi0vL1hBovR2hBo}\gamma^5_{s_2,s_3}\delta_{i_2,i_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ \text{d3}^\dagger & 3 \\ \text{d3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRboMFv1pi0}^2\text{vL1bovR2bo}\delta_{i_3,i_4}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$
\begin{pmatrix}
\text{piZ} & 1 \\
\text{piZ} & 2 \\
\text{d3}^\dagger & 3 \\
\text{hd3} & 4
\end{pmatrix}
\qquad
\frac{i\text{EpRboMFv1pi0}^2\text{vL1hBovR2bo}\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRboMFv1pi0}^2\text{vL1bovR2hBo}\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}
$$

$$
\begin{pmatrix}
\text{piZ} & 1 \\
\text{piZ} & 2 \\
\text{hd3}^\dagger & 3 \\
\text{d3} & 4
\end{pmatrix}
\qquad
\frac{i\text{EpRboMFv1pi0}^2\text{vL1bovR2hBo}\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRboMFv1pi0}^2\text{vL1hBovR2bo}\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}
$$

$$
\begin{pmatrix}
\text{piZ} & 1 \\
\text{piZ} & 2 \\
\text{hd3}^\dagger & 3 \\
\text{hd3} & 4
\end{pmatrix}
\qquad
\frac{i\text{EpRboMFv1pi0}^2\text{vL1hBovR2hBo}\delta_{i_3,i_4}\delta_{s_3,s_4}}{\text{fpi}^2}
$$

$$
\begin{pmatrix}
\text{piZP} & 1 \\
\text{d3}^\dagger & 2 \\
\text{d3} & 3
\end{pmatrix}
\qquad
-\frac{\text{EpRboMFv1pi0PvL1bovR2bo}\gamma^5_{s_2,s_3}\delta_{i_2,i_3}}{\text{fpi}}
$$

$$
\begin{pmatrix}
\text{piZP} & 1 \\
\text{d3}^\dagger & 2 \\
\text{hd3} & 3
\end{pmatrix}
\qquad
\frac{\text{EpRboMFv1pi0PvL1hBovR2bo}\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}} - \frac{\text{EpRboMFv1pi0PvL1bovR2hBo}\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}
$$

$$
\begin{pmatrix}
\text{piZP} & 1 \\
\text{hd3}^\dagger & 2 \\
\text{d3} & 3
\end{pmatrix}
\qquad
\frac{\text{EpRboMFv1pi0PvL1bovR2hBo}\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}} - \frac{\text{EpRboMFv1pi0PvL1hBovR2bo}\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}
$$

$$
\begin{pmatrix}
\text{piZP} & 1 \\
\text{hd3}^\dagger & 2 \\
\text{hd3} & 3
\end{pmatrix}
\qquad
-\frac{\text{EpRboMFv1pi0PvL1hBovR2hBo}\gamma^5_{s_2,s_3}\delta_{i_2,i_3}}{\text{fpi}}
$$

$$
\begin{pmatrix}
\text{piZ} & 1 \\
\text{piZP} & 2 \\
\text{d3}^\dagger & 3 \\
\text{d3} & 4
\end{pmatrix}
\qquad
\frac{i\text{EpRboMFv1pi0v1pi0PvL1bovR2bo}\delta_{i_3,i_4}\delta_{s_3,s_4}}{\text{fpi}^2}
$$

$$
\begin{pmatrix}
\text{piZ} & 1 \\
\text{piZP} & 2 \\
\text{d3}^\dagger & 3 \\
\text{hd3} & 4
\end{pmatrix}
\qquad
\frac{i\text{EpRboMFv1pi0v1pi0PvL1hBovR2bo}\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRboMFv1pi0v1pi0PvL1bovR2hBo}\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}
$$

$$
\begin{pmatrix}
\text{piZ} & 1 \\
\text{piZP} & 2 \\
\text{hd3}^\dagger & 3 \\
\text{d3} & 4
\end{pmatrix}
\qquad
\frac{i\text{EpRboMFv1pi0v1pi0PvL1bovR2hBo}\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRboMFv1pi0v1pi0PvL1hBovR2bo}\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}
$$

$$
\begin{pmatrix}
\text{piZ} & 1 \\
\text{piZP} & 2 \\
\text{hd3}^\dagger & 3 \\
\text{hd3} & 4
\end{pmatrix}
\qquad
\frac{i\text{EpRboMFv1pi0v1pi0PvL1hBovR2hBo}\delta_{i_3,i_4}\delta_{s_3,s_4}}{\text{fpi}^2}
$$

$$
\begin{pmatrix}
\text{piZP} & 1 \\
\text{piZP} & 2 \\
\text{d3}^\dagger & 3 \\
\text{d3} & 4
\end{pmatrix}
\qquad
\frac{i\text{EpRboMFv1pi0P}^2\text{vL1bovR2bo}\delta_{i_3,i_4}\delta_{s_3,s_4}}{\text{fpi}^2}
$$

$$
\begin{pmatrix}
\text{piZP} & 1 \\
\text{piZP} & 2 \\
\text{d3}^\dagger & 3 \\
\text{hd3} & 4
\end{pmatrix}
\qquad
\frac{i\mathrm{EpRboMFv1pi0P^2vL1hBovR2bo}\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\mathrm{fpi}^2} + \frac{i\mathrm{EpRboMFv1pi0P^2vL1bovR2hBo}\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\mathrm{fpi}^2}
$$

$$
\begin{pmatrix}
\text{piZP} & 1 \\
\text{piZP} & 2 \\
\text{hd3}^\dagger & 3 \\
\text{d3} & 4
\end{pmatrix}
\qquad
\frac{i\mathrm{EpRboMFv1pi0P^2vL1bovR2hBo}\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\mathrm{fpi}^2} + \frac{i\mathrm{EpRboMFv1pi0P^2vL1hBovR2bo}\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\mathrm{fpi}^2}
$$

$$
\begin{pmatrix}
\text{piZP} & 1 \\
\text{piZP} & 2 \\
\text{hd3}^\dagger & 3 \\
\text{hd3} & 4
\end{pmatrix}
\qquad
\frac{i\mathrm{EpRboMFv1pi0P^2vL1hBovR2hBo}\delta_{i_3,i_4}\delta_{s_3,s_4}}{\mathrm{fpi}^2}
$$

$$
\begin{pmatrix}
\text{piW}^\dagger & 1 \\
\text{piWP} & 2 \\
\text{d3}^\dagger & 3 \\
\text{d3} & 4
\end{pmatrix}
\qquad
\frac{i\mathrm{EpRboMFv1piv1piPvL1bovR2bo}\delta_{i_3,i_4}\delta_{s_3,s_4}}{\mathrm{fpi}^2}
$$

$$
\begin{pmatrix}
\text{piW}^\dagger & 1 \\
\text{piWP} & 2 \\
\text{d3}^\dagger & 3 \\
\text{hd3} & 4
\end{pmatrix}
\qquad
\frac{i\mathrm{EpRboMFv1piv1piPvL1hBovR2bo}\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\mathrm{fpi}^2} + \frac{i\mathrm{EpRboMFv1piv1piPvL1bovR2hBo}\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\mathrm{fpi}^2}
$$

$$
\begin{pmatrix}
\text{piW}^\dagger & 1 \\
\text{piWP} & 2 \\
\text{hd3}^\dagger & 3 \\
\text{d3} & 4
\end{pmatrix}
\qquad
\frac{i\mathrm{EpRboMFv1piv1piPvL1bovR2hBo}\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\mathrm{fpi}^2} + \frac{i\mathrm{EpRboMFv1piv1piPvL1hBovR2bo}\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\mathrm{fpi}^2}
$$

$$
\begin{pmatrix}
\text{piW}^\dagger & 1 \\
\text{piWP} & 2 \\
\text{hd3}^\dagger & 3 \\
\text{hd3} & 4
\end{pmatrix}
\qquad
\frac{i\mathrm{EpRboMFv1piv1piPvL1hBovR2hBo}\delta_{i_3,i_4}\delta_{s_3,s_4}}{\mathrm{fpi}^2}
$$

$$
\begin{pmatrix}
\text{piW} & 1 \\
\text{piWP}^\dagger & 2 \\
\text{d3}^\dagger & 3 \\
\text{d3} & 4
\end{pmatrix}
\qquad
\frac{i\mathrm{EpRboMFv1piv1piPvL1bovR2bo}\delta_{i_3,i_4}\delta_{s_3,s_4}}{\mathrm{fpi}^2}
$$

$$
\begin{pmatrix}
\text{piW} & 1 \\
\text{piWP}^\dagger & 2 \\
\text{d3}^\dagger & 3 \\
\text{hd3} & 4
\end{pmatrix}
\qquad
\frac{i\mathrm{EpRboMFv1piv1piPvL1hBovR2bo}\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\mathrm{fpi}^2} + \frac{i\mathrm{EpRboMFv1piv1piPvL1bovR2hBo}\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\mathrm{fpi}^2}
$$

$$
\begin{pmatrix}
\text{piW} & 1 \\
\text{piWP}^\dagger & 2 \\
\text{hd3}^\dagger & 3 \\
\text{d3} & 4
\end{pmatrix}
\qquad
\frac{i\mathrm{EpRboMFv1piv1piPvL1bovR2hBo}\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\mathrm{fpi}^2} + \frac{i\mathrm{EpRboMFv1piv1piPvL1hBovR2bo}\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\mathrm{fpi}^2}
$$

$$
\begin{pmatrix}
\text{piW} & 1 \\
\text{piWP}^\dagger & 2 \\
\text{hd3}^\dagger & 3 \\
\text{hd3} & 4
\end{pmatrix}
\qquad
\frac{i\mathrm{EpRboMFv1piv1piPvL1hBovR2hBo}\delta_{i_3,i_4}\delta_{s_3,s_4}}{\mathrm{fpi}^2}
$$

$$
\begin{pmatrix}
\text{piWP} & 1 \\
\text{piWP}^\dagger & 2 \\
\text{d3}^\dagger & 3 \\
\text{d3} & 4
\end{pmatrix}
\qquad
\frac{i\text{EpRboMFv1piP}^2\text{vL1bovR2bo}\delta_{i_3,i_4}\,\delta_{s_3,s_4}}{\text{fpi}^2}
$$

$$
\begin{pmatrix}
\text{piWP} & 1 \\
\text{piWP}^\dagger & 2 \\
\text{d3}^\dagger & 3 \\
\text{hd3} & 4
\end{pmatrix}
\qquad
\frac{i\text{EpRboMFv1piP}^2\text{vL1hBovR2bo}\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRboMFv1piP}^2\text{vL1bovR2hBo}\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}
$$

$$
\begin{pmatrix}
\text{piWP} & 1 \\
\text{piWP}^\dagger & 2 \\
\text{hd3}^\dagger & 3 \\
\text{d3} & 4
\end{pmatrix}
\qquad
\frac{i\text{EpRboMFv1piP}^2\text{vL1bovR2hBo}\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRboMFv1piP}^2\text{vL1hBovR2bo}\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}
$$

$$
\begin{pmatrix}
\text{piWP} & 1 \\
\text{piWP}^\dagger & 2 \\
\text{hd3}^\dagger & 3 \\
\text{hd3} & 4
\end{pmatrix}
\qquad
\frac{i\text{EpRboMFv1piP}^2\text{vL1hBovR2hBo}\delta_{i_3,i_4}\,\delta_{s_3,s_4}}{\text{fpi}^2}
$$

$$
\begin{pmatrix}
\text{piW}^\dagger & 1 \\
\text{d3}^\dagger & 2 \\
\text{hu3} & 3
\end{pmatrix}
\qquad
-\frac{\sqrt{2}\text{EpRboMFv1pivL1hTovR2bo}\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}} + \frac{\sqrt{2}\text{EpRtoMFv1pivL1bovR2hTo}\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}
$$

$$
\begin{pmatrix}
\text{piW}^\dagger & 1 \\
\text{d3}^\dagger & 2 \\
\text{u3} & 3
\end{pmatrix}
\qquad
-\frac{\sqrt{2}\text{EpRboMFv1pivL1tovR2bo}\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}} + \frac{\sqrt{2}\text{EpRtoMFv1pivL1bovR2to}\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}
$$

$$
\begin{pmatrix}
\text{piW}^\dagger & 1 \\
\text{hd3}^\dagger & 2 \\
\text{hu3} & 3
\end{pmatrix}
\qquad
-\frac{\sqrt{2}\text{EpRboMFv1pivL1hTovR2hBo}\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}} + \frac{\sqrt{2}\text{EpRtoMFv1pivL1hBovR2hTo}\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}
$$

$$
\begin{pmatrix}
\text{piW}^\dagger & 1 \\
\text{hd3}^\dagger & 2 \\
\text{u3} & 3
\end{pmatrix}
\qquad
-\frac{\sqrt{2}\text{EpRboMFv1pivL1tovR2hBo}\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}} + \frac{\sqrt{2}\text{EpRtoMFv1pivL1hBovR2to}\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}
$$

$$
\begin{pmatrix}
\text{piWP}^\dagger & 1 \\
\text{d3}^\dagger & 2 \\
\text{hu3} & 3
\end{pmatrix}
\qquad
-\frac{\sqrt{2}\text{EpRboMFv1piPvL1hTovR2bo}\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}} + \frac{\sqrt{2}\text{EpRtoMFv1piPvL1bovR2hTo}\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}
$$

$$
\begin{pmatrix}
\text{piWP}^\dagger & 1 \\
\text{d3}^\dagger & 2 \\
\text{u3} & 3
\end{pmatrix}
\qquad
-\frac{\sqrt{2}\text{EpRboMFv1piPvL1tovR2bo}\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}} + \frac{\sqrt{2}\text{EpRtoMFv1piPvL1bovR2to}\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}
$$

$$
\begin{pmatrix}
\text{piWP}^\dagger & 1 \\
\text{hd3}^\dagger & 2 \\
\text{hu3} & 3
\end{pmatrix}
\qquad
-\frac{\sqrt{2}\text{EpRboMFv1piPvL1hTovR2hBo}\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}} + \frac{\sqrt{2}\text{EpRtoMFv1piPvL1hBovR2hTo}\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}
$$

$$
\begin{pmatrix}
\text{piWP}^\dagger & 1 \\
\text{hd3}^\dagger & 2 \\
\text{u3} & 3
\end{pmatrix}
\qquad
-\frac{\sqrt{2}\text{EpRboMFv1piPvL1tovR2hBo}\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}} + \frac{\sqrt{2}\text{EpRtoMFv1piPvL1hBovR2to}\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}
$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ \text{hu2}^\dagger & 3 \\ \text{hu2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRchMFv1pi}^2\text{vL1hChvR2hCh}\,\delta_{i_3,i_4}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ \text{hu2}^\dagger & 3 \\ \text{u2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRchMFv1pi}^2\text{vL1chvR2hCh}\,\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRchMFv1pi}^2\text{vL1hChvR2ch}\,\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ \text{u2}^\dagger & 3 \\ \text{hu2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRchMFv1pi}^2\text{vL1hChvR2ch}\,\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRchMFv1pi}^2\text{vL1chvR2hCh}\,\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ \text{u2}^\dagger & 3 \\ \text{u2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRchMFv1pi}^2\text{vL1chvR2ch}\,\delta_{i_3,i_4}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{hu2}^\dagger & 2 \\ \text{hu2} & 3 \end{pmatrix} \qquad \frac{\text{EpRchMFv1pi0vL1hChvR2hCh}\,\gamma^5_{s_2,s_3}\delta_{i_2,i_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{hu2}^\dagger & 2 \\ \text{u2} & 3 \end{pmatrix} \qquad -\frac{\text{EpRchMFv1pi0vL1chvR2hCh}\,\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}} + \frac{\text{EpRchMFv1pi0vL1hChvR2ch}\,\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{u2}^\dagger & 2 \\ \text{hu2} & 3 \end{pmatrix} \qquad -\frac{\text{EpRchMFv1pi0vL1hChvR2ch}\,\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}} + \frac{\text{EpRchMFv1pi0vL1chvR2hCh}\,\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{u2}^\dagger & 2 \\ \text{u2} & 3 \end{pmatrix} \qquad \frac{\text{EpRchMFv1pi0vL1chvR2ch}\,\gamma^5_{s_2,s_3}\delta_{i_2,i_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ \text{hu2}^\dagger & 3 \\ \text{hu2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRchMFv1pi0}^2\text{vL1hChvR2hCh}\,\delta_{i_3,i_4}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ \text{hu2}^\dagger & 3 \\ \text{u2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRchMFv1pi0}^2\text{vL1chvR2hCh}\,\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRchMFv1pi0}^2\text{vL1hChvR2ch}\,\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ \text{u2}^\dagger & 3 \\ \text{hu2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRchMFv1pi0}^2\text{vL1hChvR2ch}\,\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRchMFv1pi0}^2\text{vL1chvR2hCh}\,\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ \text{u2}^\dagger & 3 \\ \text{u2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRchMFv1pi0}^2\text{vL1chvR2ch}\,\delta_{i_3,i_4}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{hu2}^\dagger & 2 \\ \text{hu2} & 3 \end{pmatrix} \qquad \frac{\text{EpRchMFv1pi0PvL1hChvR2hCh}\,\gamma^5_{s_2,s_3}\delta_{i_2,i_3}}{\text{fpi}}$$

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$$\begin{pmatrix} \text{piZP} & 1 \\ \text{hu2}^\dagger & 2 \\ \text{u2} & 3 \end{pmatrix} \qquad -\frac{\text{EpRchMFv1pi0PvL1chvR2hCh}\,\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}} + \frac{\text{EpRchMFv1pi0PvL1hChvR2ch}\,\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{u2}^\dagger & 2 \\ \text{hu2} & 3 \end{pmatrix} \qquad -\frac{\text{EpRchMFv1pi0PvL1hChvR2ch}\,\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}} + \frac{\text{EpRchMFv1pi0PvL1chvR2hCh}\,\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{u2}^\dagger & 2 \\ \text{u2} & 3 \end{pmatrix} \qquad \frac{\text{EpRchMFv1pi0PvL1chvR2ch}\,\gamma^5_{s_2,s_3}\delta_{i_2,i_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZP} & 2 \\ \text{hu2}^\dagger & 3 \\ \text{hu2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRchMFv1pi0v1pi0PvL1hChvR2hCh}\,\delta_{i_3,i_4}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZP} & 2 \\ \text{hu2}^\dagger & 3 \\ \text{u2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRchMFv1pi0v1pi0PvL1hChvR2hCh}\,\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRchMFv1pi0v1pi0PvL1hChvR2ch}\,\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZP} & 2 \\ \text{u2}^\dagger & 3 \\ \text{hu2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRchMFv1pi0v1pi0PvL1hChvR2ch}\,\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRchMFv1pi0v1pi0PvL1chvR2hCh}\,\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZP} & 2 \\ \text{u2}^\dagger & 3 \\ \text{u2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRchMFv1pi0v1pi0PvL1chvR2ch}\,\delta_{i_3,i_4}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piZP} & 2 \\ \text{hu2}^\dagger & 3 \\ \text{hu2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRchMFv1pi0P}^2\text{vL1hChvR2hCh}\,\delta_{i_3,i_4}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piZP} & 2 \\ \text{hu2}^\dagger & 3 \\ \text{u2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRchMFv1pi0P}^2\text{vL1chvR2hCh}\,\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRchMFv1pi0P}^2\text{vL1hChvR2ch}\,\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piZP} & 2 \\ \text{u2}^\dagger & 3 \\ \text{hu2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRchMFv1pi0P}^2\text{vL1hChvR2ch}\,\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRchMFv1pi0P}^2\text{vL1chvR2hCh}\,\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piZP} & 2 \\ \text{u2}^\dagger & 3 \\ \text{u2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRchMFv1pi0P}^2\text{vL1chvR2ch}\,\delta_{i_3,i_4}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP} & 2 \\ \text{hu2}^\dagger & 3 \\ \text{hu2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRchMFv1piv1piPvL1hChvR2hCh}\,\delta_{i_3,i_4}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP} & 2 \\ \text{hu2}^\dagger & 3 \\ \text{u2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRchMFv1piv1piPvL1chvR2hCh}\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRchMFv1piv1piPvL1hChvR2ch}\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP} & 2 \\ \text{u2}^\dagger & 3 \\ \text{hu2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRchMFv1piv1piPvL1hChvR2ch}\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRchMFv1piv1piPvL1chvR2hCh}\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP} & 2 \\ \text{u2}^\dagger & 3 \\ \text{u2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRchMFv1piv1piPvL1chvR2ch}\delta_{i_3,i_4}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{hu2}^\dagger & 3 \\ \text{hu2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRchMFv1piv1piPvL1hChvR2hCh}\delta_{i_3,i_4}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{hu2}^\dagger & 3 \\ \text{u2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRchMFv1piv1piPvL1chvR2hCh}\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRchMFv1piv1piPvL1hChvR2ch}\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{u2}^\dagger & 3 \\ \text{hu2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRchMFv1piv1piPvL1hChvR2ch}\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRchMFv1piv1piPvL1chvR2hCh}\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{u2}^\dagger & 3 \\ \text{u2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRchMFv1piv1piPvL1chvR2ch}\delta_{i_3,i_4}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{hu2}^\dagger & 3 \\ \text{hu2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRchMFv1piP}^2\text{vL1hChvR2hCh}\delta_{i_3,i_4}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{hu2}^\dagger & 3 \\ \text{u2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRchMFv1piP}^2\text{vL1chvR2hCh}\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRchMFv1piP}^2\text{vL1hChvR2ch}\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{u2}^\dagger & 3 \\ \text{hu2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRchMFv1piP}^2\text{vL1hChvR2ch}\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRchMFv1piP}^2\text{vL1chvR2hCh}\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{u2}^\dagger & 3 \\ \text{u2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRchMFv1piP}^2\text{vL1chvR2ch}\delta_{i_3,i_4}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{hu2}^\dagger & 2 \\ \text{d2} & 3 \end{pmatrix} \qquad -\frac{\sqrt{2}\text{EpRchMFv1pivL1stvR2hCh}\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}} + \frac{\sqrt{2}\text{EpRstMFv1pivL1hChvR2st}\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{hu2}^\dagger & 2 \\ \text{hd2} & 3 \end{pmatrix} \qquad -\frac{\sqrt{2}\text{EpRchMFv1pivL1hStvR2hCh}\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}} + \frac{\sqrt{2}\text{EpRstMFv1pivL1hChvR2hSt}\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{u2}^\dagger & 2 \\ \text{d2} & 3 \end{pmatrix} \qquad -\frac{\sqrt{2}\text{EpRchMFv1pivL1stvR2ch}\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}} + \frac{\sqrt{2}\text{EpRstMFv1pivL1chvR2st}\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{u2}^\dagger & 2 \\ \text{hd2} & 3 \end{pmatrix} \qquad -\frac{\sqrt{2}\text{EpRchMFv1pivL1hStvR2ch}\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}} + \frac{\sqrt{2}\text{EpRstMFv1pivL1chvR2hSt}\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{hu2}^\dagger & 2 \\ \text{d2} & 3 \end{pmatrix} \qquad -\frac{\sqrt{2}\text{EpRchMFv1piPvL1stvR2hCh}\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}} + \frac{\sqrt{2}\text{EpRstMFv1piPvL1hChvR2st}\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{hu2}^\dagger & 2 \\ \text{hd2} & 3 \end{pmatrix} \qquad -\frac{\sqrt{2}\text{EpRchMFv1piPvL1hStvR2hCh}\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}} + \frac{\sqrt{2}\text{EpRstMFv1piPvL1hChvR2hSt}\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{u2}^\dagger & 2 \\ \text{d2} & 3 \end{pmatrix} \qquad -\frac{\sqrt{2}\text{EpRchMFv1piPvL1stvR2ch}\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}} + \frac{\sqrt{2}\text{EpRstMFv1piPvL1chvR2st}\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{u2}^\dagger & 2 \\ \text{hd2} & 3 \end{pmatrix} \qquad -\frac{\sqrt{2}\text{EpRchMFv1piPvL1hStvR2ch}\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}} + \frac{\sqrt{2}\text{EpRstMFv1piPvL1chvR2hSt}\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ \text{dR1}^\dagger & 3 \\ \text{dL0} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0pi}^2\delta_{i_3,i_4}\delta_{f_3,f_4}(P_-)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{dR1}^\dagger & 2 \\ \text{dL0} & 3 \end{pmatrix} \qquad \frac{\text{EpLMFv0pi0}\delta_{i_2,i_3}\delta_{f_2,f_3}(P_-)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ \text{dR1}^\dagger & 3 \\ \text{dL0} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0pi0}^2\delta_{i_3,i_4}\delta_{f_3,f_4}(P_-)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{dR1}^\dagger & 2 \\ \text{dL0} & 3 \end{pmatrix} \qquad \frac{\text{EpLMFv0pi0P}\delta_{i_2,i_3}\delta_{f_2,f_3}(P_-)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZP} & 2 \\ \text{dR1}^\dagger & 3 \\ \text{dL0} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0pi0v0pi0P}\delta_{i_3,i_4}\delta_{f_3,f_4}(P_-)_{s_3,s_4}}{\text{fpi}^2}$$

