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Precision anomalous triple gauge coupling measurements at colliders

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A very important and promising direction of research is finding better strategies to test Standard Model (SM) and New Physics using Effective Field Theory approach and exploiting precision measurements. In this framework, Electroweak Triple Gauge Couplings (Electroweak TGCs) play a special role, particularly within diboson production processes. In fact, they may also provide a way to study Beyond Standard Model (BSM) effects related to electroweak symmetry breaking, due to the high energy equivalence between Goldstone bosons and longitudinally polarized gauge bosons. Generically, the leading contribution to the $pp \to WV$ ($V = W, Z, \gamma$) amplitudes with insertion of anomalous TGC (aTGC) irrelevant operators has a ratio with the SM amplitude that grows with the center of mass energy of the process: the large energies explored at colliders, such as LHC, can be exploited to test the presence of New Physics effects within diboson production. However, the deviations associated to the $d = 6$ O_{3W} and $O_{3\tilde{W}}$ TGC operators are known to be particularly hard to measure due to their suppressed interference with the SM amplitudes in the inclusive processes, leading to approximate flat directions in the space of these Wilson coefficients. This suppression can be overcome by considering differential distributions with respect to exclusive variables, that improve the sensitivity and the accuracy in the measurements of these BSM effects. Following the discussion of JHEP10 (2017) 027 and arXiv:1901.04821, I will present the prospects for the bounds on these aTGCs at HL-LHC and HE-LHC, taking into account effects related to NLO QCD corrections.

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