

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 [?\(hep-ph/9805229\)](#)
- *$pp \rightarrow jj e^+ \mu^+ \nu \nu$ 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 GeV^{-4} by default, thus they should be conveniently chosen before the event generation .