$$
\begin{pmatrix}
\text{piZP} & 1 \\
\text{piZP} & 2 \\
\text{dR1}^\dagger & 3 \\
\text{dL0} & 4
\end{pmatrix}
\qquad
\frac{i\text{EpLMFv0pi0P}^2\delta_{i_3,i_4}\delta_{f_3,f_4}(P_-)_{s_3,s_4}}{\text{fpi}^2}
$$

$$
\begin{pmatrix}
\text{piW}^\dagger & 1 \\
\text{piWP} & 2 \\
\text{dR1}^\dagger & 3 \\
\text{dL0} & 4
\end{pmatrix}
\qquad
\frac{i\text{EpLMFv0piv0piP}\delta_{i_3,i_4}\delta_{f_3,f_4}(P_-)_{s_3,s_4}}{\text{fpi}^2}
$$

$$
\begin{pmatrix}
\text{piW} & 1 \\
\text{piWP}^\dagger & 2 \\
\text{dR1}^\dagger & 3 \\
\text{dL0} & 4
\end{pmatrix}
\qquad
\frac{i\text{EpLMFv0piv0piP}\delta_{i_3,i_4}\delta_{f_3,f_4}(P_-)_{s_3,s_4}}{\text{fpi}^2}
$$

$$
\begin{pmatrix}
\text{piWP} & 1 \\
\text{piWP}^\dagger & 2 \\
\text{dR1}^\dagger & 3 \\
\text{dL0} & 4
\end{pmatrix}
\qquad
\frac{i\text{EpLMFv0piP}^2\delta_{i_3,i_4}\delta_{f_3,f_4}(P_-)_{s_3,s_4}}{\text{fpi}^2}
$$

$$
\begin{pmatrix}
\text{piW}^\dagger & 1 \\
\text{dR1}^\dagger & 2 \\
\text{uL0} & 3
\end{pmatrix}
\qquad
-\frac{\sqrt{2}\text{EpLMFv0pi}\delta_{i_2,i_3}\delta_{f_2,f_3}(P_-)_{s_2,s_3}}{\text{fpi}}
$$

$$
\begin{pmatrix}
\text{piWP}^\dagger & 1 \\
\text{dR1}^\dagger & 2 \\
\text{uL0} & 3
\end{pmatrix}
\qquad
-\frac{\sqrt{2}\text{EpLMFv0piP}\delta_{i_2,i_3}\delta_{f_2,f_3}(P_-)_{s_2,s_3}}{\text{fpi}}
$$

$$
\begin{pmatrix}
\text{piW}^\dagger & 1 \\
\text{d2}^\dagger & 2 \\
\text{hu2} & 3
\end{pmatrix}
\qquad
-\frac{\sqrt{2}\text{EpRstMFv1pivL1hChvR2st}\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}}
+\frac{\sqrt{2}\text{EpRchMFv1pivL1stvR2hCh}\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}
$$

$$
\begin{pmatrix}
\text{piW}^\dagger & 1 \\
\text{d2}^\dagger & 2 \\
\text{u2} & 3
\end{pmatrix}
\qquad
-\frac{\sqrt{2}\text{EpRstMFv1pivL1chvR2st}\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}}
+\frac{\sqrt{2}\text{EpRchMFv1pivL1stvR2ch}\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}
$$

$$
\begin{pmatrix}
\text{piW}^\dagger & 1 \\
\text{hd2}^\dagger & 2 \\
\text{hu2} & 3
\end{pmatrix}
\qquad
-\frac{\sqrt{2}\text{EpRstMFv1pivL1hChvR2hSt}\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}}
+\frac{\sqrt{2}\text{EpRchMFv1pivL1hStvR2hCh}\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}
$$

$$
\begin{pmatrix}
\text{piW}^\dagger & 1 \\
\text{hd2}^\dagger & 2 \\
\text{u2} & 3
\end{pmatrix}
\qquad
-\frac{\sqrt{2}\text{EpRstMFv1pivL1chvR2hSt}\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}}
+\frac{\sqrt{2}\text{EpRchMFv1pivL1hStvR2ch}\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}
$$

$$
\begin{pmatrix}
\text{piWP}^\dagger & 1 \\
\text{d2}^\dagger & 2 \\
\text{hu2} & 3
\end{pmatrix}
\qquad
-\frac{\sqrt{2}\text{EpRstMFv1piPvL1hChvR2st}\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}}
+\frac{\sqrt{2}\text{EpRchMFv1piPvL1stvR2hCh}\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}
$$

$$
\begin{pmatrix}
\text{piWP}^\dagger & 1 \\
\text{d2}^\dagger & 2 \\
\text{u2} & 3
\end{pmatrix}
\qquad
-\frac{\sqrt{2}\text{EpRstMFv1piPvL1chvR2st}\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}}
+\frac{\sqrt{2}\text{EpRchMFv1piPvL1stvR2ch}\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}
$$

$$
\begin{pmatrix}
\text{piWP}^\dagger & 1 \\
\text{hd2}^\dagger & 2 \\
\text{hu2} & 3
\end{pmatrix}
\qquad
-\frac{\sqrt{2}\text{EpRstMFv1piPvL1hChvR2hSt}\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}}
+\frac{\sqrt{2}\text{EpRchMFv1piPvL1hStvR2hCh}\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}
$$

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$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{hd2}^\dagger & 2 \\ \text{u2} & 3 \end{pmatrix} \qquad -\frac{\sqrt{2}\text{EpRstMFv1piPvL1chvR2hSt}\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}} + \frac{\sqrt{2}\text{EpRchMFv1piPvL1hStvR2ch}\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ \text{d2}^\dagger & 3 \\ \text{d2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRstMFv1pi}^2\text{vL1stvR2st}\delta_{i_3,i_4}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ \text{d2}^\dagger & 3 \\ \text{hd2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRstMFv1pi}^2\text{vL1hStvR2st}\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRstMFv1pi}^2\text{vL1stvR2hSt}\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ \text{hd2}^\dagger & 3 \\ \text{d2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRstMFv1pi}^2\text{vL1stvR2hSt}\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRstMFv1pi}^2\text{vL1hStvR2st}\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ \text{hd2}^\dagger & 3 \\ \text{hd2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRstMFv1pi}^2\text{vL1hStvR2hSt}\delta_{i_3,i_4}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{d2}^\dagger & 2 \\ \text{d2} & 3 \end{pmatrix} \qquad -\frac{\text{EpRstMFv1pi0vL1stvR2st}\gamma^5_{s_2,s_3}\delta_{i_2,i_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{d2}^\dagger & 2 \\ \text{hd2} & 3 \end{pmatrix} \qquad \frac{\text{EpRstMFv1pi0vL1hStvR2st}\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}} - \frac{\text{EpRstMFv1pi0vL1stvR2hSt}\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{hd2}^\dagger & 2 \\ \text{d2} & 3 \end{pmatrix} \qquad \frac{\text{EpRstMFv1pi0vL1stvR2hSt}\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}} - \frac{\text{EpRstMFv1pi0vL1hStvR2st}\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{hd2}^\dagger & 2 \\ \text{hd2} & 3 \end{pmatrix} \qquad -\frac{\text{EpRstMFv1pi0vL1hStvR2hSt}\gamma^5_{s_2,s_3}\delta_{i_2,i_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ \text{d2}^\dagger & 3 \\ \text{d2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRstMFv1pi0}^2\text{vL1stvR2st}\delta_{i_3,i_4}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ \text{d2}^\dagger & 3 \\ \text{hd2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRstMFv1pi0}^2\text{vL1hStvR2st}\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRstMFv1pi0}^2\text{vL1stvR2hSt}\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ \text{hd2}^\dagger & 3 \\ \text{d2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRstMFv1pi0}^2\text{vL1stvR2hSt}\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRstMFv1pi0}^2\text{vL1hStvR2st}\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ \text{hd2}^\dagger & 3 \\ \text{hd2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRstMFv1pi0}^2\text{vL1hStvR2hSt}\delta_{i_3,i_4}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{d2}^\dagger & 2 \\ \text{d2} & 3 \end{pmatrix} \qquad -\frac{\text{EpRstMFv1pi0PvL1stvR2st}\gamma^5_{s_2,s_3}\delta_{i_2,i_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{d2}^\dagger & 2 \\ \text{hd2} & 3 \end{pmatrix} \qquad \frac{\text{EpRstMFv1pi0PvL1hStvR2st}\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}} - \frac{\text{EpRstMFv1pi0PvL1stvR2hSt}\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{hd2}^\dagger & 2 \\ \text{d2} & 3 \end{pmatrix} \qquad \frac{\text{EpRstMFv1pi0PvL1stvR2hSt}\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}} - \frac{\text{EpRstMFv1pi0PvL1hStvR2st}\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{hd2}^\dagger & 2 \\ \text{hd2} & 3 \end{pmatrix} \qquad -\frac{\text{EpRstMFv1pi0PvL1hStvR2hSt}\gamma^5_{s_2,s_3}\delta_{i_2,i_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZP} & 2 \\ \text{d2}^\dagger & 3 \\ \text{d2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRstMFv1pi0v1pi0PvL1stvR2st}\delta_{i_3,i_4}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZP} & 2 \\ \text{d2}^\dagger & 3 \\ \text{hd2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRstMFv1pi0v1pi0PvL1hStvR2st}\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRstMFv1pi0v1pi0PvL1stvR2hSt}\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZP} & 2 \\ \text{hd2}^\dagger & 3 \\ \text{d2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRstMFv1pi0v1pi0PvL1stvR2hSt}\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRstMFv1pi0v1pi0PvL1hStvR2st}\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZP} & 2 \\ \text{hd2}^\dagger & 3 \\ \text{hd2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRstMFv1pi0v1pi0PvL1hStvR2hSt}\delta_{i_3,i_4}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piZP} & 2 \\ \text{d2}^\dagger & 3 \\ \text{d2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRstMFv1pi0P}^2\text{vL1stvR2st}\delta_{i_3,i_4}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piZP} & 2 \\ \text{d2}^\dagger & 3 \\ \text{hd2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRstMFv1pi0P}^2\text{vL1hStvR2st}\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRstMFv1pi0P}^2\text{vL1stvR2hSt}\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piZP} & 2 \\ \text{hd2}^\dagger & 3 \\ \text{d2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRstMFv1pi0P}^2\text{vL1stvR2hSt}\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRstMFv1pi0P}^2\text{vL1hStvR2st}\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piZP} & 2 \\ \text{hd2}^\dagger & 3 \\ \text{hd2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRstMFv1pi0P}^2\text{vL1hStvR2hSt}\delta_{i_3,i_4}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP} & 2 \\ \text{d2}^\dagger & 3 \\ \text{d2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRstMFv1piv1piPvL1stvR2st}\delta_{i_3,i_4}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP} & 2 \\ \text{d2}^\dagger & 3 \\ \text{hd2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRstMFv1piv1piPvL1stvR2st}\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRstMFv1piv1piPvL1stvR2hSt}\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP} & 2 \\ \text{hd2}^\dagger & 3 \\ \text{d2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRstMFv1piv1piPvL1stvR2hSt}\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRstMFv1piv1piPvL1hStvR2st}\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP} & 2 \\ \text{hd2}^\dagger & 3 \\ \text{hd2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRstMFv1piv1piPvL1hStvR2hSt}\delta_{i_3,i_4}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{d2}^\dagger & 3 \\ \text{d2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRstMFv1piv1piPvL1stvR2st}\delta_{i_3,i_4}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{d2}^\dagger & 3 \\ \text{hd2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRstMFv1piv1piPvL1hStvR2st}\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRstMFv1piv1piPvL1stvR2hSt}\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{hd2}^\dagger & 3 \\ \text{d2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRstMFv1piv1piPvL1stvR2hSt}\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRstMFv1piv1piPvL1hStvR2st}\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{hd2}^\dagger & 3 \\ \text{hd2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRstMFv1piv1piPvL1hStvR2hSt}\delta_{i_3,i_4}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{d2}^\dagger & 3 \\ \text{d2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRstMFv1piP}^2\text{vL1stvR2st}\delta_{i_3,i_4}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{d2}^\dagger & 3 \\ \text{hd2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRstMFv1piP}^2\text{vL1hStvR2st}\,\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRstMFv1piP}^2\text{vL1stvR2hSt}\,\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{hd2}^\dagger & 3 \\ \text{d2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRstMFv1piP}^2\text{vL1stvR2hSt}\,\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRstMFv1piP}^2\text{vL1hStvR2st}\,\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{hd2}^\dagger & 3 \\ \text{hd2} & 4 \end{pmatrix} \qquad \frac{i\text{EpRstMFv1piP}^2\text{vL1hStvR2hSt}\,\delta_{i_3,i_4}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{hu3}^\dagger & 2 \\ \text{d3} & 3 \end{pmatrix} \qquad -\frac{\sqrt{2}\text{EpRtoMFv1pivL1bovR2hTo}\,\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}} + \frac{\sqrt{2}\text{EpRboMFv1pivL1hTovR2bo}\,\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{hu3}^\dagger & 2 \\ \text{hd3} & 3 \end{pmatrix} \qquad -\frac{\sqrt{2}\text{EpRtoMFv1pivL1hBovR2hTo}\,\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}} + \frac{\sqrt{2}\text{EpRboMFv1pivL1hTovR2hBo}\,\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{u3}^\dagger & 2 \\ \text{d3} & 3 \end{pmatrix} \qquad -\frac{\sqrt{2}\text{EpRtoMFv1pivL1bovR2to}\,\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}} + \frac{\sqrt{2}\text{EpRboMFv1pivL1tovR2bo}\,\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{u3}^\dagger & 2 \\ \text{hd3} & 3 \end{pmatrix} \qquad -\frac{\sqrt{2}\text{EpRtoMFv1pivL1hBovR2to}\,\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}} + \frac{\sqrt{2}\text{EpRboMFv1pivL1tovR2hBo}\,\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{hu3}^\dagger & 2 \\ \text{d3} & 3 \end{pmatrix} \qquad -\frac{\sqrt{2}\text{EpRtoMFv1piPvL1bovR2hTo}\,\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}} + \frac{\sqrt{2}\text{EpRboMFv1piPvL1hTovR2bo}\,\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{hu3}^\dagger & 2 \\ \text{hd3} & 3 \end{pmatrix} \qquad -\frac{\sqrt{2}\text{EpRtoMFv1piPvL1hBovR2hTo}\,\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}} + \frac{\sqrt{2}\text{EpRboMFv1piPvL1hTovR2hBo}\,\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{u3}^\dagger & 2 \\ \text{d3} & 3 \end{pmatrix} \qquad -\frac{\sqrt{2}\text{EpRtoMFv1piPvL1bovR2to}\,\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}} + \frac{\sqrt{2}\text{EpRboMFv1piPvL1tovR2bo}\,\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{u3}^\dagger & 2 \\ \text{hd3} & 3 \end{pmatrix} \qquad -\frac{\sqrt{2}\text{EpRtoMFv1piPvL1hBovR2to}\,\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}} + \frac{\sqrt{2}\text{EpRboMFv1piPvL1tovR2hBo}\,\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ \text{hu3}^\dagger & 3 \\ \text{hu3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtoMFv1pi}^2\text{vL1hTovR2hTo}\,\delta_{i_3,i_4}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ \text{hu3}^\dagger & 3 \\ \text{u3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtoMFv1pi}^2\text{vL1tovR2hTo}\,\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRtoMFv1pi}^2\text{vL1hTovR2to}\,\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ \text{u3}^\dagger & 3 \\ \text{hu3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtoMFv1pi}^2\text{vL1hTovR2to}\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRtoMFv1pi}^2\text{vL1tovR2hTo}\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ \text{u3}^\dagger & 3 \\ \text{u3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtoMFv1pi}^2\text{vL1tovR2to}\delta_{i_3,i_4}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{hu3}^\dagger & 2 \\ \text{hu3} & 3 \end{pmatrix} \qquad \frac{\text{EpRtoMFv1pi0vL1hTovR2hTo}\gamma^5_{s_2,s_3}\delta_{i_2,i_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{hu3}^\dagger & 2 \\ \text{u3} & 3 \end{pmatrix} \qquad -\frac{\text{EpRtoMFv1pi0vL1tovR2hTo}\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}} + \frac{\text{EpRtoMFv1pi0vL1hTovR2to}\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{u3}^\dagger & 2 \\ \text{hu3} & 3 \end{pmatrix} \qquad -\frac{\text{EpRtoMFv1pi0vL1hTovR2to}\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}} + \frac{\text{EpRtoMFv1pi0vL1tovR2hTo}\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{u3}^\dagger & 2 \\ \text{u3} & 3 \end{pmatrix} \qquad \frac{\text{EpRtoMFv1pi0vL1tovR2to}\gamma^5_{s_2,s_3}\delta_{i_2,i_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ \text{hu3}^\dagger & 3 \\ \text{hu3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtoMFv1pi0}^2\text{vL1hTovR2hTo}\delta_{i_3,i_4}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ \text{hu3}^\dagger & 3 \\ \text{u3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtoMFv1pi0}^2\text{vL1tovR2hTo}\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRtoMFv1pi0}^2\text{vL1hTovR2to}\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ \text{u3}^\dagger & 3 \\ \text{hu3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtoMFv1pi0}^2\text{vL1hTovR2to}\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRtoMFv1pi0}^2\text{vL1tovR2hTo}\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ \text{u3}^\dagger & 3 \\ \text{u3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtoMFv1pi0}^2\text{vL1tovR2to}\delta_{i_3,i_4}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{hu3}^\dagger & 2 \\ \text{hu3} & 3 \end{pmatrix} \qquad \frac{\text{EpRtoMFv1pi0PvL1hTovR2hTo}\gamma^5_{s_2,s_3}\delta_{i_2,i_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{hu3}^\dagger & 2 \\ \text{u3} & 3 \end{pmatrix} \qquad -\frac{\text{EpRtoMFv1pi0PvL1tovR2hTo}\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}} + \frac{\text{EpRtoMFv1pi0PvL1hTovR2to}\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{u3}^\dagger & 2 \\ \text{hu3} & 3 \end{pmatrix} \qquad -\frac{\text{EpRtoMFv1pi0PvL1hTovR2to}\delta_{i_2,i_3}(P_-)_{s_2,s_3}}{\text{fpi}} + \frac{\text{EpRtoMFv1pi0PvL1tovR2hTo}\delta_{i_2,i_3}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{u3}^\dagger & 2 \\ \text{u3} & 3 \end{pmatrix} \qquad \frac{\text{EpRtoMFv1pi0PvL1tovR2to}\gamma^5_{s_2,s_3}\delta_{i_2,i_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZP} & 2 \\ \text{hu3}^\dagger & 3 \\ \text{hu3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtoMFv1pi0v1pi0PvL1hTovR2hTo}\delta_{i_3,i_4}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZP} & 2 \\ \text{hu3}^\dagger & 3 \\ \text{u3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtoMFv1pi0v1pi0PvL1tovR2hTo}\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRtoMFv1pi0v1pi0PvL1hTovR2to}\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZP} & 2 \\ \text{u3}^\dagger & 3 \\ \text{hu3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtoMFv1pi0v1pi0PvL1hTovR2to}\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRtoMFv1pi0v1pi0PvL1tovR2hTo}\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZP} & 2 \\ \text{u3}^\dagger & 3 \\ \text{u3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtoMFv1pi0v1pi0PvL1tovR2to}\delta_{i_3,i_4}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piZP} & 2 \\ \text{hu3}^\dagger & 3 \\ \text{hu3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtoMFv1pi0P}^2\text{vL1hTovR2hTo}\delta_{i_3,i_4}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piZP} & 2 \\ \text{hu3}^\dagger & 3 \\ \text{u3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtoMFv1pi0P}^2\text{vL1tovR2hTo}\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRtoMFv1pi0P}^2\text{vL1hTovR2to}\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piZP} & 2 \\ \text{u3}^\dagger & 3 \\ \text{hu3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtoMFv1pi0P}^2\text{vL1hTovR2to}\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRtoMFv1pi0P}^2\text{vL1tovR2hTo}\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piZP} & 2 \\ \text{u3}^\dagger & 3 \\ \text{u3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtoMFv1pi0P}^2\text{vL1tovR2to}\delta_{i_3,i_4}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP} & 2 \\ \text{hu3}^\dagger & 3 \\ \text{hu3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtoMFv1piv1piPvL1hTovR2hTo}\delta_{i_3,i_4}\delta_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP} & 2 \\ \text{hu3}^\dagger & 3 \\ \text{u3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtoMFv1piv1piPvL1tovR2hTo}\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRtoMFv1piv1piPvL1hTovR2to}\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP} & 2 \\ \text{u3}^\dagger & 3 \\ \text{hu3} & 4 \end{pmatrix} \qquad \frac{i\text{EpRtoMFv1piv1piPvL1hTovR2to}\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\text{fpi}^2} + \frac{i\text{EpRtoMFv1piv1piPvL1tovR2hTo}\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \mathrm{piW}^\dagger & 1 \\ \mathrm{piWP} & 2 \\ \mathrm{u3}^\dagger & 3 \\ \mathrm{u3} & 4 \end{pmatrix} \qquad \frac{i\mathrm{EpRtoMFv1piv1piPvL1tovR2to}\delta_{i_3,i_4}\delta_{s_3,s_4}}{\mathrm{fpi}^2}$$

$$\begin{pmatrix} \mathrm{piW} & 1 \\ \mathrm{piWP}^\dagger & 2 \\ \mathrm{hu3}^\dagger & 3 \\ \mathrm{hu3} & 4 \end{pmatrix} \qquad \frac{i\mathrm{EpRtoMFv1piv1piPvL1hTovR2hTo}\delta_{i_3,i_4}\delta_{s_3,s_4}}{\mathrm{fpi}^2}$$

$$\begin{pmatrix} \mathrm{piW} & 1 \\ \mathrm{piWP}^\dagger & 2 \\ \mathrm{hu3}^\dagger & 3 \\ \mathrm{u3} & 4 \end{pmatrix} \qquad \frac{i\mathrm{EpRtoMFv1piv1piPvL1tovR2hTo}\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\mathrm{fpi}^2} + \frac{i\mathrm{EpRtoMFv1piv1piPvL1hTovR2to}\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\mathrm{fpi}^2}$$

$$\begin{pmatrix} \mathrm{piW} & 1 \\ \mathrm{piWP}^\dagger & 2 \\ \mathrm{u3}^\dagger & 3 \\ \mathrm{hu3} & 4 \end{pmatrix} \qquad \frac{i\mathrm{EpRtoMFv1piv1piPvL1hTovR2to}\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\mathrm{fpi}^2} + \frac{i\mathrm{EpRtoMFv1piv1piPvL1tovR2hTo}\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\mathrm{fpi}^2}$$

$$\begin{pmatrix} \mathrm{piW} & 1 \\ \mathrm{piWP}^\dagger & 2 \\ \mathrm{u3}^\dagger & 3 \\ \mathrm{u3} & 4 \end{pmatrix} \qquad \frac{i\mathrm{EpRtoMFv1piv1piPvL1tovR2to}\delta_{i_3,i_4}\delta_{s_3,s_4}}{\mathrm{fpi}^2}$$

$$\begin{pmatrix} \mathrm{piWP} & 1 \\ \mathrm{piWP}^\dagger & 2 \\ \mathrm{hu3}^\dagger & 3 \\ \mathrm{hu3} & 4 \end{pmatrix} \qquad \frac{i\mathrm{EpRtoMFv1piP}^2\mathrm{vL1hTovR2hTo}\delta_{i_3,i_4}\delta_{s_3,s_4}}{\mathrm{fpi}^2}$$

$$\begin{pmatrix} \mathrm{piWP} & 1 \\ \mathrm{piWP}^\dagger & 2 \\ \mathrm{hu3}^\dagger & 3 \\ \mathrm{u3} & 4 \end{pmatrix} \qquad \frac{i\mathrm{EpRtoMFv1piP}^2\mathrm{vL1tovR2hTo}\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\mathrm{fpi}^2} + \frac{i\mathrm{EpRtoMFv1piP}^2\mathrm{vL1hTovR2to}\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\mathrm{fpi}^2}$$

$$\begin{pmatrix} \mathrm{piWP} & 1 \\ \mathrm{piWP}^\dagger & 2 \\ \mathrm{u3}^\dagger & 3 \\ \mathrm{hu3} & 4 \end{pmatrix} \qquad \frac{i\mathrm{EpRtoMFv1piP}^2\mathrm{vL1hTovR2to}\delta_{i_3,i_4}(P_-)_{s_3,s_4}}{\mathrm{fpi}^2} + \frac{i\mathrm{EpRtoMFv1piP}^2\mathrm{vL1tovR2hTo}\delta_{i_3,i_4}(P_+)_{s_3,s_4}}{\mathrm{fpi}^2}$$

$$\begin{pmatrix} \mathrm{piWP} & 1 \\ \mathrm{piWP}^\dagger & 2 \\ \mathrm{u3}^\dagger & 3 \\ \mathrm{u3} & 4 \end{pmatrix} \qquad \frac{i\mathrm{EpRtoMFv1piP}^2\mathrm{vL1tovR2to}\delta_{i_3,i_4}\delta_{s_3,s_4}}{\mathrm{fpi}^2}$$

$$\begin{pmatrix} \mathrm{piW} & 1 \\ \mathrm{uR1}^\dagger & 2 \\ \mathrm{dL0} & 3 \end{pmatrix} \qquad -\frac{\sqrt{2}\mathrm{EpLMFv0pi}\delta_{i_2,i_3}\delta_{f_2,f_3}(P_-)_{s_2,s_3}}{\mathrm{fpi}}$$

$$\begin{pmatrix} \mathrm{piWP} & 1 \\ \mathrm{uR1}^\dagger & 2 \\ \mathrm{dL0} & 3 \end{pmatrix} \qquad -\frac{\sqrt{2}\mathrm{EpLMFv0piP}\delta_{i_2,i_3}\delta_{f_2,f_3}(P_-)_{s_2,s_3}}{\mathrm{fpi}}$$

