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## Exploring Anomalous $HZ\gamma$ Couplings in $\gamma$ -proton Collisions at the LHC

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The anomalous  $HZ\gamma$  couplings, which are dominated by the new physics effects, through the process  $pp \rightarrow p\gamma p \rightarrow pHX$  at the LHC are studied. To this purpose, an effective Lagrangian, in a model independent approach, with dimension six operators is considered in this paper. New interaction terms regarding beyond the standard model physics include the Higgs particle anomalous vertices in both CP-even and CP-odd structures. A detailed numerical analysis is performed to scrutinize the accurate constraints on the effective  $HZ\gamma$  couplings and to discuss how far the corresponding bounds can be improved. This is achieved by testing all the possible Higgs decay channels and increasing the luminosity at three different forward detector acceptance regions. The numerical results propose that the Higgs photoproduction at the LHC, as a complementary channel, has a great potential of exploring the  $HZ\gamma$  couplings.

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