

## Wikiprint Book

**Title:** AnomalousGaugeCoupling

**Subject:** FeynRules - AnomalousGaugeCoupling

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## Anomalous quartic electroweak gauge-boson interactions

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### Description of the models:

We concentrate on anomalous quartic interaction among the electroweak gauge bosons that do not have a triple vertex associated to it. We describe these interactions using dimension eight effective operators assuming that the recently observed Higgs boson belongs to a  $SU(2)_L$  doublet; see the file [quartic.pdf](#) for further details. This model is an extension of the Standard Model (SM) implemented at <http://feynrules.irmp.ucl.ac.be/wiki/StandardModel>; for further details see this link.

The model labeled SM\_LS0\_LS1 contains the standard model interactions supplemented by the dimension eight operators  $L_{S,0}$  and  $L_{S,1}$  defined in the file [quartic.pdf](#). These dimension eight effective operators modify the vertices  $WWWW$ ,  $WWZZ$ , and  $WWZZ$  that can be a simple re-scaling of the SM quartic interaction for a suitable choice of couplings.

The model labeled SM\_LT8\_LT9 contains the standard model interactions supplemented by the dimension eight operators  $L_{T,8}$  and  $L_{T,9}$  defined in the file [quartic.pdf](#). These dimension eight effective operators give rise to anomalous AAAA, AAAZ, AAZZ, AZZZ, and ZZZZ vertices.

### References

- *Strongly interacting vector bosons at the CERN LHC: Quartic anomalous couplings*, A.S. Belyaev et al, Phys.Rev. D59 (1999) 015022 [?\(hep-ph/9805229\)](#)
- *$p p \rightarrow jj e^+ \mu^+ \nu \nu$  and  $jj e^+ \mu^+ \nu \nu$  at order ... for the study of the quartic electroweak gauge boson vertex at CERN LHC*, O.J.P. Eboli, M.C. Gonzalez-Garcia, and J.K. Mizukoshi, Phys.Rev. D74 (2006) 073005 [?\(hep-ph/0606118\)](#) the dimension eight operators are from this reference)
- *Anomalous quartic gauge boson couplings at hadron colliders*, Oscar J.P. Eboli, M.C. Gonzalez-Garcia, S.M. Lietti, and S.F. Novaes., Phys.Rev. D63 (2001) 075008 [?hep-ph/0009262](#)
- *Bosonic quartic couplings at CERN LHC*, O.J.P. Eboli, M.C. Gonzalez-Garcia, and S.M. Lietti, Phys.Rev. D69 (2004) 095005 [?\(hep-ph/0310141\)](#)

### Instructions

The model files include the quartic and SM vertices in the unitary gauge. To generate further models use the notebooks [quartic\\_ls01.nb](#) or [quartic\\_lt89.nb](#) as examples and include the additional interactions that are already defined in the model file [quartic.fr](#). The anomalous couplings are set to  $1 \text{ GeV}^{-4}$  by default, thus they should be conveniently chosen before the event generation .