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$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ \text{uR1}^\dagger & 3 \\ \text{uL0} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0pi}^2 \delta_{i_3,i_4}\delta_{f_3,f_4}(P_-)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{uR1}^\dagger & 2 \\ \text{uL0} & 3 \end{pmatrix} \qquad -\frac{\text{EpLMFv0pi0}\,\delta_{i_2,i_3}\delta_{f_2,f_3}(P_-)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ \text{uR1}^\dagger & 3 \\ \text{uL0} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0pi0}^2 \delta_{i_3,i_4}\delta_{f_3,f_4}(P_-)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{uR1}^\dagger & 2 \\ \text{uL0} & 3 \end{pmatrix} \qquad -\frac{\text{EpLMFv0pi0P}\,\delta_{i_2,i_3}\delta_{f_2,f_3}(P_-)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZP} & 2 \\ \text{uR1}^\dagger & 3 \\ \text{uL0} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0pi0v0pi0P}\,\delta_{i_3,i_4}\delta_{f_3,f_4}(P_-)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piZP} & 2 \\ \text{uR1}^\dagger & 3 \\ \text{uL0} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0pi0P}^2 \delta_{i_3,i_4}\delta_{f_3,f_4}(P_-)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP} & 2 \\ \text{uR1}^\dagger & 3 \\ \text{uL0} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0piv0piP}\,\delta_{i_3,i_4}\delta_{f_3,f_4}(P_-)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{uR1}^\dagger & 3 \\ \text{uL0} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0piv0piP}\,\delta_{i_3,i_4}\delta_{f_3,f_4}(P_-)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{uR1}^\dagger & 3 \\ \text{uL0} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0piP}^2 \delta_{i_3,i_4}\delta_{f_3,f_4}(P_-)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ \text{dL0}^\dagger & 3 \\ \text{dR1} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0pi}^2 \delta_{i_3,i_4}\delta_{f_3,f_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{dL0}^\dagger & 2 \\ \text{dR1} & 3 \end{pmatrix} \qquad -\frac{\text{EpLMFv0pi0}\,\delta_{i_2,i_3}\delta_{f_2,f_3}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ \text{dL0}^\dagger & 3 \\ \text{dR1} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0pi0}^2 \delta_{i_3,i_4}\delta_{f_3,f_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

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$$\begin{pmatrix} \text{piZP} & 1 \\ \text{dL0}^\dagger & 2 \\ \text{dR1} & 3 \end{pmatrix} \qquad -\frac{\text{EpLMFv0pi0P}\,\delta_{i_2,i_3}\,\delta_{f_2,f_3}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZP} & 2 \\ \text{dL0}^\dagger & 3 \\ \text{dR1} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0pi0v0pi0P}\,\delta_{i_3,i_4}\,\delta_{f_3,f_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piZP} & 2 \\ \text{dL0}^\dagger & 3 \\ \text{dR1} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0pi0P}^2\,\delta_{i_3,i_4}\,\delta_{f_3,f_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP} & 2 \\ \text{dL0}^\dagger & 3 \\ \text{dR1} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0piv0piP}\,\delta_{i_3,i_4}\,\delta_{f_3,f_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{dL0}^\dagger & 3 \\ \text{dR1} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0piv0piP}\,\delta_{i_3,i_4}\,\delta_{f_3,f_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{dL0}^\dagger & 3 \\ \text{dR1} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0piP}^2\,\delta_{i_3,i_4}\,\delta_{f_3,f_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{dL0}^\dagger & 2 \\ \text{uR1} & 3 \end{pmatrix} \qquad \frac{\sqrt{2}\text{EpLMFv0pi}\,\delta_{i_2,i_3}\,\delta_{f_2,f_3}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{dL0}^\dagger & 2 \\ \text{uR1} & 3 \end{pmatrix} \qquad \frac{\sqrt{2}\text{EpLMFv0piP}\,\delta_{i_2,i_3}\,\delta_{f_2,f_3}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{uL0}^\dagger & 2 \\ \text{dR1} & 3 \end{pmatrix} \qquad \frac{\sqrt{2}\text{EpLMFv0pi}\,\delta_{i_2,i_3}\,\delta_{f_2,f_3}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{uL0}^\dagger & 2 \\ \text{dR1} & 3 \end{pmatrix} \qquad \frac{\sqrt{2}\text{EpLMFv0piP}\,\delta_{i_2,i_3}\,\delta_{f_2,f_3}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ \text{uL0}^\dagger & 3 \\ \text{uR1} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0pi}^2\,\delta_{i_3,i_4}\,\delta_{f_3,f_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{uL0}^\dagger & 2 \\ \text{uR1} & 3 \end{pmatrix} \qquad \frac{\text{EpLMFv0pi0}\,\delta_{i_2,i_3}\,\delta_{f_2,f_3}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ \text{uL0}^\dagger & 3 \\ \text{uR1} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0pi0}^2\delta_{i_3,i_4}\delta_{f_3,f_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{uL0}^\dagger & 2 \\ \text{uR1} & 3 \end{pmatrix} \qquad \frac{\text{EpLMFv0pi0P}\delta_{i_2,i_3}\delta_{f_2,f_3}(P_+)_{s_2,s_3}}{\text{fpi}}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZP} & 2 \\ \text{uL0}^\dagger & 3 \\ \text{uR1} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0pi0v0pi0P}\delta_{i_3,i_4}\delta_{f_3,f_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piZP} & 2 \\ \text{uL0}^\dagger & 3 \\ \text{uR1} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0pi0P}^2\delta_{i_3,i_4}\delta_{f_3,f_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP} & 2 \\ \text{uL0}^\dagger & 3 \\ \text{uR1} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0piv0piP}\delta_{i_3,i_4}\delta_{f_3,f_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{uL0}^\dagger & 3 \\ \text{uR1} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0piv0piP}\delta_{i_3,i_4}\delta_{f_3,f_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{uL0}^\dagger & 3 \\ \text{uR1} & 4 \end{pmatrix} \qquad \frac{i\text{EpLMFv0piP}^2\delta_{i_3,i_4}\delta_{f_3,f_4}(P_+)_{s_3,s_4}}{\text{fpi}^2}$$

6.6 $V_{\textbf{Ghost}}$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{ghWm}^\dagger & 2 \\ \text{ghA} & 3 \end{pmatrix} \qquad -\tfrac{1}{2}\text{EEfpi}g\text{v0piv0W} + \tfrac{1}{2}\text{EEfpigtv0piv1W} - \tfrac{1}{2}\text{EEfpigtv1piv1W}$$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{ghWm}^\dagger & 2 \\ \text{ghA} & 3 \end{pmatrix} \qquad -\tfrac{1}{2}\text{EEfpi}g\text{v0piPv0W} + \tfrac{1}{2}\text{EEfpigtv0piPv1W} - \tfrac{1}{2}\text{EEfpigtv1piPv1W}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ \text{ghWm}^\dagger & 3 \\ \text{ghWm} & 4 \end{pmatrix} \qquad \tfrac{1}{12}ig^2\text{v0pi}^2\text{v0W}^2 - \tfrac{1}{6}ig\text{gtv0pi}^2\text{v0Wv1W} + \tfrac{1}{12}ig\text{t}^2\text{v0pi}^2\text{v1W}^2 + \tfrac{1}{12}ig\text{t}^2\text{v1pi}^2\text{v1W}^2$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{ghWm}^\dagger & 2 \\ \text{ghWm} & 3 \end{pmatrix} \qquad \tfrac{1}{4}\text{fpi}g^2\text{v0pi0v0W}^2 - \tfrac{1}{4}\text{fpigt}^2\text{v0pi0v1W}^2 + \tfrac{1}{4}\text{fpigt}^2\text{v1pi0v1W}^2$$

$$
\begin{pmatrix}
\text{piZ} & 1 \\
\text{piZ} & 2 \\
\text{ghWm}^\dagger & 3 \\
\text{ghWm} & 4
\end{pmatrix}
\qquad
\tfrac{1}{6}ig^2\text{v0pi0}^2\text{v0W}^2 - \tfrac{1}{3}ig g\text{tv0pi0}^2\text{v0Wv1W} + \tfrac{1}{6}ig\text{t}^2\text{v0pi0}^2\text{v1W}^2 + \tfrac{1}{6}ig\text{t}^2\text{v1pi0}^2\text{v1W}^2
$$

$$
\begin{pmatrix}
\text{piZP} & 1 \\
\text{ghWm}^\dagger & 2 \\
\text{ghWm} & 3
\end{pmatrix}
\qquad
\tfrac{1}{4}\text{fpi}ig^2\text{v0pi0Pv0W}^2 - \tfrac{1}{4}\text{fpi}ig\text{t}^2\text{v0pi0Pv1W}^2 + \tfrac{1}{4}\text{fpi}ig\text{t}^2\text{v1pi0Pv1W}^2
$$

$$
\begin{pmatrix}
\text{piZ} & 1 \\
\text{piZP} & 2 \\
\text{ghWm}^\dagger & 3 \\
\text{ghWm} & 4
\end{pmatrix}
\qquad
\tfrac{1}{6}ig^2\text{v0pi0v0pi0Pv0W}^2 - \tfrac{1}{3}ig g\text{tv0pi0v0pi0Pv0Wv1W} + \tfrac{1}{6}ig\text{t}^2\text{v0pi0v0pi0Pv1W}^2 + \\ \tfrac{1}{6}ig\text{t}^2\text{v1pi0v1pi0Pv1W}^2
$$

$$
\begin{pmatrix}
\text{piZP} & 1 \\
\text{piZP} & 2 \\
\text{ghWm}^\dagger & 3 \\
\text{ghWm} & 4
\end{pmatrix}
\qquad
\tfrac{1}{6}ig^2\text{v0pi0P}^2\text{v0W}^2 - \tfrac{1}{3}ig g\text{tv0pi0P}^2\text{v0Wv1W} + \tfrac{1}{6}ig\text{t}^2\text{v0pi0P}^2\text{v1W}^2 + \tfrac{1}{6}ig\text{t}^2\text{v1pi0P}^2\text{v1W}^2
$$

$$
\begin{pmatrix}
\text{piW}^\dagger & 1 \\
\text{piWP} & 2 \\
\text{ghWm}^\dagger & 3 \\
\text{ghWm} & 4
\end{pmatrix}
\qquad
\tfrac{1}{12}ig^2\text{v0piv0piPv0W}^2 - \tfrac{1}{6}ig g\text{tv0piv0piPv0Wv1W} + \tfrac{1}{12}ig\text{t}^2\text{v0piv0piPv1W}^2 + \tfrac{1}{12}ig\text{t}^2\text{v1piv1piPv1W}^2
$$

$$
\begin{pmatrix}
\text{piW} & 1 \\
\text{piWP}^\dagger & 2 \\
\text{ghWm}^\dagger & 3 \\
\text{ghWm} & 4
\end{pmatrix}
\qquad
\tfrac{1}{12}ig^2\text{v0piv0piPv0W}^2 - \tfrac{1}{6}ig g\text{tv0piv0piPv0Wv1W} + \tfrac{1}{12}ig\text{t}^2\text{v0piv0piPv1W}^2 + \tfrac{1}{12}ig\text{t}^2\text{v1piv1piPv1W}^2
$$

$$
\begin{pmatrix}
\text{piWP} & 1 \\
\text{piWP}^\dagger & 2 \\
\text{ghWm}^\dagger & 3 \\
\text{ghWm} & 4
\end{pmatrix}
\qquad
\tfrac{1}{12}ig^2\text{v0piP}^2\text{v0W}^2 - \tfrac{1}{6}ig g\text{tv0piP}^2\text{v0Wv1W} + \tfrac{1}{12}ig\text{t}^2\text{v0piP}^2\text{v1W}^2 + \tfrac{1}{12}ig\text{t}^2\text{v1piP}^2\text{v1W}^2
$$

$$
\begin{pmatrix}
\text{piW}^\dagger & 1 \\
\text{piW}^\dagger & 2 \\
\text{ghWm}^\dagger & 3 \\
\text{ghWp} & 4
\end{pmatrix}
\qquad
-\tfrac{1}{6}ig^2\text{v0pi}^2\text{v0W}^2 + \tfrac{1}{3}ig g\text{tv0pi}^2\text{v0Wv1W} - \tfrac{1}{6}ig\text{t}^2\text{v0pi}^2\text{v1W}^2 - \tfrac{1}{6}ig\text{t}^2\text{v1pi}^2\text{v1W}^2
$$

$$
\begin{pmatrix}
\text{piW}^\dagger & 1 \\
\text{piWP}^\dagger & 2 \\
\text{ghWm}^\dagger & 3 \\
\text{ghWp} & 4
\end{pmatrix}
\qquad
-\tfrac{1}{6}ig^2\text{v0piv0piPv0W}^2 + \tfrac{1}{3}ig g\text{tv0piv0piPv0Wv1W} - \tfrac{1}{6}ig\text{t}^2\text{v0piv0piPv1W}^2 - \tfrac{1}{6}ig\text{t}^2\text{v1piv1piPv1W}^2
$$

$$
\begin{pmatrix}
\text{piWP}^\dagger & 1 \\
\text{piWP}^\dagger & 2 \\
\text{ghWm}^\dagger & 3 \\
\text{ghWp} & 4
\end{pmatrix}
\qquad
-\tfrac{1}{6}ig^2\text{v0piP}^2\text{v0W}^2 + \tfrac{1}{3}ig g\text{tv0piP}^2\text{v0Wv1W} - \tfrac{1}{6}ig\text{t}^2\text{v0piP}^2\text{v1W}^2 - \tfrac{1}{6}ig\text{t}^2\text{v1piP}^2\text{v1W}^2
$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ \text{ghWm}^\dagger & 3 \\ \text{ghWPm} & 4 \end{pmatrix} \quad \frac{1}{12}ig^2\text{v0pi}^2\text{v0Wv0WP} - \frac{1}{12}ig\text{gtv0pi}^2\text{v0WPv1W} - \frac{1}{12}ig\text{gtv0pi}^2\text{v0Wv1WP} + \frac{1}{12}ig\text{t}^2\text{v0pi}^2\text{v1Wv1WP} + \frac{1}{12}ig\text{t}^2\text{v1pi}^2\text{v1Wv1WP}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{ghWm}^\dagger & 2 \\ \text{ghWPm} & 3 \end{pmatrix} \quad \frac{1}{4}\text{fpi}g^2\text{v0pi0v0Wv0WP} - \frac{1}{4}\text{fpi}g\text{gtv0pi0v0WPv1W} + \frac{1}{4}\text{fpi}g\text{gtv0pi0v0Wv1WP} - \frac{1}{4}\text{fpigt}^2\text{v0pi0v1Wv1WP} + \frac{1}{4}\text{fpigt}^2\text{v1pi0v1Wv1WP}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ \text{ghWm}^\dagger & 3 \\ \text{ghWPm} & 4 \end{pmatrix} \quad \frac{1}{6}ig^2\text{v0pi0}^2\text{v0Wv0WP} - \frac{1}{6}ig\text{gtv0pi0}^2\text{v0WPv1W} - \frac{1}{6}ig\text{gtv0pi0}^2\text{v0Wv1WP} + \frac{1}{6}ig\text{t}^2\text{v0pi0}^2\text{v1Wv1WP} + \frac{1}{6}ig\text{t}^2\text{v1pi0}^2\text{v1Wv1WP}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{ghWm}^\dagger & 2 \\ \text{ghWPm} & 3 \end{pmatrix} \quad \frac{1}{4}\text{fpi}g^2\text{v0pi0Pv0Wv0WP} - \frac{1}{4}\text{fpi}g\text{gtv0pi0Pv0WPv1W} + \frac{1}{4}\text{fpi}g\text{gtv0pi0Pv0Wv1WP} - \frac{1}{4}\text{fpigt}^2\text{v0pi0Pv1Wv1WP} + \frac{1}{4}\text{fpigt}^2\text{v1pi0Pv1Wv1WP}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZP} & 2 \\ \text{ghWm}^\dagger & 3 \\ \text{ghWPm} & 4 \end{pmatrix} \quad \frac{1}{6}ig^2\text{v0pi0v0pi0Pv0Wv0WP} - \frac{1}{6}ig\text{gtv0pi0v0pi0Pv0WPv1W} - \frac{1}{6}ig\text{gtv0pi0v0pi0Pv0Wv1WP} + \frac{1}{6}ig\text{t}^2\text{v0pi0v0pi0Pv1Wv1WP} + \frac{1}{6}ig\text{t}^2\text{v1pi0v1pi0Pv1Wv1WP}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piZP} & 2 \\ \text{ghWm}^\dagger & 3 \\ \text{ghWPm} & 4 \end{pmatrix} \quad \frac{1}{6}ig^2\text{v0pi0P}^2\text{v0Wv0WP} - \frac{1}{6}ig\text{gtv0pi0P}^2\text{v0WPv1W} - \frac{1}{6}ig\text{gtv0pi0P}^2\text{v0Wv1WP} + \frac{1}{6}ig\text{t}^2\text{v0pi0P}^2\text{v1Wv1WP} + \frac{1}{6}ig\text{t}^2\text{v1pi0P}^2\text{v1Wv1WP}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP} & 2 \\ \text{ghWm}^\dagger & 3 \\ \text{ghWPm} & 4 \end{pmatrix} \quad \frac{1}{12}ig^2\text{v0piv0piPv0Wv0WP} - \frac{1}{12}ig\text{gtv0piv0piPv0WPv1W} - \frac{1}{12}ig\text{gtv0piv0piPv0Wv1WP} + \frac{1}{12}ig\text{t}^2\text{v0piv0piPv1Wv1WP} + \frac{1}{12}ig\text{t}^2\text{v1piv1piPv1Wv1WP}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{ghWm}^\dagger & 3 \\ \text{ghWPm} & 4 \end{pmatrix} \quad \frac{1}{12}ig^2\text{v0piv0piPv0Wv0WP} - \frac{1}{12}ig\text{gtv0piv0piPv0WPv1W} - \frac{1}{12}ig\text{gtv0piv0piPv0Wv1WP} + \frac{1}{12}ig\text{t}^2\text{v0piv0piPv1Wv1WP} + \frac{1}{12}ig\text{t}^2\text{v1piv1piPv1Wv1WP}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{ghWm}^\dagger & 3 \\ \text{ghWPm} & 4 \end{pmatrix} \quad \frac{1}{12}ig^2\text{v0piP}^2\text{v0Wv0WP} - \frac{1}{12}ig\text{gtv0piP}^2\text{v0WPv1W} - \frac{1}{12}ig\text{gtv0piP}^2\text{v0Wv1WP} + \frac{1}{12}ig\text{t}^2\text{v0piP}^2\text{v1Wv1WP} + \frac{1}{12}ig\text{t}^2\text{v1piP}^2\text{v1Wv1WP}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piW}^\dagger & 2 \\ \text{ghWm}^\dagger & 3 \\ \text{ghWPp} & 4 \end{pmatrix} \quad -\frac{1}{6}ig^2\text{v0pi}^2\text{v0Wv0WP} + \frac{1}{6}ig\text{gtv0pi}^2\text{v0WPv1W} + \frac{1}{6}ig\text{gtv0pi}^2\text{v0Wv1WP} - \frac{1}{6}ig\text{t}^2\text{v0pi}^2\text{v1Wv1WP} - \frac{1}{6}ig\text{t}^2\text{v1pi}^2\text{v1Wv1WP}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP}^\dagger & 2 \\ \text{ghWm}^\dagger & 3 \\ \text{ghWPp} & 4 \end{pmatrix} \quad \begin{array}{l} -\frac{1}{6}ig^2\text{v0piv0piPv0Wv0WP} + \frac{1}{6}igg\text{tv0piv0piPv0WPv1W} + \frac{1}{6}igg\text{tv0piv0piPv0Wv1WP} - \\ \frac{1}{6}i\text{gt}^2\text{v0piv0piPv1Wv1WP} - \frac{1}{6}i\text{gt}^2\text{v1piv1piPv1Wv1WP} \end{array}$$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piWP}^\dagger & 2 \\ \text{ghWm}^\dagger & 3 \\ \text{ghWPp} & 4 \end{pmatrix} \quad \begin{array}{l} -\frac{1}{6}ig^2\text{v0piP}^2\text{v0Wv0WP} + \frac{1}{6}igg\text{tv0piP}^2\text{v0WPv1W} + \frac{1}{6}igg\text{tv0piP}^2\text{v0Wv1WP} - \\ \frac{1}{6}i\text{gt}^2\text{v0piP}^2\text{v1Wv1WP} - \frac{1}{6}i\text{gt}^2\text{v1piP}^2\text{v1Wv1WP} \end{array}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{ghWm}^\dagger & 2 \\ \text{ghZ} & 3 \end{pmatrix} \quad \begin{array}{l} -\frac{1}{4}\text{fpi}g^2\text{v0piv0Wv0Z} + \frac{1}{4}\text{fpi}gg\text{tv0piv0Zv1W} - \frac{1}{4}\text{fpi}gg\text{tv0piv0Wv1Z} + \frac{1}{4}\text{fpigt}^2\text{v0piv1Wv1Z} - \\ \frac{1}{4}\text{fpigt}^2\text{v1piv1Wv1Z} - \frac{1}{4}\text{fpigpgtv1piv1Wv2Z} \end{array}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piZ} & 2 \\ \text{ghWm}^\dagger & 3 \\ \text{ghZ} & 4 \end{pmatrix} \quad \begin{array}{l} -\frac{1}{12}ig^2\text{v0piv0pi0v0Wv0Z} + \frac{1}{12}igg\text{tv0piv0pi0v0Zv1W} + \frac{1}{12}igg\text{tv0piv0pi0v0Wv1Z} - \\ \frac{1}{12}i\text{gt}^2\text{v0piv0pi0v1Wv1Z} - \frac{1}{12}i\text{gt}^2\text{v1piv1pi0v1Wv1Z} + \frac{1}{12}i\text{gpgtv1piv1pi0v1Wv2Z} \end{array}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piZP} & 2 \\ \text{ghWm}^\dagger & 3 \\ \text{ghZ} & 4 \end{pmatrix} \quad \begin{array}{l} -\frac{1}{12}ig^2\text{v0piv0pi0Pv0Wv0Z} + \frac{1}{12}igg\text{tv0piv0pi0Pv0Zv1W} + \frac{1}{12}igg\text{tv0piv0pi0Pv0Wv1Z} - \\ \frac{1}{12}i\text{gt}^2\text{v0piv0pi0Pv1Wv1Z} - \frac{1}{12}i\text{gt}^2\text{v1piv1pi0Pv1Wv1Z} + \frac{1}{12}i\text{gpgtv1piv1pi0Pv1Wv2Z} \end{array}$$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{ghWm}^\dagger & 2 \\ \text{ghZ} & 3 \end{pmatrix} \quad \begin{array}{l} -\frac{1}{4}\text{fpi}g^2\text{v0piPv0Wv0Z} + \frac{1}{4}\text{fpi}gg\text{tv0piPv0Zv1W} - \frac{1}{4}\text{fpi}gg\text{tv0piPv0Wv1Z} + \frac{1}{4}\text{fpigt}^2\text{v0piPv1Wv1Z} - \\ \frac{1}{4}\text{fpigt}^2\text{v1piPv1Wv1Z} - \frac{1}{4}\text{fpigpgtv1piPv1Wv2Z} \end{array}$$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piZ} & 2 \\ \text{ghWm}^\dagger & 3 \\ \text{ghZ} & 4 \end{pmatrix} \quad \begin{array}{l} -\frac{1}{12}ig^2\text{v0pi0v0piPv0Wv0Z} + \frac{1}{12}igg\text{tv0pi0v0piPv0Zv1W} + \frac{1}{12}igg\text{tv0pi0v0piPv0Wv1Z} - \\ \frac{1}{12}i\text{gt}^2\text{v0pi0v0piPv1Wv1Z} - \frac{1}{12}i\text{gt}^2\text{v1pi0v1piPv1Wv1Z} + \frac{1}{12}i\text{gpgtv1pi0v1piPv1Wv2Z} \end{array}$$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piZP} & 2 \\ \text{ghWm}^\dagger & 3 \\ \text{ghZ} & 4 \end{pmatrix} \quad \begin{array}{l} -\frac{1}{12}ig^2\text{v0pi0Pv0piPv0Wv0Z} + \frac{1}{12}igg\text{tv0pi0Pv0piPv0Zv1W} + \frac{1}{12}igg\text{tv0pi0Pv0piPv0Wv1Z} - \\ \frac{1}{12}i\text{gt}^2\text{v0pi0Pv0piPv1Wv1Z} - \frac{1}{12}i\text{gt}^2\text{v1pi0Pv1piPv1Wv1Z} + \frac{1}{12}i\text{gpgtv1pi0Pv1piPv1Wv2Z} \end{array}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{ghWm}^\dagger & 2 \\ \text{ghZP} & 3 \end{pmatrix} \quad \begin{array}{l} -\frac{1}{4}\text{fpi}g^2\text{v0piv0Wv0ZP} + \frac{1}{4}\text{fpi}gg\text{tv0piv0ZPv1W} - \frac{1}{4}\text{fpi}gg\text{tv0piv0Wv1ZP} + \frac{1}{4}\text{fpigt}^2\text{v0piv1Wv1ZP} - \\ \frac{1}{4}\text{fpigt}^2\text{v1piv1Wv1ZP} - \frac{1}{4}\text{fpigpgtv1piv1Wv2ZP} \end{array}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piZ} & 2 \\ \text{ghWm}^\dagger & 3 \\ \text{ghZP} & 4 \end{pmatrix} \quad \begin{array}{l} -\frac{1}{12}ig^2\text{v0piv0pi0v0Wv0ZP} + \frac{1}{12}igg\text{tv0piv0pi0v0ZPv1W} + \frac{1}{12}igg\text{tv0piv0pi0v0Wv1ZP} - \\ \frac{1}{12}i\text{gt}^2\text{v0piv0pi0v1Wv1ZP} - \frac{1}{12}i\text{gt}^2\text{v1piv1pi0v1Wv1ZP} + \frac{1}{12}i\text{gpgtv1piv1pi0v1Wv2ZP} \end{array}$$

