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Prospects of search for CP-violating effects of neutral triple gauge couplings at the LHC

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The main goal of modern experiments in high-energy-physics area is to find deviations from the Standard Model (SM), which describe data well but is expected to be extended to a more general theory. Anomalous coupling approach provides a possibility to look for a wide range of new physics effects in different experimental signatures thanks for its model-independence. In this work the neutral triple gauge couplings (nTGCs) are considered in $ZZ(\ell\ell\nu\nu)$ and $Z(\ell\ell)\gamma$ channels, and effective field theory is used to parameterize these couplings in the Lagrangian. NTGCs are triple interactions between Z bosons and photons, and some of them violate CP. Often constraints on CP-violating nTGCs are set basing on CP-conserving effects, and therefore CP violation is not probed in these studies. This work presents a study of CP-sensitive variables in the aforementioned channels using special angular variables and matrix-element-based optimal observables. Basing on these variables, one- and two-dimensional expected limits on the nTGCs are set for the conditions of Run3 at LHC experiments. This study shows the possibility to search for CP-violation using nTGC framework and special CP-sensitive variables. These variables also can be used in other channels and with different parameterizations of the Lagrangian.

Primary author(s) : SEMUSHIN, Artur (NRNU MEPhI)

Co-author(s) : SOLDATOV, Evgeny (MEPhI)

Presenter(s) : SEMUSHIN, Artur (NRNU MEPhI)

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