$$
\begin{pmatrix}
\text{piW}^\dagger & 1 \\
\text{piZP} & 2 \\
\text{ghWm}^\dagger & 3 \\
\text{ghZP} & 4
\end{pmatrix}
\quad
\begin{aligned}
&-\tfrac{1}{12}ig^2\text{v0piv0pi0Pv0Wv0ZP}+\tfrac{1}{12}ig g\text{tv0piv0pi0Pv0ZPv1W}+\tfrac{1}{12}ig g\text{tv0piv0pi0Pv0Wv1ZP}-\\
&\tfrac{1}{12}ig\text{t}^2\text{v0piv0pi0Pv1Wv1ZP}-\tfrac{1}{12}ig\text{t}^2\text{v1piv1pi0Pv1Wv1ZP}+\tfrac{1}{12}ig\text{pgtv1piv1pi0Pv1Wv2ZP}
\end{aligned}
$$

$$
\begin{pmatrix}
\text{piWP}^\dagger & 1 \\
\text{ghWm}^\dagger & 2 \\
\text{ghZP} & 3
\end{pmatrix}
\quad
\begin{aligned}
&-\tfrac{1}{4}\text{fpi}g^2\text{v0piPv0Wv0ZP}+\tfrac{1}{4}\text{fpi}g g\text{tv0piPv0ZPv1W}-\tfrac{1}{4}\text{fpi}g g\text{tv0piPv0Wv1ZP}+\\
&\tfrac{1}{4}\text{fpigt}^2\text{v0piPv1Wv1ZP}-\tfrac{1}{4}\text{fpigt}^2\text{v1piPv1Wv1ZP}-\tfrac{1}{4}\text{fpigpgtv1piPv1Wv2ZP}
\end{aligned}
$$

$$
\begin{pmatrix}
\text{piWP}^\dagger & 1 \\
\text{piZ} & 2 \\
\text{ghWm}^\dagger & 3 \\
\text{ghZP} & 4
\end{pmatrix}
\quad
\begin{aligned}
&-\tfrac{1}{12}ig^2\text{v0pi0v0piPv0Wv0ZP}+\tfrac{1}{12}ig g\text{tv0pi0v0piPv0ZPv1W}+\tfrac{1}{12}ig g\text{tv0pi0v0piPv0Wv1ZP}-\\
&\tfrac{1}{12}ig\text{t}^2\text{v0pi0v0piPv1Wv1ZP}-\tfrac{1}{12}ig\text{t}^2\text{v1pi0v1piPv1Wv1ZP}+\tfrac{1}{12}ig\text{pgtv1pi0v1piPv1Wv2ZP}
\end{aligned}
$$

$$
\begin{pmatrix}
\text{piWP}^\dagger & 1 \\
\text{piZP} & 2 \\
\text{ghWm}^\dagger & 3 \\
\text{ghZP} & 4
\end{pmatrix}
\quad
\begin{aligned}
&-\tfrac{1}{12}ig^2\text{v0pi0Pv0piPv0Wv0ZP}+\tfrac{1}{12}ig g\text{tv0pi0Pv0piPv0ZPv1W}+\tfrac{1}{12}ig g\text{tv0pi0Pv0piPv0Wv1ZP}-\\
&\tfrac{1}{12}ig\text{t}^2\text{v0pi0Pv0piPv1Wv1ZP}-\tfrac{1}{12}ig\text{t}^2\text{v1pi0Pv1piPv1Wv1ZP}+\tfrac{1}{12}ig\text{pgtv1pi0Pv1piPv1Wv2ZP}
\end{aligned}
$$

$$
\begin{pmatrix}
\text{piW} & 1 \\
\text{ghWp}^\dagger & 2 \\
\text{ghA} & 3
\end{pmatrix}
\quad
\tfrac{1}{2}\text{EEfpi}g\text{v0piv0W}-\tfrac{1}{2}\text{EEfpigtv0piv1W}+\tfrac{1}{2}\text{EEfpigtv1piv1W}
$$

$$
\begin{pmatrix}
\text{piWP} & 1 \\
\text{ghWp}^\dagger & 2 \\
\text{ghA} & 3
\end{pmatrix}
\quad
\tfrac{1}{2}\text{EEfpi}g\text{v0piPv0W}-\tfrac{1}{2}\text{EEfpigtv0piPv1W}+\tfrac{1}{2}\text{EEfpigtv1piPv1W}
$$

$$
\begin{pmatrix}
\text{piW} & 1 \\
\text{piW} & 2 \\
\text{ghWp}^\dagger & 3 \\
\text{ghWm} & 4
\end{pmatrix}
\quad
-\tfrac{1}{6}ig^2\text{v0pi}^2\text{v0W}^2+\tfrac{1}{3}ig g\text{tv0pi}^2\text{v0Wv1W}-\tfrac{1}{6}ig\text{t}^2\text{v0pi}^2\text{v1W}^2-\tfrac{1}{6}ig\text{t}^2\text{v1pi}^2\text{v1W}^2
$$

$$
\begin{pmatrix}
\text{piW} & 1 \\
\text{piWP} & 2 \\
\text{ghWp}^\dagger & 3 \\
\text{ghWm} & 4
\end{pmatrix}
\quad
-\tfrac{1}{6}ig^2\text{v0piv0piPv0W}^2+\tfrac{1}{3}ig g\text{tv0piv0piPv0Wv1W}-\tfrac{1}{6}ig\text{t}^2\text{v0piv0piPv1W}^2-\tfrac{1}{6}ig\text{t}^2\text{v1piv1piPv1W}^2
$$

$$
\begin{pmatrix}
\text{piWP} & 1 \\
\text{piWP} & 2 \\
\text{ghWp}^\dagger & 3 \\
\text{ghWm} & 4
\end{pmatrix}
\quad
-\tfrac{1}{6}ig^2\text{v0piP}^2\text{v0W}^2+\tfrac{1}{3}ig g\text{tv0piP}^2\text{v0Wv1W}-\tfrac{1}{6}ig\text{t}^2\text{v0piP}^2\text{v1W}^2-\tfrac{1}{6}ig\text{t}^2\text{v1piP}^2\text{v1W}^2
$$

$$
\begin{pmatrix}
\text{piW} & 1 \\
\text{piW}^\dagger & 2 \\
\text{ghWp}^\dagger & 3 \\
\text{ghWp} & 4
\end{pmatrix}
\quad
\tfrac{1}{12}ig^2\text{v0pi}^2\text{v0W}^2-\tfrac{1}{6}ig g\text{tv0pi}^2\text{v0Wv1W}+\tfrac{1}{12}ig\text{t}^2\text{v0pi}^2\text{v1W}^2+\tfrac{1}{12}ig\text{t}^2\text{v1pi}^2\text{v1W}^2
$$

$$
\begin{pmatrix}
\text{piZ} & 1 \\
\text{ghWp}^\dagger & 2 \\
\text{ghWp} & 3
\end{pmatrix}
\quad
-\tfrac{1}{4}\text{fpi}g^2\text{v0pi0v0W}^2+\tfrac{1}{4}\text{fpigt}^2\text{v0pi0v1W}^2-\tfrac{1}{4}\text{fpigt}^2\text{v1pi0v1W}^2
$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ \text{ghWp}^\dagger & 3 \\ \text{ghWp} & 4 \end{pmatrix} \quad \tfrac{1}{6}ig^2\text{v0pi0}^2\text{v0W}^2 - \tfrac{1}{3}ig g\text{tv0pi0}^2\text{v0Wv1W} + \tfrac{1}{6}ig\text{t}^2\text{v0pi0}^2\text{v1W}^2 + \tfrac{1}{6}ig\text{t}^2\text{v1pi0}^2\text{v1W}^2$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{ghWp}^\dagger & 2 \\ \text{ghWp} & 3 \end{pmatrix} \quad -\tfrac{1}{4}\text{fpi}ig^2\text{v0pi0Pv0W}^2 + \tfrac{1}{4}\text{fpi}ig\text{t}^2\text{v0pi0Pv1W}^2 - \tfrac{1}{4}\text{fpi}ig\text{t}^2\text{v1pi0Pv1W}^2$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZP} & 2 \\ \text{ghWp}^\dagger & 3 \\ \text{ghWp} & 4 \end{pmatrix} \quad \tfrac{1}{6}ig^2\text{v0pi0v0pi0Pv0W}^2 - \tfrac{1}{3}ig g\text{tv0pi0v0pi0Pv0Wv1W} + \tfrac{1}{6}ig\text{t}^2\text{v0pi0v0pi0Pv1W}^2 + \tfrac{1}{6}ig\text{t}^2\text{v1pi0v1pi0Pv1W}^2$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piZP} & 2 \\ \text{ghWp}^\dagger & 3 \\ \text{ghWp} & 4 \end{pmatrix} \quad \tfrac{1}{6}ig^2\text{v0pi0P}^2\text{v0W}^2 - \tfrac{1}{3}ig g\text{tv0pi0P}^2\text{v0Wv1W} + \tfrac{1}{6}ig\text{t}^2\text{v0pi0P}^2\text{v1W}^2 + \tfrac{1}{6}ig\text{t}^2\text{v1pi0P}^2\text{v1W}^2$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP} & 2 \\ \text{ghWp}^\dagger & 3 \\ \text{ghWp} & 4 \end{pmatrix} \quad \tfrac{1}{12}ig^2\text{v0piv0piPv0W}^2 - \tfrac{1}{6}ig g\text{tv0piv0piPv0Wv1W} + \tfrac{1}{12}ig\text{t}^2\text{v0piv0piPv1W}^2 + \tfrac{1}{12}ig\text{t}^2\text{v1piv1piPv1W}^2$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{ghWp}^\dagger & 3 \\ \text{ghWp} & 4 \end{pmatrix} \quad \tfrac{1}{12}ig^2\text{v0piv0piPv0W}^2 - \tfrac{1}{6}ig g\text{tv0piv0piPv0Wv1W} + \tfrac{1}{12}ig\text{t}^2\text{v0piv0piPv1W}^2 + \tfrac{1}{12}ig\text{t}^2\text{v1piv1piPv1W}^2$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{ghWp}^\dagger & 3 \\ \text{ghWp} & 4 \end{pmatrix} \quad \tfrac{1}{12}ig^2\text{v0piP}^2\text{v0W}^2 - \tfrac{1}{6}ig g\text{tv0piP}^2\text{v0Wv1W} + \tfrac{1}{12}ig\text{t}^2\text{v0piP}^2\text{v1W}^2 + \tfrac{1}{12}ig\text{t}^2\text{v1piP}^2\text{v1W}^2$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW} & 2 \\ \text{ghWp}^\dagger & 3 \\ \text{ghWPm} & 4 \end{pmatrix} \quad -\tfrac{1}{6}ig^2\text{v0pi}^2\text{v0Wv0WP} + \tfrac{1}{6}ig g\text{tv0pi}^2\text{v0WPv1W} + \tfrac{1}{6}ig g\text{tv0pi}^2\text{v0Wv1WP} - \tfrac{1}{6}ig\text{t}^2\text{v0pi}^2\text{v1Wv1WP} - \tfrac{1}{6}ig\text{t}^2\text{v1pi}^2\text{v1Wv1WP}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piWP} & 2 \\ \text{ghWp}^\dagger & 3 \\ \text{ghWPm} & 4 \end{pmatrix} \quad -\tfrac{1}{6}ig^2\text{v0piv0piPv0Wv0WP} + \tfrac{1}{6}ig g\text{tv0piv0piPv0WPv1W} + \tfrac{1}{6}ig g\text{tv0piv0piPv0Wv1WP} - \tfrac{1}{6}ig\text{t}^2\text{v0piv0piPv1Wv1WP} - \tfrac{1}{6}ig\text{t}^2\text{v1piv1piPv1Wv1WP}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP} & 2 \\ \text{ghWp}^\dagger & 3 \\ \text{ghWPm} & 4 \end{pmatrix} \quad -\tfrac{1}{6}ig^2\text{v0piP}^2\text{v0Wv0WP} + \tfrac{1}{6}ig g\text{tv0piP}^2\text{v0WPv1W} + \tfrac{1}{6}ig g\text{tv0piP}^2\text{v0Wv1WP} - \tfrac{1}{6}ig\text{t}^2\text{v0piP}^2\text{v1Wv1WP} - \tfrac{1}{6}ig\text{t}^2\text{v1piP}^2\text{v1Wv1WP}$$

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$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ \text{ghWp}^\dagger & 3 \\ \text{ghWPp} & 4 \end{pmatrix} \quad \begin{array}{l} \frac{1}{12}ig^2\text{v0pi}^2\text{v0Wv0WP} - \frac{1}{12}ig\text{gtv0pi}^2\text{v0WPv1W} - \frac{1}{12}ig\text{gtv0pi}^2\text{v0Wv1WP} + \\ \frac{1}{12}i\text{gt}^2\text{v0pi}^2\text{v1Wv1WP} + \frac{1}{12}i\text{gt}^2\text{v1pi}^2\text{v1Wv1WP} \end{array}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{ghWp}^\dagger & 2 \\ \text{ghWPp} & 3 \end{pmatrix} \quad \begin{array}{l} -\frac{1}{4}\text{fpi}g^2\text{v0pi0v0Wv0WP} + \frac{1}{4}\text{fpi}g\text{gtv0pi0v0WPv1W} - \frac{1}{4}\text{fpi}g\text{gtv0pi0v0Wv1WP} + \\ \frac{1}{4}\text{fpigt}^2\text{v0pi0v1Wv1WP} - \frac{1}{4}\text{fpigt}^2\text{v1pi0v1Wv1WP} \end{array}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ \text{ghWp}^\dagger & 3 \\ \text{ghWPp} & 4 \end{pmatrix} \quad \begin{array}{l} \frac{1}{6}ig^2\text{v0pi0}^2\text{v0Wv0WP} - \frac{1}{6}ig\text{gtv0pi0}^2\text{v0WPv1W} - \frac{1}{6}ig\text{gtv0pi0}^2\text{v0Wv1WP} + \\ \frac{1}{6}i\text{gt}^2\text{v0pi0}^2\text{v1Wv1WP} + \frac{1}{6}i\text{gt}^2\text{v1pi0}^2\text{v1Wv1WP} \end{array}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{ghWp}^\dagger & 2 \\ \text{ghWPp} & 3 \end{pmatrix} \quad \begin{array}{l} -\frac{1}{4}\text{fpi}g^2\text{v0pi0Pv0Wv0WP} + \frac{1}{4}\text{fpi}g\text{gtv0pi0Pv0WPv1W} - \frac{1}{4}\text{fpi}g\text{gtv0pi0Pv0Wv1WP} + \\ \frac{1}{4}\text{fpigt}^2\text{v0pi0Pv1Wv1WP} - \frac{1}{4}\text{fpigt}^2\text{v1pi0Pv1Wv1WP} \end{array}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZP} & 2 \\ \text{ghWp}^\dagger & 3 \\ \text{ghWPp} & 4 \end{pmatrix} \quad \begin{array}{l} \frac{1}{6}ig^2\text{v0pi0v0pi0Pv0Wv0WP} - \frac{1}{6}ig\text{gtv0pi0v0pi0Pv0WPv1W} - \frac{1}{6}ig\text{gtv0pi0v0pi0Pv0Wv1WP} + \\ \frac{1}{6}i\text{gt}^2\text{v0pi0v0pi0Pv1Wv1WP} + \frac{1}{6}i\text{gt}^2\text{v1pi0v1pi0Pv1Wv1WP} \end{array}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piZP} & 2 \\ \text{ghWp}^\dagger & 3 \\ \text{ghWPp} & 4 \end{pmatrix} \quad \begin{array}{l} \frac{1}{6}ig^2\text{v0pi0P}^2\text{v0Wv0WP} - \frac{1}{6}ig\text{gtv0pi0P}^2\text{v0WPv1W} - \frac{1}{6}ig\text{gtv0pi0P}^2\text{v0Wv1WP} + \\ \frac{1}{6}i\text{gt}^2\text{v0pi0P}^2\text{v1Wv1WP} + \frac{1}{6}i\text{gt}^2\text{v1pi0P}^2\text{v1Wv1WP} \end{array}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP} & 2 \\ \text{ghWp}^\dagger & 3 \\ \text{ghWPp} & 4 \end{pmatrix} \quad \begin{array}{l} \frac{1}{12}ig^2\text{v0piv0piPv0Wv0WP} - \frac{1}{12}ig\text{gtv0piv0piPv0WPv1W} - \frac{1}{12}ig\text{gtv0piv0piPv0Wv1WP} + \\ \frac{1}{12}i\text{gt}^2\text{v0piv0piPv1Wv1WP} + \frac{1}{12}i\text{gt}^2\text{v1piv1piPv1Wv1WP} \end{array}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{ghWp}^\dagger & 3 \\ \text{ghWPp} & 4 \end{pmatrix} \quad \begin{array}{l} \frac{1}{12}ig^2\text{v0piv0piPv0Wv0WP} - \frac{1}{12}ig\text{gtv0piv0piPv0WPv1W} - \frac{1}{12}ig\text{gtv0piv0piPv0Wv1WP} + \\ \frac{1}{12}i\text{gt}^2\text{v0piv0piPv1Wv1WP} + \frac{1}{12}i\text{gt}^2\text{v1piv1piPv1Wv1WP} \end{array}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{ghWp}^\dagger & 3 \\ \text{ghWPp} & 4 \end{pmatrix} \quad \begin{array}{l} \frac{1}{12}ig^2\text{v0piP}^2\text{v0Wv0WP} - \frac{1}{12}ig\text{gtv0piP}^2\text{v0WPv1W} - \frac{1}{12}ig\text{gtv0piP}^2\text{v0Wv1WP} + \\ \frac{1}{12}i\text{gt}^2\text{v0piP}^2\text{v1Wv1WP} + \frac{1}{12}i\text{gt}^2\text{v1piP}^2\text{v1Wv1WP} \end{array}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{ghWp}^\dagger & 2 \\ \text{ghZ} & 3 \end{pmatrix} \quad \begin{array}{l} \frac{1}{4}\text{fpi}g^2\text{v0piv0Wv0Z} - \frac{1}{4}\text{fpi}g\text{gtv0piv0Zv1W} + \frac{1}{4}\text{fpi}g\text{gtv0piv0Wv1Z} - \frac{1}{4}\text{fpigt}^2\text{v0piv1Wv1Z} + \\ \frac{1}{4}\text{fpigt}^2\text{v1piv1Wv1Z} + \frac{1}{4}\text{fpigpgtv1piv1Wv2Z} \end{array}$$

$$
\begin{pmatrix}
\text{piW} & 1 \\
\text{piZ} & 2 \\
\text{ghWp}^\dagger & 3 \\
\text{ghZ} & 4
\end{pmatrix}
\quad
\begin{aligned}
&-\tfrac{1}{12}ig^2\text{v0piv0pi0v0Wv0Z} + \tfrac{1}{12}ig g\text{tv0piv0pi0v0Zv1W} + \tfrac{1}{12}ig g\text{tv0piv0pi0v0Wv1Z} - \\
&\tfrac{1}{12}ig\text{t}^2\text{v0piv0pi0v1Wv1Z} - \tfrac{1}{12}ig\text{t}^2\text{v1piv1pi0v1Wv1Z} + \tfrac{1}{12}ig\text{pgtv1piv1pi0v1Wv2Z}
\end{aligned}
$$

$$
\begin{pmatrix}
\text{piW} & 1 \\
\text{piZP} & 2 \\
\text{ghWp}^\dagger & 3 \\
\text{ghZ} & 4
\end{pmatrix}
\quad
\begin{aligned}
&-\tfrac{1}{12}ig^2\text{v0piv0pi0Pv0Wv0Z} + \tfrac{1}{12}ig g\text{tv0piv0pi0Pv0Zv1W} + \tfrac{1}{12}ig g\text{tv0piv0pi0Pv0Wv1Z} - \\
&\tfrac{1}{12}ig\text{t}^2\text{v0piv0pi0Pv1Wv1Z} - \tfrac{1}{12}ig\text{t}^2\text{v1piv1pi0Pv1Wv1Z} + \tfrac{1}{12}ig\text{pgtv1piv1pi0Pv1Wv2Z}
\end{aligned}
$$

$$
\begin{pmatrix}
\text{piWP} & 1 \\
\text{ghWp}^\dagger & 2 \\
\text{ghZ} & 3
\end{pmatrix}
\quad
\begin{aligned}
&\tfrac{1}{4}\text{fpi}g^2\text{v0piPv0Wv0Z} - \tfrac{1}{4}\text{fpi}g g\text{tv0piPv0Zv1W} + \tfrac{1}{4}\text{fpi}g g\text{tv0piPv0Wv1Z} - \tfrac{1}{4}\text{fpi}g\text{t}^2\text{v0piPv1Wv1Z} + \\
&\tfrac{1}{4}\text{fpi}g\text{t}^2\text{v1piPv1Wv1Z} + \tfrac{1}{4}\text{fpigpgtv1piPv1Wv2Z}
\end{aligned}
$$

$$
\begin{pmatrix}
\text{piWP} & 1 \\
\text{piZ} & 2 \\
\text{ghWp}^\dagger & 3 \\
\text{ghZ} & 4
\end{pmatrix}
\quad
\begin{aligned}
&-\tfrac{1}{12}ig^2\text{v0pi0v0piPv0Wv0Z} + \tfrac{1}{12}ig g\text{tv0pi0v0piPv0Zv1W} + \tfrac{1}{12}ig g\text{tv0pi0v0piPv0Wv1Z} - \\
&\tfrac{1}{12}ig\text{t}^2\text{v0pi0v0piPv1Wv1Z} - \tfrac{1}{12}ig\text{t}^2\text{v1pi0v1piPv1Wv1Z} + \tfrac{1}{12}ig\text{pgtv1pi0v1piPv1Wv2Z}
\end{aligned}
$$

$$
\begin{pmatrix}
\text{piWP} & 1 \\
\text{piZP} & 2 \\
\text{ghWp}^\dagger & 3 \\
\text{ghZ} & 4
\end{pmatrix}
\quad
\begin{aligned}
&-\tfrac{1}{12}ig^2\text{v0pi0Pv0piPv0Wv0Z} + \tfrac{1}{12}ig g\text{tv0pi0Pv0piPv0Zv1W} + \tfrac{1}{12}ig g\text{tv0pi0Pv0piPv0Wv1Z} - \\
&\tfrac{1}{12}ig\text{t}^2\text{v0pi0Pv0piPv1Wv1Z} - \tfrac{1}{12}ig\text{t}^2\text{v1pi0Pv1piPv1Wv1Z} + \tfrac{1}{12}ig\text{pgtv1pi0Pv1piPv1Wv2Z}
\end{aligned}
$$

$$
\begin{pmatrix}
\text{piW} & 1 \\
\text{ghWp}^\dagger & 2 \\
\text{ghZP} & 3
\end{pmatrix}
\quad
\begin{aligned}
&\tfrac{1}{4}\text{fpi}g^2\text{v0piv0Wv0ZP} - \tfrac{1}{4}\text{fpi}g g\text{tv0piv0ZPv1W} + \tfrac{1}{4}\text{fpi}g g\text{tv0piv0Wv1ZP} - \tfrac{1}{4}\text{fpi}g\text{t}^2\text{v0piv1Wv1ZP} + \\
&\tfrac{1}{4}\text{fpi}g\text{t}^2\text{v1piv1Wv1ZP} + \tfrac{1}{4}\text{fpigpgtv1piv1Wv2ZP}
\end{aligned}
$$

$$
\begin{pmatrix}
\text{piW} & 1 \\
\text{piZ} & 2 \\
\text{ghWp}^\dagger & 3 \\
\text{ghZP} & 4
\end{pmatrix}
\quad
\begin{aligned}
&-\tfrac{1}{12}ig^2\text{v0piv0pi0v0Wv0ZP} + \tfrac{1}{12}ig g\text{tv0piv0pi0v0ZPv1W} + \tfrac{1}{12}ig g\text{tv0piv0pi0v0Wv1ZP} - \\
&\tfrac{1}{12}ig\text{t}^2\text{v0piv0pi0v1Wv1ZP} - \tfrac{1}{12}ig\text{t}^2\text{v1piv1pi0v1Wv1ZP} + \tfrac{1}{12}ig\text{pgtv1piv1pi0v1Wv2ZP}
\end{aligned}
$$

$$
\begin{pmatrix}
\text{piW} & 1 \\
\text{piZP} & 2 \\
\text{ghWp}^\dagger & 3 \\
\text{ghZP} & 4
\end{pmatrix}
\quad
\begin{aligned}
&-\tfrac{1}{12}ig^2\text{v0piv0pi0Pv0Wv0ZP} + \tfrac{1}{12}ig g\text{tv0piv0pi0Pv0ZPv1W} + \tfrac{1}{12}ig g\text{tv0piv0pi0Pv0Wv1ZP} - \\
&\tfrac{1}{12}ig\text{t}^2\text{v0piv0pi0Pv1Wv1ZP} - \tfrac{1}{12}ig\text{t}^2\text{v1piv1pi0Pv1Wv1ZP} + \tfrac{1}{12}ig\text{pgtv1piv1pi0Pv1Wv2ZP}
\end{aligned}
$$

$$
\begin{pmatrix}
\text{piWP} & 1 \\
\text{ghWp}^\dagger & 2 \\
\text{ghZP} & 3
\end{pmatrix}
\quad
\begin{aligned}
&\tfrac{1}{4}\text{fpi}g^2\text{v0piPv0Wv0ZP} - \tfrac{1}{4}\text{fpi}g g\text{tv0piPv0ZPv1W} + \tfrac{1}{4}\text{fpi}g g\text{tv0piPv0Wv1ZP} - \\
&\tfrac{1}{4}\text{fpi}g\text{t}^2\text{v0piPv1Wv1ZP} + \tfrac{1}{4}\text{fpi}g\text{t}^2\text{v1piPv1Wv1ZP} + \tfrac{1}{4}\text{fpigpgtv1piPv1Wv2ZP}
\end{aligned}
$$

$$
\begin{pmatrix}
\text{piWP} & 1 \\
\text{piZ} & 2 \\
\text{ghWp}^\dagger & 3 \\
\text{ghZP} & 4
\end{pmatrix}
\quad
\begin{aligned}
&-\tfrac{1}{12}ig^2\text{v0pi0v0piPv0Wv0ZP} + \tfrac{1}{12}ig g\text{tv0pi0v0piPv0ZPv1W} + \tfrac{1}{12}ig g\text{tv0pi0v0piPv0Wv1ZP} - \\
&\tfrac{1}{12}ig\text{t}^2\text{v0pi0v0piPv1Wv1ZP} - \tfrac{1}{12}ig\text{t}^2\text{v1pi0v1piPv1Wv1ZP} + \tfrac{1}{12}ig\text{pgtv1pi0v1piPv1Wv2ZP}
\end{aligned}
$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piZP} & 2 \\ \text{ghWp}^\dagger & 3 \\ \text{ghZP} & 4 \end{pmatrix}$$
$-\frac{1}{12}ig^2\text{v0pi0Pv0piPv0Wv0ZP} + \frac{1}{12}ig g\text{tv0pi0Pv0piPv0ZPv1W} + \frac{1}{12}ig g\text{tv0pi0Pv0piPv0Wv1ZP} - \frac{1}{12}i\text{gt}^2\text{v0pi0Pv0piPv1Wv1ZP} - \frac{1}{12}i\text{gt}^2\text{v1pi0Pv1piPv1Wv1ZP} + \frac{1}{12}i\text{gpgtv1pi0Pv1piPv1Wv2ZP}$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{ghWPm}^\dagger & 2 \\ \text{ghA} & 3 \end{pmatrix}$$
$-\frac{1}{2}\text{EEfpi}g\text{v0piv0WP} + \frac{1}{2}\text{EEfpigtv0piv1WP} - \frac{1}{2}\text{EEfpigtv1piv1WP}$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{ghWPm}^\dagger & 2 \\ \text{ghA} & 3 \end{pmatrix}$$
$-\frac{1}{2}\text{EEfpi}g\text{v0piPv0WP} + \frac{1}{2}\text{EEfpigtv0piPv1WP} - \frac{1}{2}\text{EEfpigtv1piPv1WP}$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ \text{ghWPm}^\dagger & 3 \\ \text{ghWm} & 4 \end{pmatrix}$$
$\frac{1}{12}ig^2\text{v0pi}^2\text{v0Wv0WP} - \frac{1}{12}ig g\text{tv0pi}^2\text{v0WPv1W} - \frac{1}{12}ig g\text{tv0pi}^2\text{v0Wv1WP} + \frac{1}{12}i\text{gt}^2\text{v0pi}^2\text{v1Wv1WP} + \frac{1}{12}i\text{gt}^2\text{v1pi}^2\text{v1Wv1WP}$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{ghWPm}^\dagger & 2 \\ \text{ghWm} & 3 \end{pmatrix}$$
$\frac{1}{4}\text{fpi}g^2\text{v0pi0v0Wv0WP} + \frac{1}{4}\text{fpi}g g\text{tv0pi0v0WPv1W} - \frac{1}{4}\text{fpi}g g\text{tv0pi0v0Wv1WP} - \frac{1}{4}\text{fpigt}^2\text{v0pi0v1Wv1WP} + \frac{1}{4}\text{fpigt}^2\text{v1pi0v1Wv1WP}$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ \text{ghWPm}^\dagger & 3 \\ \text{ghWm} & 4 \end{pmatrix}$$
$\frac{1}{6}ig^2\text{v0pi0}^2\text{v0Wv0WP} - \frac{1}{6}ig g\text{tv0pi0}^2\text{v0WPv1W} - \frac{1}{6}ig g\text{tv0pi0}^2\text{v0Wv1WP} + \frac{1}{6}i\text{gt}^2\text{v0pi0}^2\text{v1Wv1WP} + \frac{1}{6}i\text{gt}^2\text{v1pi0}^2\text{v1Wv1WP}$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{ghWPm}^\dagger & 2 \\ \text{ghWm} & 3 \end{pmatrix}$$
$\frac{1}{4}\text{fpi}g^2\text{v0pi0Pv0Wv0WP} + \frac{1}{4}\text{fpi}g g\text{tv0pi0Pv0WPv1W} - \frac{1}{4}\text{fpi}g g\text{tv0pi0Pv0Wv1WP} - \frac{1}{4}\text{fpigt}^2\text{v0pi0Pv1Wv1WP} + \frac{1}{4}\text{fpigt}^2\text{v1pi0Pv1Wv1WP}$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZP} & 2 \\ \text{ghWPm}^\dagger & 3 \\ \text{ghWm} & 4 \end{pmatrix}$$
$\frac{1}{6}ig^2\text{v0pi0v0pi0Pv0Wv0WP} - \frac{1}{6}ig g\text{tv0pi0v0pi0Pv0WPv1W} - \frac{1}{6}ig g\text{tv0pi0v0pi0Pv0Wv1WP} + \frac{1}{6}i\text{gt}^2\text{v0pi0v0pi0Pv1Wv1WP} + \frac{1}{6}i\text{gt}^2\text{v1pi0v1pi0Pv1Wv1WP}$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piZP} & 2 \\ \text{ghWPm}^\dagger & 3 \\ \text{ghWm} & 4 \end{pmatrix}$$
$\frac{1}{6}ig^2\text{v0pi0P}^2\text{v0Wv0WP} - \frac{1}{6}ig g\text{tv0pi0P}^2\text{v0WPv1W} - \frac{1}{6}ig g\text{tv0pi0P}^2\text{v0Wv1WP} + \frac{1}{6}i\text{gt}^2\text{v0pi0P}^2\text{v1Wv1WP} + \frac{1}{6}i\text{gt}^2\text{v1pi0P}^2\text{v1Wv1WP}$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP} & 2 \\ \text{ghWPm}^\dagger & 3 \\ \text{ghWm} & 4 \end{pmatrix}$$
$\frac{1}{12}ig^2\text{v0piv0piPv0Wv0WP} - \frac{1}{12}ig g\text{tv0piv0piPv0WPv1W} - \frac{1}{12}ig g\text{tv0piv0piPv0Wv1WP} + \frac{1}{12}i\text{gt}^2\text{v0piv0piPv1Wv1WP} + \frac{1}{12}i\text{gt}^2\text{v1piv1piPv1Wv1WP}$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{ghWPm}^\dagger & 3 \\ \text{ghWm} & 4 \end{pmatrix}$$
$\frac{1}{12}ig^2\text{v0piv0piPv0Wv0WP} - \frac{1}{12}ig g\text{tv0piv0piPv0WPv1W} - \frac{1}{12}ig g\text{tv0piv0piPv0Wv1WP} + \frac{1}{12}i\text{gt}^2\text{v0piv0piPv1Wv1WP} + \frac{1}{12}i\text{gt}^2\text{v1piv1piPv1Wv1WP}$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{ghWPm}^\dagger & 3 \\ \text{ghWm} & 4 \end{pmatrix} \quad \frac{1}{12}ig^2\text{v0piP}^2\text{v0Wv0WP} - \frac{1}{12}ig\text{gtv0piP}^2\text{v0WPv1W} - \frac{1}{12}ig\text{gtv0piP}^2\text{v0Wv1WP} + \frac{1}{12}i\text{gt}^2\text{v0piP}^2\text{v1Wv1WP} + \frac{1}{12}i\text{gt}^2\text{v1piP}^2\text{v1Wv1WP}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piW}^\dagger & 2 \\ \text{ghWPm}^\dagger & 3 \\ \text{ghWp} & 4 \end{pmatrix} \quad -\frac{1}{6}ig^2\text{v0pi}^2\text{v0Wv0WP} + \frac{1}{6}ig\text{gtv0pi}^2\text{v0WPv1W} + \frac{1}{6}ig\text{gtv0pi}^2\text{v0Wv1WP} - \frac{1}{6}i\text{gt}^2\text{v0pi}^2\text{v1Wv1WP} - \frac{1}{6}i\text{gt}^2\text{v1pi}^2\text{v1Wv1WP}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP}^\dagger & 2 \\ \text{ghWPm}^\dagger & 3 \\ \text{ghWp} & 4 \end{pmatrix} \quad -\frac{1}{6}ig^2\text{v0piv0piPv0Wv0WP} + \frac{1}{6}ig\text{gtv0piv0piPv0WPv1W} + \frac{1}{6}ig\text{gtv0piv0piPv0Wv1WP} - \frac{1}{6}i\text{gt}^2\text{v0piv0piPv1Wv1WP} - \frac{1}{6}i\text{gt}^2\text{v1piv1piPv1Wv1WP}$$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piWP}^\dagger & 2 \\ \text{ghWPm}^\dagger & 3 \\ \text{ghWp} & 4 \end{pmatrix} \quad -\frac{1}{6}ig^2\text{v0piP}^2\text{v0Wv0WP} + \frac{1}{6}ig\text{gtv0piP}^2\text{v0WPv1W} + \frac{1}{6}ig\text{gtv0piP}^2\text{v0Wv1WP} - \frac{1}{6}i\text{gt}^2\text{v0piP}^2\text{v1Wv1WP} - \frac{1}{6}i\text{gt}^2\text{v1piP}^2\text{v1Wv1WP}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ \text{ghWPm}^\dagger & 3 \\ \text{ghWPm} & 4 \end{pmatrix} \quad \frac{1}{12}ig^2\text{v0pi}^2\text{v0WP}^2 - \frac{1}{6}ig\text{gtv0pi}^2\text{v0WPv1WP} + \frac{1}{12}i\text{gt}^2\text{v0pi}^2\text{v1WP}^2 + \frac{1}{12}i\text{gt}^2\text{v1pi}^2\text{v1WP}^2$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{ghWPm}^\dagger & 2 \\ \text{ghWPm} & 3 \end{pmatrix} \quad \frac{1}{4}\text{fpi}g^2\text{v0pi0v0WP}^2 - \frac{1}{4}\text{fpigt}^2\text{v0pi0v1WP}^2 + \frac{1}{4}\text{fpigt}^2\text{v1pi0v1WP}^2$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ \text{ghWPm}^\dagger & 3 \\ \text{ghWPm} & 4 \end{pmatrix} \quad \frac{1}{6}ig^2\text{v0pi0}^2\text{v0WP}^2 - \frac{1}{3}ig\text{gtv0pi0}^2\text{v0WPv1WP} + \frac{1}{6}i\text{gt}^2\text{v0pi0}^2\text{v1WP}^2 + \frac{1}{6}i\text{gt}^2\text{v1pi0}^2\text{v1WP}^2$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{ghWPm}^\dagger & 2 \\ \text{ghWPm} & 3 \end{pmatrix} \quad \frac{1}{4}\text{fpi}g^2\text{v0pi0Pv0WP}^2 - \frac{1}{4}\text{fpigt}^2\text{v0pi0Pv1WP}^2 + \frac{1}{4}\text{fpigt}^2\text{v1pi0Pv1WP}^2$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZP} & 2 \\ \text{ghWPm}^\dagger & 3 \\ \text{ghWPm} & 4 \end{pmatrix} \quad \frac{1}{6}ig^2\text{v0pi0v0pi0Pv0WP}^2 - \frac{1}{3}ig\text{gtv0pi0v0pi0Pv0WPv1WP} + \frac{1}{6}i\text{gt}^2\text{v0pi0v0pi0Pv1WP}^2 + \frac{1}{6}i\text{gt}^2\text{v1pi0v1pi0Pv1WP}^2$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piZP} & 2 \\ \text{ghWPm}^\dagger & 3 \\ \text{ghWPm} & 4 \end{pmatrix} \quad \frac{1}{6}ig^2\text{v0pi0P}^2\text{v0WP}^2 - \frac{1}{3}ig\text{gtv0pi0P}^2\text{v0WPv1WP} + \frac{1}{6}i\text{gt}^2\text{v0pi0P}^2\text{v1WP}^2 + \frac{1}{6}i\text{gt}^2\text{v1pi0P}^2\text{v1WP}^2$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP} & 2 \\ \text{ghWPm}^\dagger & 3 \\ \text{ghWPm} & 4 \end{pmatrix}$$ $\frac{1}{12}ig^2\text{v0piv0piPv0WP}^2 - \frac{1}{6}ig g \text{tv0piv0piPv0WPv1WP} + \frac{1}{12}ig\text{t}^2\text{v0piv0piPv1WP}^2 + \frac{1}{12}ig\text{t}^2\text{v1piv1piPv1WP}^2$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{ghWPm}^\dagger & 3 \\ \text{ghWPm} & 4 \end{pmatrix}$$ $\frac{1}{12}ig^2\text{v0piv0piPv0WP}^2 - \frac{1}{6}ig g \text{tv0piv0piPv0WPv1WP} + \frac{1}{12}ig\text{t}^2\text{v0piv0piPv1WP}^2 + \frac{1}{12}ig\text{t}^2\text{v1piv1piPv1WP}^2$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{ghWPm}^\dagger & 3 \\ \text{ghWPm} & 4 \end{pmatrix}$$ $\frac{1}{12}ig^2\text{v0piP}^2\text{v0WP}^2 - \frac{1}{6}ig g \text{tv0piP}^2\text{v0WPv1WP} + \frac{1}{12}ig\text{t}^2\text{v0piP}^2\text{v1WP}^2 + \frac{1}{12}ig\text{t}^2\text{v1piP}^2\text{v1WP}^2$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piW}^\dagger & 2 \\ \text{ghWPm}^\dagger & 3 \\ \text{ghWPp} & 4 \end{pmatrix}$$ $-\frac{1}{6}ig^2\text{v0pi}^2\text{v0WP}^2 + \frac{1}{3}ig g \text{tv0pi}^2\text{v0WPv1WP} - \frac{1}{6}ig\text{t}^2\text{v0pi}^2\text{v1WP}^2 - \frac{1}{6}ig\text{t}^2\text{v1pi}^2\text{v1WP}^2$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP}^\dagger & 2 \\ \text{ghWPm}^\dagger & 3 \\ \text{ghWPp} & 4 \end{pmatrix}$$ $-\frac{1}{6}ig^2\text{v0piv0piPv0WP}^2 + \frac{1}{3}ig g \text{tv0piv0piPv0WPv1WP} - \frac{1}{6}ig\text{t}^2\text{v0piv0piPv1WP}^2 - \frac{1}{6}ig\text{t}^2\text{v1piv1piPv1WP}^2$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piWP}^\dagger & 2 \\ \text{ghWPm}^\dagger & 3 \\ \text{ghWPp} & 4 \end{pmatrix}$$ $-\frac{1}{6}ig^2\text{v0piP}^2\text{v0WP}^2 + \frac{1}{3}ig g \text{tv0piP}^2\text{v0WPv1WP} - \frac{1}{6}ig\text{t}^2\text{v0piP}^2\text{v1WP}^2 - \frac{1}{6}ig\text{t}^2\text{v1piP}^2\text{v1WP}^2$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{ghWPm}^\dagger & 2 \\ \text{ghZ} & 3 \end{pmatrix}$$ $-\frac{1}{4}\text{fpi}g^2\text{v0piv0WPv0Z} + \frac{1}{4}\text{fpi}g g \text{tv0piv0Zv1WP} - \frac{1}{4}\text{fpi}g g \text{tv0piv0WPv1Z} + \frac{1}{4}\text{fpi}ig\text{t}^2\text{v0piv1WPv1Z} - \frac{1}{4}\text{fpi}ig\text{t}^2\text{v1piv1WPv1Z} - \frac{1}{4}\text{fpi}ig\text{pgtv1piv1WPv2Z}$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piZ} & 2 \\ \text{ghWPm}^\dagger & 3 \\ \text{ghZ} & 4 \end{pmatrix}$$ $-\frac{1}{12}ig^2\text{v0piv0pi0v0WPv0Z} + \frac{1}{12}ig g \text{tv0piv0pi0v0Zv1WP} + \frac{1}{12}ig g \text{tv0piv0pi0v0WPv1Z} - \frac{1}{12}ig\text{t}^2\text{v0piv0pi0v1WPv1Z} - \frac{1}{12}ig\text{t}^2\text{v1piv1pi0v1WPv1Z} + \frac{1}{12}ig\text{pgtv1piv1pi0v1WPv2Z}$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piZP} & 2 \\ \text{ghWPm}^\dagger & 3 \\ \text{ghZ} & 4 \end{pmatrix}$$ $-\frac{1}{12}ig^2\text{v0piv0pi0Pv0WPv0Z} + \frac{1}{12}ig g \text{tv0piv0pi0Pv0Zv1WP} + \frac{1}{12}ig g \text{tv0piv0pi0Pv0WPv1Z} - \frac{1}{12}ig\text{t}^2\text{v0piv0pi0Pv1WPv1Z} - \frac{1}{12}ig\text{t}^2\text{v1piv1pi0Pv1WPv1Z} + \frac{1}{12}ig\text{pgtv1piv1pi0Pv1WPv2Z}$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{ghWPm}^\dagger & 2 \\ \text{ghZ} & 3 \end{pmatrix}$$ $-\frac{1}{4}\text{fpi}g^2\text{v0piPv0WPv0Z} + \frac{1}{4}\text{fpi}g g \text{tv0piPv0Zv1WP} - \frac{1}{4}\text{fpi}g g \text{tv0piPv0WPv1Z} + \frac{1}{4}\text{fpi}ig\text{t}^2\text{v0piPv1WPv1Z} - \frac{1}{4}\text{fpi}ig\text{t}^2\text{v1piPv1WPv1Z} - \frac{1}{4}\text{fpi}ig\text{pgtv1piPv1WPv2Z}$

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$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piZ} & 2 \\ \text{ghWPm}^\dagger & 3 \\ \text{ghZ} & 4 \end{pmatrix} \quad \begin{array}{l} -\frac{1}{12}ig^2\text{v0pi0v0piPv0WPv0Z} + \frac{1}{12}igg\text{tv0pi0v0piPv0Zv1WP} + \frac{1}{12}igg\text{tv0pi0v0piPv0WPv1Z} - \\ \frac{1}{12}ig\text{t}^2\text{v0pi0v0piPv1WPv1Z} - \frac{1}{12}ig\text{t}^2\text{v1pi0v1piPv1WPv1Z} + \frac{1}{12}ig\text{pgtv1pi0v1piPv1WPv2Z} \end{array}$$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piZP} & 2 \\ \text{ghWPm}^\dagger & 3 \\ \text{ghZ} & 4 \end{pmatrix} \quad \begin{array}{l} -\frac{1}{12}ig^2\text{v0pi0Pv0piPv0WPv0Z} + \frac{1}{12}igg\text{tv0pi0Pv0piPv0Zv1WP} + \frac{1}{12}igg\text{tv0pi0Pv0piPv0WPv1Z} - \\ \frac{1}{12}ig\text{t}^2\text{v0pi0Pv0piPv1WPv1Z} - \frac{1}{12}ig\text{t}^2\text{v1pi0Pv1piPv1WPv1Z} + \frac{1}{12}ig\text{pgtv1pi0Pv1piPv1WPv2Z} \end{array}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{ghWPm}^\dagger & 2 \\ \text{ghZP} & 3 \end{pmatrix} \quad \begin{array}{l} -\frac{1}{4}\text{fpi}ig^2\text{v0piv0WPv0ZP} + \frac{1}{4}\text{fpi}igg\text{tv0piv0ZPv1WP} - \frac{1}{4}\text{fpi}igg\text{tv0piv0WPv1ZP} + \\ \frac{1}{4}\text{fpi}ig\text{t}^2\text{v0piv1WPv1ZP} - \frac{1}{4}\text{fpi}ig\text{t}^2\text{v1piv1WPv1ZP} - \frac{1}{4}\text{fpigpgtv1piv1WPv2ZP} \end{array}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piZ} & 2 \\ \text{ghWPm}^\dagger & 3 \\ \text{ghZP} & 4 \end{pmatrix} \quad \begin{array}{l} -\frac{1}{12}ig^2\text{v0piv0pi0v0WPv0ZP} + \frac{1}{12}igg\text{tv0piv0pi0v0ZPv1WP} + \frac{1}{12}igg\text{tv0piv0pi0v0WPv1ZP} - \\ \frac{1}{12}ig\text{t}^2\text{v0piv0pi0v1WPv1ZP} - \frac{1}{12}ig\text{t}^2\text{v1piv1pi0v1WPv1ZP} + \frac{1}{12}ig\text{pgtv1piv1pi0v1WPv2ZP} \end{array}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piZP} & 2 \\ \text{ghWPm}^\dagger & 3 \\ \text{ghZP} & 4 \end{pmatrix} \quad \begin{array}{l} -\frac{1}{12}ig^2\text{v0piv0pi0Pv0WPv0ZP} + \frac{1}{12}igg\text{tv0piv0pi0Pv0ZPv1WP} + \frac{1}{12}igg\text{tv0piv0pi0Pv0WPv1ZP} - \\ \frac{1}{12}ig\text{t}^2\text{v0piv0pi0Pv1WPv1ZP} - \frac{1}{12}ig\text{t}^2\text{v1piv1pi0Pv1WPv1ZP} + \frac{1}{12}ig\text{pgtv1piv1pi0Pv1WPv2ZP} \end{array}$$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{ghWPm}^\dagger & 2 \\ \text{ghZP} & 3 \end{pmatrix} \quad \begin{array}{l} -\frac{1}{4}\text{fpi}ig^2\text{v0piPv0WPv0ZP} + \frac{1}{4}\text{fpi}igg\text{tv0piPv0ZPv1WP} - \frac{1}{4}\text{fpi}igg\text{tv0piPv0WPv1ZP} + \\ \frac{1}{4}\text{fpi}ig\text{t}^2\text{v0piPv1WPv1ZP} - \frac{1}{4}\text{fpi}ig\text{t}^2\text{v1piPv1WPv1ZP} - \frac{1}{4}\text{fpigpgtv1piPv1WPv2ZP} \end{array}$$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piZ} & 2 \\ \text{ghWPm}^\dagger & 3 \\ \text{ghZP} & 4 \end{pmatrix} \quad \begin{array}{l} -\frac{1}{12}ig^2\text{v0pi0v0piPv0WPv0ZP} + \frac{1}{12}igg\text{tv0pi0v0piPv0ZPv1WP} + \frac{1}{12}igg\text{tv0pi0v0piPv0WPv1ZP} - \\ \frac{1}{12}ig\text{t}^2\text{v0pi0v0piPv1WPv1ZP} - \frac{1}{12}ig\text{t}^2\text{v1pi0v1piPv1WPv1ZP} + \frac{1}{12}ig\text{pgtv1pi0v1piPv1WPv2ZP} \end{array}$$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piZP} & 2 \\ \text{ghWPm}^\dagger & 3 \\ \text{ghZP} & 4 \end{pmatrix} \quad \begin{array}{l} -\frac{1}{12}ig^2\text{v0pi0Pv0piPv0WPv0ZP} + \frac{1}{12}igg\text{tv0pi0Pv0piPv0ZPv1WP} + \frac{1}{12}igg\text{tv0pi0Pv0piPv0WPv1ZP} - \\ \frac{1}{12}ig\text{t}^2\text{v0pi0Pv0piPv1WPv1ZP} - \frac{1}{12}ig\text{t}^2\text{v1pi0Pv1piPv1WPv1ZP} + \frac{1}{12}ig\text{pgtv1pi0Pv1piPv1WPv2ZP} \end{array}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{ghWPp}^\dagger & 2 \\ \text{ghA} & 3 \end{pmatrix} \quad \frac{1}{2}\text{EEfpi}g\text{v0piv0WP} - \frac{1}{2}\text{EEfpigtv0piv1WP} + \frac{1}{2}\text{EEfpigtv1piv1WP}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{ghWPp}^\dagger & 2 \\ \text{ghA} & 3 \end{pmatrix} \quad \frac{1}{2}\text{EEfpi}g\text{v0piPv0WP} - \frac{1}{2}\text{EEfpigtv0piPv1WP} + \frac{1}{2}\text{EEfpigtv1piPv1WP}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW} & 2 \\ \text{ghWPp}^\dagger & 3 \\ \text{ghWm} & 4 \end{pmatrix} \quad \begin{array}{l} -\frac{1}{6}ig^2\text{v0pi}^2\text{v0Wv0WP} + \frac{1}{6}igg\text{tv0pi}^2\text{v0WPv1W} + \frac{1}{6}igg\text{tv0pi}^2\text{v0Wv1WP} - \frac{1}{6}ig\text{t}^2\text{v0pi}^2\text{v1Wv1WP} - \\ \frac{1}{6}ig\text{t}^2\text{v1pi}^2\text{v1Wv1WP} \end{array}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piWP} & 2 \\ \text{ghWPp}^\dagger & 3 \\ \text{ghWm} & 4 \end{pmatrix} \quad -\tfrac{1}{6}ig^2\text{v0piv0piPv0Wv0WP} + \tfrac{1}{6}ig g\text{tv0piv0piPv0WPv1W} + \tfrac{1}{6}ig g\text{tv0piv0piPv0Wv1WP} - \tfrac{1}{6}ig\text{t}^2\text{v0piv0piPv1Wv1WP} - \tfrac{1}{6}ig\text{t}^2\text{v1piv1piPv1Wv1WP}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP} & 2 \\ \text{ghWPp}^\dagger & 3 \\ \text{ghWm} & 4 \end{pmatrix} \quad -\tfrac{1}{6}ig^2\text{v0piP}^2\text{v0Wv0WP} + \tfrac{1}{6}ig g\text{tv0piP}^2\text{v0WPv1W} + \tfrac{1}{6}ig g\text{tv0piP}^2\text{v0Wv1WP} - \tfrac{1}{6}ig\text{t}^2\text{v0piP}^2\text{v1Wv1WP} - \tfrac{1}{6}ig\text{t}^2\text{v1piP}^2\text{v1Wv1WP}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ \text{ghWPp}^\dagger & 3 \\ \text{ghWp} & 4 \end{pmatrix} \quad \tfrac{1}{12}ig^2\text{v0pi}^2\text{v0Wv0WP} - \tfrac{1}{12}ig g\text{tv0pi}^2\text{v0WPv1W} - \tfrac{1}{12}ig g\text{tv0pi}^2\text{v0Wv1WP} + \tfrac{1}{12}ig\text{t}^2\text{v0pi}^2\text{v1Wv1WP} + \tfrac{1}{12}ig\text{t}^2\text{v1pi}^2\text{v1Wv1WP}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{ghWPp}^\dagger & 2 \\ \text{ghWp} & 3 \end{pmatrix} \quad -\tfrac{1}{4}\text{fpi}ig^2\text{v0pi0v0Wv0WP} - \tfrac{1}{4}\text{fpi}ig g\text{tv0pi0v0WPv1W} + \tfrac{1}{4}\text{fpi}ig g\text{tv0pi0v0Wv1WP} + \tfrac{1}{4}\text{fpi}ig\text{t}^2\text{v0pi0v1Wv1WP} - \tfrac{1}{4}\text{fpi}ig\text{t}^2\text{v1pi0v1Wv1WP}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ \text{ghWPp}^\dagger & 3 \\ \text{ghWp} & 4 \end{pmatrix} \quad \tfrac{1}{6}ig^2\text{v0pi0}^2\text{v0Wv0WP} - \tfrac{1}{6}ig g\text{tv0pi0}^2\text{v0WPv1W} - \tfrac{1}{6}ig g\text{tv0pi0}^2\text{v0Wv1WP} + \tfrac{1}{6}ig\text{t}^2\text{v0pi0}^2\text{v1Wv1WP} + \tfrac{1}{6}ig\text{t}^2\text{v1pi0}^2\text{v1Wv1WP}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{ghWPp}^\dagger & 2 \\ \text{ghWp} & 3 \end{pmatrix} \quad -\tfrac{1}{4}\text{fpi}ig^2\text{v0pi0Pv0Wv0WP} - \tfrac{1}{4}\text{fpi}ig g\text{tv0pi0Pv0WPv1W} + \tfrac{1}{4}\text{fpi}ig g\text{tv0pi0Pv0Wv1WP} + \tfrac{1}{4}\text{fpi}ig\text{t}^2\text{v0pi0Pv1Wv1WP} - \tfrac{1}{4}\text{fpi}ig\text{t}^2\text{v1pi0Pv1Wv1WP}$$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZP} & 2 \\ \text{ghWPp}^\dagger & 3 \\ \text{ghWp} & 4 \end{pmatrix} \quad \tfrac{1}{6}ig^2\text{v0pi0v0pi0Pv0Wv0WP} - \tfrac{1}{6}ig g\text{tv0pi0v0pi0Pv0WPv1W} - \tfrac{1}{6}ig g\text{tv0pi0v0pi0Pv0Wv1WP} + \tfrac{1}{6}ig\text{t}^2\text{v0pi0v0pi0Pv1Wv1WP} + \tfrac{1}{6}ig\text{t}^2\text{v1pi0v1pi0Pv1Wv1WP}$$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piZP} & 2 \\ \text{ghWPp}^\dagger & 3 \\ \text{ghWp} & 4 \end{pmatrix} \quad \tfrac{1}{6}ig^2\text{v0pi0P}^2\text{v0Wv0WP} - \tfrac{1}{6}ig g\text{tv0pi0P}^2\text{v0WPv1W} - \tfrac{1}{6}ig g\text{tv0pi0P}^2\text{v0Wv1WP} + \tfrac{1}{6}ig\text{t}^2\text{v0pi0P}^2\text{v1Wv1WP} + \tfrac{1}{6}ig\text{t}^2\text{v1pi0P}^2\text{v1Wv1WP}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP} & 2 \\ \text{ghWPp}^\dagger & 3 \\ \text{ghWp} & 4 \end{pmatrix} \quad \tfrac{1}{12}ig^2\text{v0piv0piPv0Wv0WP} - \tfrac{1}{12}ig g\text{tv0piv0piPv0WPv1W} - \tfrac{1}{12}ig g\text{tv0piv0piPv0Wv1WP} + \tfrac{1}{12}ig\text{t}^2\text{v0piv0piPv1Wv1WP} + \tfrac{1}{12}ig\text{t}^2\text{v1piv1piPv1Wv1WP}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{ghWPp}^\dagger & 3 \\ \text{ghWp} & 4 \end{pmatrix} \quad \tfrac{1}{12}ig^2\text{v0piv0piPv0Wv0WP} - \tfrac{1}{12}ig g\text{tv0piv0piPv0WPv1W} - \tfrac{1}{12}ig g\text{tv0piv0piPv0Wv1WP} + \tfrac{1}{12}ig\text{t}^2\text{v0piv0piPv1Wv1WP} + \tfrac{1}{12}ig\text{t}^2\text{v1piv1piPv1Wv1WP}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{ghWPp}^\dagger & 3 \\ \text{ghWp} & 4 \end{pmatrix}$$ $\frac{1}{12}ig^2\text{v0piP}^2\text{v0Wv0WP} - \frac{1}{12}ig g\text{tv0piP}^2\text{v0WPv1W} - \frac{1}{12}ig g\text{tv0piP}^2\text{v0Wv1WP} + \frac{1}{12}ig\text{t}^2\text{v0piP}^2\text{v1Wv1WP} + \frac{1}{12}ig\text{t}^2\text{v1piP}^2\text{v1Wv1WP}$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW} & 2 \\ \text{ghWPp}^\dagger & 3 \\ \text{ghWPm} & 4 \end{pmatrix}$$ $-\frac{1}{6}ig^2\text{v0pi}^2\text{v0WP}^2 + \frac{1}{3}ig g\text{tv0pi}^2\text{v0WPv1WP} - \frac{1}{6}ig\text{t}^2\text{v0pi}^2\text{v1WP}^2 - \frac{1}{6}ig\text{t}^2\text{v1pi}^2\text{v1WP}^2$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piWP} & 2 \\ \text{ghWPp}^\dagger & 3 \\ \text{ghWPm} & 4 \end{pmatrix}$$ $-\frac{1}{6}ig^2\text{v0piv0piPv0WP}^2 + \frac{1}{3}ig g\text{tv0piv0piPv0WPv1WP} - \frac{1}{6}ig\text{t}^2\text{v0piv0piPv1WP}^2 - \frac{1}{6}ig\text{t}^2\text{v1piv1piPv1WP}^2$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP} & 2 \\ \text{ghWPp}^\dagger & 3 \\ \text{ghWPm} & 4 \end{pmatrix}$$ $-\frac{1}{6}ig^2\text{v0piP}^2\text{v0WP}^2 + \frac{1}{3}ig g\text{tv0piP}^2\text{v0WPv1WP} - \frac{1}{6}ig\text{t}^2\text{v0piP}^2\text{v1WP}^2 - \frac{1}{6}ig\text{t}^2\text{v1piP}^2\text{v1WP}^2$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ \text{ghWPp}^\dagger & 3 \\ \text{ghWPp} & 4 \end{pmatrix}$$ $\frac{1}{12}ig^2\text{v0pi}^2\text{v0WP}^2 - \frac{1}{6}ig g\text{tv0pi}^2\text{v0WPv1WP} + \frac{1}{12}ig\text{t}^2\text{v0pi}^2\text{v1WP}^2 + \frac{1}{12}ig\text{t}^2\text{v1pi}^2\text{v1WP}^2$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{ghWPp}^\dagger & 2 \\ \text{ghWPp} & 3 \end{pmatrix}$$ $-\frac{1}{4}\text{fpi}g^2\text{v0pi0v0WP}^2 + \frac{1}{4}\text{fpi}g\text{t}^2\text{v0pi0v1WP}^2 - \frac{1}{4}\text{fpi}g\text{t}^2\text{v1pi0v1WP}^2$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZ} & 2 \\ \text{ghWPp}^\dagger & 3 \\ \text{ghWPp} & 4 \end{pmatrix}$$ $\frac{1}{6}ig^2\text{v0pi0}^2\text{v0WP}^2 - \frac{1}{3}ig g\text{tv0pi0}^2\text{v0WPv1WP} + \frac{1}{6}ig\text{t}^2\text{v0pi0}^2\text{v1WP}^2 + \frac{1}{6}ig\text{t}^2\text{v1pi0}^2\text{v1WP}^2$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{ghWPp}^\dagger & 2 \\ \text{ghWPp} & 3 \end{pmatrix}$$ $-\frac{1}{4}\text{fpi}g^2\text{v0pi0Pv0WP}^2 + \frac{1}{4}\text{fpi}g\text{t}^2\text{v0pi0Pv1WP}^2 - \frac{1}{4}\text{fpi}g\text{t}^2\text{v1pi0Pv1WP}^2$

$$\begin{pmatrix} \text{piZ} & 1 \\ \text{piZP} & 2 \\ \text{ghWPp}^\dagger & 3 \\ \text{ghWPp} & 4 \end{pmatrix}$$ $\frac{1}{6}ig^2\text{v0pi0v0pi0Pv0WP}^2 - \frac{1}{3}ig g\text{tv0pi0v0pi0Pv0WPv1WP} + \frac{1}{6}ig\text{t}^2\text{v0pi0v0pi0Pv1WP}^2 + \frac{1}{6}ig\text{t}^2\text{v1pi0v1pi0Pv1WP}^2$

$$\begin{pmatrix} \text{piZP} & 1 \\ \text{piZP} & 2 \\ \text{ghWPp}^\dagger & 3 \\ \text{ghWPp} & 4 \end{pmatrix}$$ $\frac{1}{6}ig^2\text{v0pi0P}^2\text{v0WP}^2 - \frac{1}{3}ig g\text{tv0pi0P}^2\text{v0WPv1WP} + \frac{1}{6}ig\text{t}^2\text{v0pi0P}^2\text{v1WP}^2 + \frac{1}{6}ig\text{t}^2\text{v1pi0P}^2\text{v1WP}^2$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP} & 2 \\ \text{ghWPp}^\dagger & 3 \\ \text{ghWPp} & 4 \end{pmatrix}$$ $\frac{1}{12}ig^2\text{v0piv0piPv0WP}^2 - \frac{1}{6}ig g\text{tv0piv0piPv0WPv1WP} + \frac{1}{12}ig\text{t}^2\text{v0piv0piPv1WP}^2 + \frac{1}{12}ig\text{t}^2\text{v1piv1piPv1WP}^2$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{ghWPp}^\dagger & 3 \\ \text{ghWPp} & 4 \end{pmatrix}$$ $\frac{1}{12}ig^2\text{v0piv0piPv0WP}^2 - \frac{1}{6}ig g\text{tv0piv0piPv0WPv1WP} + \frac{1}{12}ig\text{t}^2\text{v0piv0piPv1WP}^2 + \frac{1}{12}ig\text{t}^2\text{v1piv1piPv1WP}^2$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{ghWPp}^\dagger & 3 \\ \text{ghWPp} & 4 \end{pmatrix}$$ $\frac{1}{12}ig^2\text{v0piP}^2\text{v0WP}^2 - \frac{1}{6}ig g\text{tv0piP}^2\text{v0WPv1WP} + \frac{1}{12}ig\text{t}^2\text{v0piP}^2\text{v1WP}^2 + \frac{1}{12}ig\text{t}^2\text{v1piP}^2\text{v1WP}^2$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{ghWPp}^\dagger & 2 \\ \text{ghZ} & 3 \end{pmatrix}$$ $\frac{1}{4}\text{fpi}g^2\text{v0piv0WPv0Z} - \frac{1}{4}\text{fpi}g g\text{tv0piv0Zv1WP} + \frac{1}{4}\text{fpi}g g\text{tv0piv0WPv1Z} - \frac{1}{4}\text{fpi}g\text{t}^2\text{v0piv1WPv1Z} + \frac{1}{4}\text{fpi}g\text{t}^2\text{v1piv1WPv1Z} + \frac{1}{4}\text{fpigpgtv1piv1WPv2Z}$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piZ} & 2 \\ \text{ghWPp}^\dagger & 3 \\ \text{ghZ} & 4 \end{pmatrix}$$ $-\frac{1}{12}ig^2\text{v0piv0pi0v0WPv0Z} + \frac{1}{12}ig g\text{tv0piv0pi0v0Zv1WP} + \frac{1}{12}ig g\text{tv0piv0pi0v0WPv1Z} - \frac{1}{12}ig\text{t}^2\text{v0piv0pi0v1WPv1Z} - \frac{1}{12}ig\text{t}^2\text{v1piv1pi0v1WPv1Z} + \frac{1}{12}ig\text{pgtv1piv1pi0v1WPv2Z}$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piZP} & 2 \\ \text{ghWPp}^\dagger & 3 \\ \text{ghZ} & 4 \end{pmatrix}$$ $-\frac{1}{12}ig^2\text{v0piv0pi0Pv0WPv0Z} + \frac{1}{12}ig g\text{tv0piv0pi0Pv0Zv1WP} + \frac{1}{12}ig g\text{tv0piv0pi0Pv0WPv1Z} - \frac{1}{12}ig\text{t}^2\text{v0piv0pi0Pv1WPv1Z} - \frac{1}{12}ig\text{t}^2\text{v1piv1pi0Pv1WPv1Z} + \frac{1}{12}ig\text{pgtv1piv1pi0Pv1WPv2Z}$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{ghWPp}^\dagger & 2 \\ \text{ghZ} & 3 \end{pmatrix}$$ $\frac{1}{4}\text{fpi}g^2\text{v0piPv0WPv0Z} - \frac{1}{4}\text{fpi}g g\text{tv0piPv0Zv1WP} + \frac{1}{4}\text{fpi}g g\text{tv0piPv0WPv1Z} - \frac{1}{4}\text{fpi}g\text{t}^2\text{v0piPv1WPv1Z} + \frac{1}{4}\text{fpi}g\text{t}^2\text{v1piPv1WPv1Z} + \frac{1}{4}\text{fpigpgtv1piPv1WPv2Z}$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piZ} & 2 \\ \text{ghWPp}^\dagger & 3 \\ \text{ghZ} & 4 \end{pmatrix}$$ $-\frac{1}{12}ig^2\text{v0pi0v0piPv0WPv0Z} + \frac{1}{12}ig g\text{tv0pi0v0piPv0Zv1WP} + \frac{1}{12}ig g\text{tv0pi0v0piPv0WPv1Z} - \frac{1}{12}ig\text{t}^2\text{v0pi0v0piPv1WPv1Z} - \frac{1}{12}ig\text{t}^2\text{v1pi0v1piPv1WPv1Z} + \frac{1}{12}ig\text{pgtv1pi0v1piPv1WPv2Z}$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piZP} & 2 \\ \text{ghWPp}^\dagger & 3 \\ \text{ghZ} & 4 \end{pmatrix}$$ $-\frac{1}{12}ig^2\text{v0pi0Pv0piPv0WPv0Z} + \frac{1}{12}ig g\text{tv0pi0Pv0piPv0Zv1WP} + \frac{1}{12}ig g\text{tv0pi0Pv0piPv0WPv1Z} - \frac{1}{12}ig\text{t}^2\text{v0pi0Pv0piPv1WPv1Z} - \frac{1}{12}ig\text{t}^2\text{v1pi0Pv1piPv1WPv1Z} + \frac{1}{12}ig\text{pgtv1pi0Pv1piPv1WPv2Z}$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{ghWPp}^\dagger & 2 \\ \text{ghZP} & 3 \end{pmatrix}$$ $\frac{1}{4}\text{fpi}g^2\text{v0piv0WPv0ZP} - \frac{1}{4}\text{fpi}g g\text{tv0piv0ZPv1WP} + \frac{1}{4}\text{fpi}g g\text{tv0piv0WPv1ZP} - \frac{1}{4}\text{fpi}g\text{t}^2\text{v0piv1WPv1ZP} + \frac{1}{4}\text{fpi}g\text{t}^2\text{v1piv1WPv1ZP} + \frac{1}{4}\text{fpigpgtv1piv1WPv2ZP}$

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$$
\begin{pmatrix}
\text{piW} & 1 \\
\text{piZ} & 2 \\
\text{ghWPp}^\dagger & 3 \\
\text{ghZP} & 4
\end{pmatrix}
\quad
\begin{aligned}
&-\tfrac{1}{12}ig^2\text{v0piv0pi0v0WPv0ZP} + \tfrac{1}{12}ig g\text{tv0piv0pi0v0ZPv1WP} + \tfrac{1}{12}ig g\text{tv0piv0pi0v0WPv1ZP} - \\
&\tfrac{1}{12}ig\text{t}^2\text{v0piv0pi0v1WPv1ZP} - \tfrac{1}{12}ig\text{t}^2\text{v1piv1pi0v1WPv1ZP} + \tfrac{1}{12}ig\text{pgtv1piv1pi0v1WPv2ZP}
\end{aligned}
$$

$$
\begin{pmatrix}
\text{piW} & 1 \\
\text{piZP} & 2 \\
\text{ghWPp}^\dagger & 3 \\
\text{ghZP} & 4
\end{pmatrix}
\quad
\begin{aligned}
&-\tfrac{1}{12}ig^2\text{v0piv0pi0Pv0WPv0ZP} + \tfrac{1}{12}ig g\text{tv0piv0pi0Pv0ZPv1WP} + \tfrac{1}{12}ig g\text{tv0piv0pi0Pv0WPv1ZP} - \\
&\tfrac{1}{12}ig\text{t}^2\text{v0piv0pi0Pv1WPv1ZP} - \tfrac{1}{12}ig\text{t}^2\text{v1piv1pi0Pv1WPv1ZP} + \tfrac{1}{12}ig\text{pgtv1piv1pi0Pv1WPv2ZP}
\end{aligned}
$$

$$
\begin{pmatrix}
\text{piWP} & 1 \\
\text{ghWPp}^\dagger & 2 \\
\text{ghZP} & 3
\end{pmatrix}
\quad
\begin{aligned}
&\tfrac{1}{4}\text{fpi}ig^2\text{v0piPv0WPv0ZP} - \tfrac{1}{4}\text{fpi}ig g\text{tv0piPv0ZPv1WP} + \tfrac{1}{4}\text{fpi}ig g\text{tv0piPv0WPv1ZP} - \\
&\tfrac{1}{4}\text{fpi}ig\text{t}^2\text{v0piPv1WPv1ZP} + \tfrac{1}{4}\text{fpi}ig\text{t}^2\text{v1piPv1WPv1ZP} + \tfrac{1}{4}\text{fpi}ig\text{pgtv1piPv1WPv2ZP}
\end{aligned}
$$

$$
\begin{pmatrix}
\text{piWP} & 1 \\
\text{piZ} & 2 \\
\text{ghWPp}^\dagger & 3 \\
\text{ghZP} & 4
\end{pmatrix}
\quad
\begin{aligned}
&-\tfrac{1}{12}ig^2\text{v0pi0v0piPv0WPv0ZP} + \tfrac{1}{12}ig g\text{tv0pi0v0piPv0ZPv1WP} + \tfrac{1}{12}ig g\text{tv0pi0v0piPv0WPv1ZP} - \\
&\tfrac{1}{12}ig\text{t}^2\text{v0pi0v0piPv1WPv1ZP} - \tfrac{1}{12}ig\text{t}^2\text{v1pi0v1piPv1WPv1ZP} + \tfrac{1}{12}ig\text{pgtv1pi0v1piPv1WPv2ZP}
\end{aligned}
$$

$$
\begin{pmatrix}
\text{piWP} & 1 \\
\text{piZP} & 2 \\
\text{ghWPp}^\dagger & 3 \\
\text{ghZP} & 4
\end{pmatrix}
\quad
\begin{aligned}
&-\tfrac{1}{12}ig^2\text{v0pi0Pv0piPv0WPv0ZP} + \tfrac{1}{12}ig g\text{tv0pi0Pv0piPv0ZPv1WP} + \tfrac{1}{12}ig g\text{tv0pi0Pv0piPv0WPv1ZP} - \\
&\tfrac{1}{12}ig\text{t}^2\text{v0pi0Pv0piPv1WPv1ZP} - \tfrac{1}{12}ig\text{t}^2\text{v1pi0Pv1piPv1WPv1ZP} + \tfrac{1}{12}ig\text{pgtv1pi0Pv1piPv1WPv2ZP}
\end{aligned}
$$

$$
\begin{pmatrix}
\text{piW} & 1 \\
\text{ghZ}^\dagger & 2 \\
\text{ghWm} & 3
\end{pmatrix}
\quad
\begin{aligned}
&-\tfrac{1}{4}\text{fpi}ig^2\text{v0piv0Wv0Z} - \tfrac{1}{4}\text{fpi}ig g\text{tv0piv0Zv1W} + \tfrac{1}{4}\text{fpi}ig g\text{tv0piv0Wv1Z} + \tfrac{1}{4}\text{fpi}ig\text{t}^2\text{v0piv1Wv1Z} - \\
&\tfrac{1}{4}\text{fpi}ig\text{t}^2\text{v1piv1Wv1Z} + \tfrac{1}{4}\text{fpi}ig\text{pgtv1piv1Wv2Z}
\end{aligned}
$$

$$
\begin{pmatrix}
\text{piW} & 1 \\
\text{piZ} & 2 \\
\text{ghZ}^\dagger & 3 \\
\text{ghWm} & 4
\end{pmatrix}
\quad
\begin{aligned}
&-\tfrac{1}{12}ig^2\text{v0piv0pi0v0Wv0Z} + \tfrac{1}{12}ig g\text{tv0piv0pi0v0Zv1W} + \tfrac{1}{12}ig g\text{tv0piv0pi0v0Wv1Z} - \\
&\tfrac{1}{12}ig\text{t}^2\text{v0piv0pi0v1Wv1Z} - \tfrac{1}{12}ig\text{t}^2\text{v1piv1pi0v1Wv1Z} + \tfrac{1}{12}ig\text{pgtv1piv1pi0v1Wv2Z}
\end{aligned}
$$

$$
\begin{pmatrix}
\text{piW} & 1 \\
\text{piZP} & 2 \\
\text{ghZ}^\dagger & 3 \\
\text{ghWm} & 4
\end{pmatrix}
\quad
\begin{aligned}
&-\tfrac{1}{12}ig^2\text{v0piv0pi0Pv0Wv0Z} + \tfrac{1}{12}ig g\text{tv0piv0pi0Pv0Zv1W} + \tfrac{1}{12}ig g\text{tv0piv0pi0Pv0Wv1Z} - \\
&\tfrac{1}{12}ig\text{t}^2\text{v0piv0pi0Pv1Wv1Z} - \tfrac{1}{12}ig\text{t}^2\text{v1piv1pi0Pv1Wv1Z} + \tfrac{1}{12}ig\text{pgtv1piv1pi0Pv1Wv2Z}
\end{aligned}
$$

$$
\begin{pmatrix}
\text{piWP} & 1 \\
\text{ghZ}^\dagger & 2 \\
\text{ghWm} & 3
\end{pmatrix}
\quad
\begin{aligned}
&-\tfrac{1}{4}\text{fpi}ig^2\text{v0piPv0Wv0Z} - \tfrac{1}{4}\text{fpi}ig g\text{tv0piPv0Zv1W} + \tfrac{1}{4}\text{fpi}ig g\text{tv0piPv0Wv1Z} + \tfrac{1}{4}\text{fpi}ig\text{t}^2\text{v0piPv1Wv1Z} - \\
&\tfrac{1}{4}\text{fpi}ig\text{t}^2\text{v1piPv1Wv1Z} + \tfrac{1}{4}\text{fpi}ig\text{pgtv1piPv1Wv2Z}
\end{aligned}
$$

$$
\begin{pmatrix}
\text{piWP} & 1 \\
\text{piZ} & 2 \\
\text{ghZ}^\dagger & 3 \\
\text{ghWm} & 4
\end{pmatrix}
\quad
\begin{aligned}
&-\tfrac{1}{12}ig^2\text{v0pi0v0piPv0Wv0Z} + \tfrac{1}{12}ig g\text{tv0pi0v0piPv0Zv1W} + \tfrac{1}{12}ig g\text{tv0pi0v0piPv0Wv1Z} - \\
&\tfrac{1}{12}ig\text{t}^2\text{v0pi0v0piPv1Wv1Z} - \tfrac{1}{12}ig\text{t}^2\text{v1pi0v1piPv1Wv1Z} + \tfrac{1}{12}ig\text{pgtv1pi0v1piPv1Wv2Z}
\end{aligned}
$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piZP} & 2 \\ \text{ghZ}^\dagger & 3 \\ \text{ghWm} & 4 \end{pmatrix}$$

$-\frac{1}{12}ig^2\text{v0pi0Pv0piPv0Wv0Z} + \frac{1}{12}ig g\text{tv0pi0Pv0piPv0Zv1W} + \frac{1}{12}ig g\text{tv0pi0Pv0piPv0Wv1Z} - \frac{1}{12}ig\text{t}^2\text{v0pi0Pv0piPv1Wv1Z} - \frac{1}{12}ig\text{t}^2\text{v1pi0Pv1piPv1Wv1Z} + \frac{1}{12}ig\text{pgtv1pi0Pv1piPv1Wv2Z}$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{ghZ}^\dagger & 2 \\ \text{ghWp} & 3 \end{pmatrix}$$

$\frac{1}{4}\text{fpi}g^2\text{v0piv0Wv0Z} + \frac{1}{4}\text{fpi}g g\text{tv0piv0Zv1W} - \frac{1}{4}\text{fpi}g g\text{tv0piv0Wv1Z} - \frac{1}{4}\text{fpi}g\text{t}^2\text{v0piv1Wv1Z} + \frac{1}{4}\text{fpi}g\text{t}^2\text{v1piv1Wv1Z} - \frac{1}{4}\text{fpigpgtv1piv1Wv2Z}$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piZ} & 2 \\ \text{ghZ}^\dagger & 3 \\ \text{ghWp} & 4 \end{pmatrix}$$

$-\frac{1}{12}ig^2\text{v0piv0pi0v0Wv0Z} + \frac{1}{12}ig g\text{tv0piv0pi0v0Zv1W} + \frac{1}{12}ig g\text{tv0piv0pi0v0Wv1Z} - \frac{1}{12}ig\text{t}^2\text{v0piv0pi0v1Wv1Z} - \frac{1}{12}ig\text{t}^2\text{v1piv1pi0v1Wv1Z} + \frac{1}{12}ig\text{pgtv1piv1pi0v1Wv2Z}$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piZP} & 2 \\ \text{ghZ}^\dagger & 3 \\ \text{ghWp} & 4 \end{pmatrix}$$

$-\frac{1}{12}ig^2\text{v0piv0pi0Pv0Wv0Z} + \frac{1}{12}ig g\text{tv0piv0pi0Pv0Zv1W} + \frac{1}{12}ig g\text{tv0piv0pi0Pv0Wv1Z} - \frac{1}{12}ig\text{t}^2\text{v0piv0pi0Pv1Wv1Z} - \frac{1}{12}ig\text{t}^2\text{v1piv1pi0Pv1Wv1Z} + \frac{1}{12}ig\text{pgtv1piv1pi0Pv1Wv2Z}$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{ghZ}^\dagger & 2 \\ \text{ghWp} & 3 \end{pmatrix}$$

$\frac{1}{4}\text{fpi}g^2\text{v0piPv0Wv0Z} + \frac{1}{4}\text{fpi}g g\text{tv0piPv0Zv1W} - \frac{1}{4}\text{fpi}g g\text{tv0piPv0Wv1Z} - \frac{1}{4}\text{fpi}g\text{t}^2\text{v0piPv1Wv1Z} + \frac{1}{4}\text{fpi}g\text{t}^2\text{v1piPv1Wv1Z} - \frac{1}{4}\text{fpigpgtv1piPv1Wv2Z}$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piZ} & 2 \\ \text{ghZ}^\dagger & 3 \\ \text{ghWp} & 4 \end{pmatrix}$$

$-\frac{1}{12}ig^2\text{v0pi0v0piPv0Wv0Z} + \frac{1}{12}ig g\text{tv0pi0v0piPv0Zv1W} + \frac{1}{12}ig g\text{tv0pi0v0piPv0Wv1Z} - \frac{1}{12}ig\text{t}^2\text{v0pi0v0piPv1Wv1Z} - \frac{1}{12}ig\text{t}^2\text{v1pi0v1piPv1Wv1Z} + \frac{1}{12}ig\text{pgtv1pi0v1piPv1Wv2Z}$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piZP} & 2 \\ \text{ghZ}^\dagger & 3 \\ \text{ghWp} & 4 \end{pmatrix}$$

$-\frac{1}{12}ig^2\text{v0pi0Pv0piPv0Wv0Z} + \frac{1}{12}ig g\text{tv0pi0Pv0piPv0Zv1W} + \frac{1}{12}ig g\text{tv0pi0Pv0piPv0Wv1Z} - \frac{1}{12}ig\text{t}^2\text{v0pi0Pv0piPv1Wv1Z} - \frac{1}{12}ig\text{t}^2\text{v1pi0Pv1piPv1Wv1Z} + \frac{1}{12}ig\text{pgtv1pi0Pv1piPv1Wv2Z}$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{ghZ}^\dagger & 2 \\ \text{ghWPm} & 3 \end{pmatrix}$$

$-\frac{1}{4}\text{fpi}g^2\text{v0piv0WPv0Z} - \frac{1}{4}\text{fpi}g g\text{tv0piv0Zv1WP} + \frac{1}{4}\text{fpi}g g\text{tv0piv0WPv1Z} + \frac{1}{4}\text{fpi}g\text{t}^2\text{v0piv1WPv1Z} - \frac{1}{4}\text{fpi}g\text{t}^2\text{v1piv1WPv1Z} + \frac{1}{4}\text{fpigpgtv1piv1WPv2Z}$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piZ} & 2 \\ \text{ghZ}^\dagger & 3 \\ \text{ghWPm} & 4 \end{pmatrix}$$

$-\frac{1}{12}ig^2\text{v0piv0pi0v0WPv0Z} + \frac{1}{12}ig g\text{tv0piv0pi0v0Zv1WP} + \frac{1}{12}ig g\text{tv0piv0pi0v0WPv1Z} - \frac{1}{12}ig\text{t}^2\text{v0piv0pi0v1WPv1Z} - \frac{1}{12}ig\text{t}^2\text{v1piv1pi0v1WPv1Z} + \frac{1}{12}ig\text{pgtv1piv1pi0v1WPv2Z}$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piZP} & 2 \\ \text{ghZ}^\dagger & 3 \\ \text{ghWPm} & 4 \end{pmatrix}$$

$-\frac{1}{12}ig^2\text{v0piv0pi0Pv0WPv0Z} + \frac{1}{12}ig g\text{tv0piv0pi0Pv0Zv1WP} + \frac{1}{12}ig g\text{tv0piv0pi0Pv0WPv1Z} - \frac{1}{12}ig\text{t}^2\text{v0piv0pi0Pv1WPv1Z} - \frac{1}{12}ig\text{t}^2\text{v1piv1pi0Pv1WPv1Z} + \frac{1}{12}ig\text{pgtv1piv1pi0Pv1WPv2Z}$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{ghZ}^\dagger & 2 \\ \text{ghWPm} & 3 \end{pmatrix}$$

$-\frac{1}{4}\text{fpi}g^2\text{v0piPv0WPv0Z} - \frac{1}{4}\text{fpi}g g\text{tv0piPv0Zv1WP} + \frac{1}{4}\text{fpi}g g\text{tv0piPv0WPv1Z} + \frac{1}{4}\text{fpi}g\text{t}^2\text{v0piPv1WPv1Z} - \frac{1}{4}\text{fpi}g\text{t}^2\text{v1piPv1WPv1Z} + \frac{1}{4}\text{fpigpgtv1piPv1WPv2Z}$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piZ} & 2 \\ \text{ghZ}^\dagger & 3 \\ \text{ghWPm} & 4 \end{pmatrix}$$
$-\frac{1}{12}ig^2\text{v0pi0v0piPv0WPv0Z} + \frac{1}{12}ig g\text{tv0pi0v0piPv0Zv1WP} + \frac{1}{12}ig g\text{tv0pi0v0piPv0WPv1Z} - \frac{1}{12}ig\text{t}^2\text{v0pi0v0piPv1WPv1Z} - \frac{1}{12}ig\text{t}^2\text{v1pi0v1piPv1WPv1Z} + \frac{1}{12}ig\text{pgtv1pi0v1piPv1WPv2Z}$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piZP} & 2 \\ \text{ghZ}^\dagger & 3 \\ \text{ghWPm} & 4 \end{pmatrix}$$
$-\frac{1}{12}ig^2\text{v0pi0Pv0piPv0WPv0Z} + \frac{1}{12}ig g\text{tv0pi0Pv0piPv0Zv1WP} + \frac{1}{12}ig g\text{tv0pi0Pv0piPv0WPv1Z} - \frac{1}{12}ig\text{t}^2\text{v0pi0Pv0piPv1WPv1Z} - \frac{1}{12}ig\text{t}^2\text{v1pi0Pv1piPv1WPv1Z} + \frac{1}{12}ig\text{pgtv1pi0Pv1piPv1WPv2Z}$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{ghZ}^\dagger & 2 \\ \text{ghWPp} & 3 \end{pmatrix}$$
$\frac{1}{4}\text{fpi}ig^2\text{v0piv0WPv0Z} + \frac{1}{4}\text{fpi}ig g\text{tv0piv0Zv1WP} - \frac{1}{4}\text{fpi}ig g\text{tv0piv0WPv1Z} - \frac{1}{4}\text{fpi}ig\text{t}^2\text{v0piv1WPv1Z} + \frac{1}{4}\text{fpi}ig\text{t}^2\text{v1piv1WPv1Z} - \frac{1}{4}\text{fpi}ig\text{pgtv1piv1WPv2Z}$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piZ} & 2 \\ \text{ghZ}^\dagger & 3 \\ \text{ghWPp} & 4 \end{pmatrix}$$
$-\frac{1}{12}ig^2\text{v0piv0pi0v0WPv0Z} + \frac{1}{12}ig g\text{tv0piv0pi0v0Zv1WP} + \frac{1}{12}ig g\text{tv0piv0pi0v0WPv1Z} - \frac{1}{12}ig\text{t}^2\text{v0piv0pi0v1WPv1Z} - \frac{1}{12}ig\text{t}^2\text{v1piv1pi0v1WPv1Z} + \frac{1}{12}ig\text{pgtv1piv1pi0v1WPv2Z}$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piZP} & 2 \\ \text{ghZ}^\dagger & 3 \\ \text{ghWPp} & 4 \end{pmatrix}$$
$-\frac{1}{12}ig^2\text{v0piv0pi0Pv0WPv0Z} + \frac{1}{12}ig g\text{tv0piv0pi0Pv0Zv1WP} + \frac{1}{12}ig g\text{tv0piv0pi0Pv0WPv1Z} - \frac{1}{12}ig\text{t}^2\text{v0piv0pi0Pv1WPv1Z} - \frac{1}{12}ig\text{t}^2\text{v1piv1pi0Pv1WPv1Z} + \frac{1}{12}ig\text{pgtv1piv1pi0Pv1WPv2Z}$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{ghZ}^\dagger & 2 \\ \text{ghWPp} & 3 \end{pmatrix}$$
$\frac{1}{4}\text{fpi}ig^2\text{v0piPv0WPv0Z} + \frac{1}{4}\text{fpi}ig g\text{tv0piPv0Zv1WP} - \frac{1}{4}\text{fpi}ig g\text{tv0piPv0WPv1Z} - \frac{1}{4}\text{fpi}ig\text{t}^2\text{v0piPv1WPv1Z} + \frac{1}{4}\text{fpi}ig\text{t}^2\text{v1piPv1WPv1Z} - \frac{1}{4}\text{fpi}ig\text{pgtv1piPv1WPv2Z}$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piZ} & 2 \\ \text{ghZ}^\dagger & 3 \\ \text{ghWPp} & 4 \end{pmatrix}$$
$-\frac{1}{12}ig^2\text{v0pi0v0piPv0WPv0Z} + \frac{1}{12}ig g\text{tv0pi0v0piPv0Zv1WP} + \frac{1}{12}ig g\text{tv0pi0v0piPv0WPv1Z} - \frac{1}{12}ig\text{t}^2\text{v0pi0v0piPv1WPv1Z} - \frac{1}{12}ig\text{t}^2\text{v1pi0v1piPv1WPv1Z} + \frac{1}{12}ig\text{pgtv1pi0v1piPv1WPv2Z}$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piZP} & 2 \\ \text{ghZ}^\dagger & 3 \\ \text{ghWPp} & 4 \end{pmatrix}$$
$-\frac{1}{12}ig^2\text{v0pi0Pv0piPv0WPv0Z} + \frac{1}{12}ig g\text{tv0pi0Pv0piPv0Zv1WP} + \frac{1}{12}ig g\text{tv0pi0Pv0piPv0WPv1Z} - \frac{1}{12}ig\text{t}^2\text{v0pi0Pv0piPv1WPv1Z} - \frac{1}{12}ig\text{t}^2\text{v1pi0Pv1piPv1WPv1Z} + \frac{1}{12}ig\text{pgtv1pi0Pv1piPv1WPv2Z}$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ \text{ghZ}^\dagger & 3 \\ \text{ghZ} & 4 \end{pmatrix}$$
$\frac{1}{6}ig^2\text{v0pi}^2\text{v0Z}^2 - \frac{1}{3}ig g\text{tv0pi}^2\text{v0Zv1Z} + \frac{1}{6}ig\text{t}^2\text{v0pi}^2\text{v1Z}^2 + \frac{1}{6}ig\text{t}^2\text{v1pi}^2\text{v1Z}^2 - \frac{1}{3}ig\text{pgtv1pi}^2\text{v1Zv2Z} + \frac{1}{6}ig\text{p}^2\text{v1pi}^2\text{v2Z}^2$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP} & 2 \\ \text{ghZ}^\dagger & 3 \\ \text{ghZ} & 4 \end{pmatrix}$$
$\frac{1}{6}ig^2\text{v0piv0piPv0Z}^2 - \frac{1}{3}ig g\text{tv0piv0piPv0Zv1Z} + \frac{1}{6}ig\text{t}^2\text{v0piv0piPv1Z}^2 + \frac{1}{6}ig\text{t}^2\text{v1piv1piPv1Z}^2 - \frac{1}{3}ig\text{pgtv1piv1piPv1Zv2Z} + \frac{1}{6}ig\text{p}^2\text{v1piv1piPv2Z}^2$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{ghZ}^\dagger & 3 \\ \text{ghZ} & 4 \end{pmatrix} \quad \frac{1}{6}ig^2\text{v0piv0piPv0Z}^2 - \frac{1}{3}ig g\text{tv0piv0piPv0Zv1Z} + \frac{1}{6}ig\text{t}^2\text{v0piv0piPv1Z}^2 + \frac{1}{6}ig\text{t}^2\text{v1piv1piPv1Z}^2 - \frac{1}{3}ig\text{pgtv1piv1piPv1Zv2Z} + \frac{1}{6}ig\text{p}^2\text{v1piv1piPv2Z}^2$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{ghZ}^\dagger & 3 \\ \text{ghZ} & 4 \end{pmatrix} \quad \frac{1}{6}ig^2\text{v0piP}^2\text{v0Z}^2 - \frac{1}{3}ig g\text{tv0piP}^2\text{v0Zv1Z} + \frac{1}{6}ig\text{t}^2\text{v0piP}^2\text{v1Z}^2 + \frac{1}{6}ig\text{t}^2\text{v1piP}^2\text{v1Z}^2 - \frac{1}{3}ig\text{pgtv1piP}^2\text{v1Zv2Z} + \frac{1}{6}ig\text{p}^2\text{v1piP}^2\text{v2Z}^2$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piW}^\dagger & 2 \\ \text{ghZ}^\dagger & 3 \\ \text{ghZP} & 4 \end{pmatrix} \quad \frac{1}{6}ig^2\text{v0pi}^2\text{v0Zv0ZP} - \frac{1}{6}ig g\text{tv0pi}^2\text{v0ZPv1Z} - \frac{1}{6}ig g\text{tv0pi}^2\text{v0Zv1ZP} + \frac{1}{6}ig\text{t}^2\text{v0pi}^2\text{v1Zv1ZP} + \frac{1}{6}ig\text{t}^2\text{v1pi}^2\text{v1Zv1ZP} - \frac{1}{6}ig\text{pgtv1pi}^2\text{v1ZPv2Z} - \frac{1}{6}ig\text{pgtv1pi}^2\text{v1Zv2ZP} + \frac{1}{6}ig\text{p}^2\text{v1pi}^2\text{v2Zv2ZP}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piWP} & 2 \\ \text{ghZ}^\dagger & 3 \\ \text{ghZP} & 4 \end{pmatrix} \quad \frac{1}{6}ig^2\text{v0piv0piPv0Zv0ZP} - \frac{1}{6}ig g\text{tv0piv0piPv0ZPv1Z} - \frac{1}{6}ig g\text{tv0piv0piPv0Zv1ZP} + \frac{1}{6}ig\text{t}^2\text{v0piv0piPv1Zv1ZP} + \frac{1}{6}ig\text{t}^2\text{v1piv1piPv1Zv1ZP} - \frac{1}{6}ig\text{pgtv1piv1piPv1ZPv2Z} - \frac{1}{6}ig\text{pgtv1piv1piPv1Zv2ZP} + \frac{1}{6}ig\text{p}^2\text{v1piv1piPv2Zv2ZP}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{ghZ}^\dagger & 3 \\ \text{ghZP} & 4 \end{pmatrix} \quad \frac{1}{6}ig^2\text{v0piv0piPv0Zv0ZP} - \frac{1}{6}ig g\text{tv0piv0piPv0ZPv1Z} - \frac{1}{6}ig g\text{tv0piv0piPv0Zv1ZP} + \frac{1}{6}ig\text{t}^2\text{v0piv0piPv1Zv1ZP} + \frac{1}{6}ig\text{t}^2\text{v1piv1piPv1Zv1ZP} - \frac{1}{6}ig\text{pgtv1piv1piPv1ZPv2Z} - \frac{1}{6}ig\text{pgtv1piv1piPv1Zv2ZP} + \frac{1}{6}ig\text{p}^2\text{v1piv1piPv2Zv2ZP}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piWP}^\dagger & 2 \\ \text{ghZ}^\dagger & 3 \\ \text{ghZP} & 4 \end{pmatrix} \quad \frac{1}{6}ig^2\text{v0piP}^2\text{v0Zv0ZP} - \frac{1}{6}ig g\text{tv0piP}^2\text{v0ZPv1Z} - \frac{1}{6}ig g\text{tv0piP}^2\text{v0Zv1ZP} + \frac{1}{6}ig\text{t}^2\text{v0piP}^2\text{v1Zv1ZP} + \frac{1}{6}ig\text{t}^2\text{v1piP}^2\text{v1Zv1ZP} - \frac{1}{6}ig\text{pgtv1piP}^2\text{v1ZPv2Z} - \frac{1}{6}ig\text{pgtv1piP}^2\text{v1Zv2ZP} + \frac{1}{6}ig\text{p}^2\text{v1piP}^2\text{v2Zv2ZP}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{ghZP}^\dagger & 2 \\ \text{ghWm} & 3 \end{pmatrix} \quad -\frac{1}{4}\text{fpi}g^2\text{v0piv0Wv0ZP} - \frac{1}{4}\text{fpi}g g\text{tv0piv0ZPv1W} + \frac{1}{4}\text{fpi}g g\text{tv0piv0Wv1ZP} + \frac{1}{4}\text{fpi}g\text{t}^2\text{v0piv1Wv1ZP} - \frac{1}{4}\text{fpi}g\text{t}^2\text{v1piv1Wv1ZP} + \frac{1}{4}\text{fpigpgtv1piv1Wv2ZP}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piZ} & 2 \\ \text{ghZP}^\dagger & 3 \\ \text{ghWm} & 4 \end{pmatrix} \quad -\frac{1}{12}ig^2\text{v0piv0pi0v0Wv0ZP} + \frac{1}{12}ig g\text{tv0piv0pi0v0ZPv1W} + \frac{1}{12}ig g\text{tv0piv0pi0v0Wv1ZP} - \frac{1}{12}ig\text{t}^2\text{v0piv0pi0v1Wv1ZP} - \frac{1}{12}ig\text{t}^2\text{v1piv1pi0v1Wv1ZP} + \frac{1}{12}ig\text{pgtv1piv1pi0v1Wv2ZP}$$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piZP} & 2 \\ \text{ghZP}^\dagger & 3 \\ \text{ghWm} & 4 \end{pmatrix} \quad -\frac{1}{12}ig^2\text{v0piv0pi0Pv0Wv0ZP} + \frac{1}{12}ig g\text{tv0piv0pi0Pv0ZPv1W} + \frac{1}{12}ig g\text{tv0piv0pi0Pv0Wv1ZP} - \frac{1}{12}ig\text{t}^2\text{v0piv0pi0Pv1Wv1ZP} - \frac{1}{12}ig\text{t}^2\text{v1piv1pi0Pv1Wv1ZP} + \frac{1}{12}ig\text{pgtv1piv1pi0Pv1Wv2ZP}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{ghZP}^\dagger & 2 \\ \text{ghWm} & 3 \end{pmatrix} \quad -\frac{1}{4}\text{fpi}g^2\text{v0piPv0Wv0ZP} - \frac{1}{4}\text{fpi}g g\text{tv0piPv0ZPv1W} + \frac{1}{4}\text{fpi}g g\text{tv0piPv0Wv1ZP} + \frac{1}{4}\text{fpi}g\text{t}^2\text{v0piPv1Wv1ZP} - \frac{1}{4}\text{fpi}g\text{t}^2\text{v1piPv1Wv1ZP} + \frac{1}{4}\text{fpigpgtv1piPv1Wv2ZP}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piZ} & 2 \\ \text{ghZP}^\dagger & 3 \\ \text{ghWm} & 4 \end{pmatrix}$$

$-\frac{1}{12}ig^2\text{v0pi0v0piPv0Wv0ZP} + \frac{1}{12}ig\text{gtv0pi0v0piPv0ZPv1W} + \frac{1}{12}ig\text{gtv0pi0v0piPv0Wv1ZP} - \frac{1}{12}ig\text{t}^2\text{v0pi0v0piPv1Wv1ZP} - \frac{1}{12}ig\text{t}^2\text{v1pi0v1piPv1Wv1ZP} + \frac{1}{12}ig\text{pgtv1pi0v1piPv1Wv2ZP}$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piZP} & 2 \\ \text{ghZP}^\dagger & 3 \\ \text{ghWm} & 4 \end{pmatrix}$$

$-\frac{1}{12}ig^2\text{v0pi0Pv0piPv0Wv0ZP} + \frac{1}{12}ig\text{gtv0pi0Pv0piPv0ZPv1W} + \frac{1}{12}ig\text{gtv0pi0Pv0piPv0Wv1ZP} - \frac{1}{12}ig\text{t}^2\text{v0pi0Pv0piPv1Wv1ZP} - \frac{1}{12}ig\text{t}^2\text{v1pi0Pv1piPv1Wv1ZP} + \frac{1}{12}ig\text{pgtv1pi0Pv1piPv1Wv2ZP}$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{ghZP}^\dagger & 2 \\ \text{ghWp} & 3 \end{pmatrix}$$

$\frac{1}{4}\text{fpi}g^2\text{v0piv0Wv0ZP} + \frac{1}{4}\text{fpi}g\text{gtv0piv0ZPv1W} - \frac{1}{4}\text{fpi}g\text{gtv0piv0Wv1ZP} - \frac{1}{4}\text{fpig}\text{t}^2\text{v0piv1Wv1ZP} + \frac{1}{4}\text{fpig}\text{t}^2\text{v1piv1Wv1ZP} - \frac{1}{4}\text{fpigpgtv1piv1Wv2ZP}$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piZ} & 2 \\ \text{ghZP}^\dagger & 3 \\ \text{ghWp} & 4 \end{pmatrix}$$

$-\frac{1}{12}ig^2\text{v0piv0pi0v0Wv0ZP} + \frac{1}{12}ig\text{gtv0piv0pi0v0ZPv1W} + \frac{1}{12}ig\text{gtv0piv0pi0v0Wv1ZP} - \frac{1}{12}ig\text{t}^2\text{v0piv0pi0v1Wv1ZP} - \frac{1}{12}ig\text{t}^2\text{v1piv1pi0v1Wv1ZP} + \frac{1}{12}ig\text{pgtv1piv1pi0v1Wv2ZP}$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piZP} & 2 \\ \text{ghZP}^\dagger & 3 \\ \text{ghWp} & 4 \end{pmatrix}$$

$-\frac{1}{12}ig^2\text{v0piv0pi0Pv0Wv0ZP} + \frac{1}{12}ig\text{gtv0piv0pi0Pv0ZPv1W} + \frac{1}{12}ig\text{gtv0piv0pi0Pv0Wv1ZP} - \frac{1}{12}ig\text{t}^2\text{v0piv0pi0Pv1Wv1ZP} - \frac{1}{12}ig\text{t}^2\text{v1piv1pi0Pv1Wv1ZP} + \frac{1}{12}ig\text{pgtv1piv1pi0Pv1Wv2ZP}$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{ghZP}^\dagger & 2 \\ \text{ghWp} & 3 \end{pmatrix}$$

$\frac{1}{4}\text{fpi}g^2\text{v0piPv0Wv0ZP} + \frac{1}{4}\text{fpi}g\text{gtv0piPv0ZPv1W} - \frac{1}{4}\text{fpi}g\text{gtv0piPv0Wv1ZP} - \frac{1}{4}\text{fpig}\text{t}^2\text{v0piPv1Wv1ZP} + \frac{1}{4}\text{fpig}\text{t}^2\text{v1piPv1Wv1ZP} - \frac{1}{4}\text{fpigpgtv1piPv1Wv2ZP}$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piZ} & 2 \\ \text{ghZP}^\dagger & 3 \\ \text{ghWp} & 4 \end{pmatrix}$$

$-\frac{1}{12}ig^2\text{v0pi0v0piPv0Wv0ZP} + \frac{1}{12}ig\text{gtv0pi0v0piPv0ZPv1W} + \frac{1}{12}ig\text{gtv0pi0v0piPv0Wv1ZP} - \frac{1}{12}ig\text{t}^2\text{v0pi0v0piPv1Wv1ZP} - \frac{1}{12}ig\text{t}^2\text{v1pi0v1piPv1Wv1ZP} + \frac{1}{12}ig\text{pgtv1pi0v1piPv1Wv2ZP}$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piZP} & 2 \\ \text{ghZP}^\dagger & 3 \\ \text{ghWp} & 4 \end{pmatrix}$$

$-\frac{1}{12}ig^2\text{v0pi0Pv0piPv0Wv0ZP} + \frac{1}{12}ig\text{gtv0pi0Pv0piPv0ZPv1W} + \frac{1}{12}ig\text{gtv0pi0Pv0piPv0Wv1ZP} - \frac{1}{12}ig\text{t}^2\text{v0pi0Pv0piPv1Wv1ZP} - \frac{1}{12}ig\text{t}^2\text{v1pi0Pv1piPv1Wv1ZP} + \frac{1}{12}ig\text{pgtv1pi0Pv1piPv1Wv2ZP}$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{ghZP}^\dagger & 2 \\ \text{ghWPm} & 3 \end{pmatrix}$$

$-\frac{1}{4}\text{fpi}g^2\text{v0piv0WPv0ZP} - \frac{1}{4}\text{fpi}g\text{gtv0piv0ZPv1WP} + \frac{1}{4}\text{fpi}g\text{gtv0piv0WPv1ZP} + \frac{1}{4}\text{fpig}\text{t}^2\text{v0piv1WPv1ZP} - \frac{1}{4}\text{fpig}\text{t}^2\text{v1piv1WPv1ZP} + \frac{1}{4}\text{fpigpgtv1piv1WPv2ZP}$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piZ} & 2 \\ \text{ghZP}^\dagger & 3 \\ \text{ghWPm} & 4 \end{pmatrix}$$

$-\frac{1}{12}ig^2\text{v0piv0pi0v0WPv0ZP} + \frac{1}{12}ig\text{gtv0piv0pi0v0ZPv1WP} + \frac{1}{12}ig\text{gtv0piv0pi0v0WPv1ZP} - \frac{1}{12}ig\text{t}^2\text{v0piv0pi0v1WPv1ZP} - \frac{1}{12}ig\text{t}^2\text{v1piv1pi0v1WPv1ZP} + \frac{1}{12}ig\text{pgtv1piv1pi0v1WPv2ZP}$

$$\begin{pmatrix} \text{piW} & 1 \\ \text{piZP} & 2 \\ \text{ghZP}^\dagger & 3 \\ \text{ghWPm} & 4 \end{pmatrix} \quad \begin{aligned} &-\tfrac{1}{12}ig^2\text{v0piv0pi0Pv0WPv0ZP} + \tfrac{1}{12}ig\text{gtv0piv0pi0Pv0ZPv1WP} + \tfrac{1}{12}ig\text{gtv0piv0pi0Pv0WPv1ZP} - \\ &\tfrac{1}{12}ig\text{t}^2\text{v0piv0pi0Pv1WPv1ZP} - \tfrac{1}{12}ig\text{t}^2\text{v1piv1pi0Pv1WPv1ZP} + \tfrac{1}{12}ig\text{pgtv1piv1pi0Pv1WPv2ZP} \end{aligned}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{ghZP}^\dagger & 2 \\ \text{ghWPm} & 3 \end{pmatrix} \quad \begin{aligned} &-\tfrac{1}{4}\text{fpi}ig^2\text{v0piPv0WPv0ZP} - \tfrac{1}{4}\text{fpi}ig\text{gtv0piPv0ZPv1WP} + \tfrac{1}{4}\text{fpi}ig\text{gtv0piPv0WPv1ZP} + \\ &\tfrac{1}{4}\text{fpi}ig\text{t}^2\text{v0piPv1WPv1ZP} - \tfrac{1}{4}\text{fpi}ig\text{t}^2\text{v1piPv1WPv1ZP} + \tfrac{1}{4}\text{fpi}ig\text{pgtv1piPv1WPv2ZP} \end{aligned}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piZ} & 2 \\ \text{ghZP}^\dagger & 3 \\ \text{ghWPm} & 4 \end{pmatrix} \quad \begin{aligned} &-\tfrac{1}{12}ig^2\text{v0pi0v0piPv0WPv0ZP} + \tfrac{1}{12}ig\text{gtv0pi0v0piPv0ZPv1WP} + \tfrac{1}{12}ig\text{gtv0pi0v0piPv0WPv1ZP} - \\ &\tfrac{1}{12}ig\text{t}^2\text{v0pi0v0piPv1WPv1ZP} - \tfrac{1}{12}ig\text{t}^2\text{v1pi0v1piPv1WPv1ZP} + \tfrac{1}{12}ig\text{pgtv1pi0v1piPv1WPv2ZP} \end{aligned}$$

$$\begin{pmatrix} \text{piWP} & 1 \\ \text{piZP} & 2 \\ \text{ghZP}^\dagger & 3 \\ \text{ghWPm} & 4 \end{pmatrix} \quad \begin{aligned} &-\tfrac{1}{12}ig^2\text{v0pi0Pv0piPv0WPv0ZP} + \tfrac{1}{12}ig\text{gtv0pi0Pv0piPv0ZPv1WP} + \tfrac{1}{12}ig\text{gtv0pi0Pv0piPv0WPv1ZP} - \\ &\tfrac{1}{12}ig\text{t}^2\text{v0pi0Pv0piPv1WPv1ZP} - \tfrac{1}{12}ig\text{t}^2\text{v1pi0Pv1piPv1WPv1ZP} + \tfrac{1}{12}ig\text{pgtv1pi0Pv1piPv1WPv2ZP} \end{aligned}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{ghZP}^\dagger & 2 \\ \text{ghWPp} & 3 \end{pmatrix} \quad \begin{aligned} &\tfrac{1}{4}\text{fpi}ig^2\text{v0piv0WPv0ZP} + \tfrac{1}{4}\text{fpi}ig\text{gtv0piv0ZPv1WP} - \tfrac{1}{4}\text{fpi}ig\text{gtv0piv0WPv1ZP} - \\ &\tfrac{1}{4}\text{fpi}ig\text{t}^2\text{v0piv1WPv1ZP} + \tfrac{1}{4}\text{fpi}ig\text{t}^2\text{v1piv1WPv1ZP} - \tfrac{1}{4}\text{fpi}ig\text{pgtv1piv1WPv2ZP} \end{aligned}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piZ} & 2 \\ \text{ghZP}^\dagger & 3 \\ \text{ghWPp} & 4 \end{pmatrix} \quad \begin{aligned} &-\tfrac{1}{12}ig^2\text{v0piv0pi0v0WPv0ZP} + \tfrac{1}{12}ig\text{gtv0piv0pi0v0ZPv1WP} + \tfrac{1}{12}ig\text{gtv0piv0pi0v0WPv1ZP} - \\ &\tfrac{1}{12}ig\text{t}^2\text{v0piv0pi0v1WPv1ZP} - \tfrac{1}{12}ig\text{t}^2\text{v1piv1pi0v1WPv1ZP} + \tfrac{1}{12}ig\text{pgtv1piv1pi0v1WPv2ZP} \end{aligned}$$

$$\begin{pmatrix} \text{piW}^\dagger & 1 \\ \text{piZP} & 2 \\ \text{ghZP}^\dagger & 3 \\ \text{ghWPp} & 4 \end{pmatrix} \quad \begin{aligned} &-\tfrac{1}{12}ig^2\text{v0piv0pi0Pv0WPv0ZP} + \tfrac{1}{12}ig\text{gtv0piv0pi0Pv0ZPv1WP} + \tfrac{1}{12}ig\text{gtv0piv0pi0Pv0WPv1ZP} - \\ &\tfrac{1}{12}ig\text{t}^2\text{v0piv0pi0Pv1WPv1ZP} - \tfrac{1}{12}ig\text{t}^2\text{v1piv1pi0Pv1WPv1ZP} + \tfrac{1}{12}ig\text{pgtv1piv1pi0Pv1WPv2ZP} \end{aligned}$$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{ghZP}^\dagger & 2 \\ \text{ghWPp} & 3 \end{pmatrix} \quad \begin{aligned} &\tfrac{1}{4}\text{fpi}ig^2\text{v0piPv0WPv0ZP} + \tfrac{1}{4}\text{fpi}ig\text{gtv0piPv0ZPv1WP} - \tfrac{1}{4}\text{fpi}ig\text{gtv0piPv0WPv1ZP} - \\ &\tfrac{1}{4}\text{fpi}ig\text{t}^2\text{v0piPv1WPv1ZP} + \tfrac{1}{4}\text{fpi}ig\text{t}^2\text{v1piPv1WPv1ZP} - \tfrac{1}{4}\text{fpi}ig\text{pgtv1piPv1WPv2ZP} \end{aligned}$$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piZ} & 2 \\ \text{ghZP}^\dagger & 3 \\ \text{ghWPp} & 4 \end{pmatrix} \quad \begin{aligned} &-\tfrac{1}{12}ig^2\text{v0pi0v0piPv0WPv0ZP} + \tfrac{1}{12}ig\text{gtv0pi0v0piPv0ZPv1WP} + \tfrac{1}{12}ig\text{gtv0pi0v0piPv0WPv1ZP} - \\ &\tfrac{1}{12}ig\text{t}^2\text{v0pi0v0piPv1WPv1ZP} - \tfrac{1}{12}ig\text{t}^2\text{v1pi0v1piPv1WPv1ZP} + \tfrac{1}{12}ig\text{pgtv1pi0v1piPv1WPv2ZP} \end{aligned}$$

$$\begin{pmatrix} \text{piWP}^\dagger & 1 \\ \text{piZP} & 2 \\ \text{ghZP}^\dagger & 3 \\ \text{ghWPp} & 4 \end{pmatrix} \quad \begin{aligned} &-\tfrac{1}{12}ig^2\text{v0pi0Pv0piPv0WPv0ZP} + \tfrac{1}{12}ig\text{gtv0pi0Pv0piPv0ZPv1WP} + \tfrac{1}{12}ig\text{gtv0pi0Pv0piPv0WPv1ZP} - \\ &\tfrac{1}{12}ig\text{t}^2\text{v0pi0Pv0piPv1WPv1ZP} - \tfrac{1}{12}ig\text{t}^2\text{v1pi0Pv1piPv1WPv1ZP} + \tfrac{1}{12}ig\text{pgtv1pi0Pv1piPv1WPv2ZP} \end{aligned}$$

$$
\begin{pmatrix}
\text{piW} & 1 \\
\text{piW}^\dagger & 2 \\
\text{ghZP}^\dagger & 3 \\
\text{ghZ} & 4
\end{pmatrix}
\qquad
\begin{aligned}
&\tfrac{1}{6}ig^2\text{v0pi}^2\text{v0Zv0ZP} - \tfrac{1}{6}ig g\text{tv0pi}^2\text{v0ZPv1Z} - \tfrac{1}{6}ig g\text{tv0pi}^2\text{v0Zv1ZP} + \tfrac{1}{6}ig\text{t}^2\text{v0pi}^2\text{v1Zv1ZP} + \\
&\tfrac{1}{6}ig\text{t}^2\text{v1pi}^2\text{v1Zv1ZP} - \tfrac{1}{6}ig\text{pgtv1pi}^2\text{v1ZPv2Z} - \tfrac{1}{6}ig\text{pgtv1pi}^2\text{v1Zv2ZP} + \tfrac{1}{6}ig\text{p}^2\text{v1pi}^2\text{v2Zv2ZP}
\end{aligned}
$$

$$
\begin{pmatrix}
\text{piW}^\dagger & 1 \\
\text{piWP} & 2 \\
\text{ghZP}^\dagger & 3 \\
\text{ghZ} & 4
\end{pmatrix}
\qquad
\begin{aligned}
&\tfrac{1}{6}ig^2\text{v0piv0piPv0Zv0ZP} - \tfrac{1}{6}ig g\text{tv0piv0piPv0ZPv1Z} - \tfrac{1}{6}ig g\text{tv0piv0piPv0Zv1ZP} + \\
&\tfrac{1}{6}ig\text{t}^2\text{v0piv0piPv1Zv1ZP} + \tfrac{1}{6}ig\text{t}^2\text{v1piv1piPv1Zv1ZP} - \tfrac{1}{6}ig\text{pgtv1piv1piPv1ZPv2Z} - \\
&\tfrac{1}{6}ig\text{pgtv1piv1piPv1Zv2ZP} + \tfrac{1}{6}ig\text{p}^2\text{v1piv1piPv2Zv2ZP}
\end{aligned}
$$

$$
\begin{pmatrix}
\text{piW} & 1 \\
\text{piWP}^\dagger & 2 \\
\text{ghZP}^\dagger & 3 \\
\text{ghZ} & 4
\end{pmatrix}
\qquad
\begin{aligned}
&\tfrac{1}{6}ig^2\text{v0piv0piPv0Zv0ZP} - \tfrac{1}{6}ig g\text{tv0piv0piPv0ZPv1Z} - \tfrac{1}{6}ig g\text{tv0piv0piPv0Zv1ZP} + \\
&\tfrac{1}{6}ig\text{t}^2\text{v0piv0piPv1Zv1ZP} + \tfrac{1}{6}ig\text{t}^2\text{v1piv1piPv1Zv1ZP} - \tfrac{1}{6}ig\text{pgtv1piv1piPv1ZPv2Z} - \\
&\tfrac{1}{6}ig\text{pgtv1piv1piPv1Zv2ZP} + \tfrac{1}{6}ig\text{p}^2\text{v1piv1piPv2Zv2ZP}
\end{aligned}
$$

$$
\begin{pmatrix}
\text{piWP} & 1 \\
\text{piWP}^\dagger & 2 \\
\text{ghZP}^\dagger & 3 \\
\text{ghZ} & 4
\end{pmatrix}
\qquad
\begin{aligned}
&\tfrac{1}{6}ig^2\text{v0piP}^2\text{v0Zv0ZP} - \tfrac{1}{6}ig g\text{tv0piP}^2\text{v0ZPv1Z} - \tfrac{1}{6}ig g\text{tv0piP}^2\text{v0Zv1ZP} + \tfrac{1}{6}ig\text{t}^2\text{v0piP}^2\text{v1Zv1ZP} + \\
&\tfrac{1}{6}ig\text{t}^2\text{v1piP}^2\text{v1Zv1ZP} - \tfrac{1}{6}ig\text{pgtv1piP}^2\text{v1ZPv2Z} - \tfrac{1}{6}ig\text{pgtv1piP}^2\text{v1Zv2ZP} + \tfrac{1}{6}ig\text{p}^2\text{v1piP}^2\text{v2Zv2ZP}
\end{aligned}
$$

$$
\begin{pmatrix}
\text{piW} & 1 \\
\text{piW}^\dagger & 2 \\
\text{ghZP}^\dagger & 3 \\
\text{ghZP} & 4
\end{pmatrix}
\qquad
\begin{aligned}
&\tfrac{1}{6}ig^2\text{v0pi}^2\text{v0ZP}^2 - \tfrac{1}{3}ig g\text{tv0pi}^2\text{v0ZPv1ZP} + \tfrac{1}{6}ig\text{t}^2\text{v0pi}^2\text{v1ZP}^2 + \tfrac{1}{6}ig\text{t}^2\text{v1pi}^2\text{v1ZP}^2 - \\
&\tfrac{1}{3}ig\text{pgtv1pi}^2\text{v1ZPv2ZP} + \tfrac{1}{6}ig\text{p}^2\text{v1pi}^2\text{v2ZP}^2
\end{aligned}
$$

$$
\begin{pmatrix}
\text{piW}^\dagger & 1 \\
\text{piWP} & 2 \\
\text{ghZP}^\dagger & 3 \\
\text{ghZP} & 4
\end{pmatrix}
\qquad
\begin{aligned}
&\tfrac{1}{6}ig^2\text{v0piv0piPv0ZP}^2 - \tfrac{1}{3}ig g\text{tv0piv0piPv0ZPv1ZP} + \tfrac{1}{6}ig\text{t}^2\text{v0piv0piPv1ZP}^2 + \\
&\tfrac{1}{6}ig\text{t}^2\text{v1piv1piPv1ZP}^2 - \tfrac{1}{3}ig\text{pgtv1piv1piPv1ZPv2ZP} + \tfrac{1}{6}ig\text{p}^2\text{v1piv1piPv2ZP}^2
\end{aligned}
$$

$$
\begin{pmatrix}
\text{piW} & 1 \\
\text{piWP}^\dagger & 2 \\
\text{ghZP}^\dagger & 3 \\
\text{ghZP} & 4
\end{pmatrix}
\qquad
\begin{aligned}
&\tfrac{1}{6}ig^2\text{v0piv0piPv0ZP}^2 - \tfrac{1}{3}ig g\text{tv0piv0piPv0ZPv1ZP} + \tfrac{1}{6}ig\text{t}^2\text{v0piv0piPv1ZP}^2 + \\
&\tfrac{1}{6}ig\text{t}^2\text{v1piv1piPv1ZP}^2 - \tfrac{1}{3}ig\text{pgtv1piv1piPv1ZPv2ZP} + \tfrac{1}{6}ig\text{p}^2\text{v1piv1piPv2ZP}^2
\end{aligned}
$$

$$
\begin{pmatrix}
\text{piWP} & 1 \\
\text{piWP}^\dagger & 2 \\
\text{ghZP}^\dagger & 3 \\
\text{ghZP} & 4
\end{pmatrix}
\qquad
\begin{aligned}
&\tfrac{1}{6}ig^2\text{v0piP}^2\text{v0ZP}^2 - \tfrac{1}{3}ig g\text{tv0piP}^2\text{v0ZPv1ZP} + \tfrac{1}{6}ig\text{t}^2\text{v0piP}^2\text{v1ZP}^2 + \tfrac{1}{6}ig\text{t}^2\text{v1piP}^2\text{v1ZP}^2 - \\
&\tfrac{1}{3}ig\text{pgtv1piP}^2\text{v1ZPv2ZP} + \tfrac{1}{6}ig\text{p}^2\text{v1piP}^2\text{v2ZP}^2
\end{aligned}
$$

$$
\begin{pmatrix}
\text{W0} & 1 \\
\text{ghW0}^\dagger & 2 \\
\text{ghW0} & 3
\end{pmatrix}
\qquad
-g\epsilon_{s_1,s_2,s_3}p_1^{\mu_1} - g\epsilon_{s_1,s_2,s_3}p_3^{\mu_1}
$$

$$
\begin{pmatrix}
\text{W1} & 1 \\
\text{ghW1}^\dagger & 2 \\
\text{ghW1} & 3
\end{pmatrix}
\qquad
-\text{gt}\epsilon_{t_1,t_2,t_3}p_1^{\mu_1} - \text{gt}\epsilon_{t_1,t_2,t_3}p_3^{\mu_1}
$$

$$\begin{pmatrix} G & 1 \\ \text{ghG}^\dagger & 2 \\ \text{ghG} & 3 \end{pmatrix} \qquad -\text{gs}f_{a_1,a_2,a_3}p_1^{\mu_1} - \text{gs}f_{a_1,a_2,a_3}p_3^{\mu_1}$$

References

[1] Phys. Rev. D74: 075011, 2006

[2] Phys. Rev. D78: 031701, 2008

[3] N. D. Christensen and C. Duhr, arXiv:0806.4194 [hep-ph].