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Study of associate production of the Higgs boson in the diphoton decay channel at the CMS Experiment

The observation of a boson compatible with the Standard Model (SM) Higgs particle is the starting point for the complete understanding of the electroweak symmetry-breaking mechanism. More specifically, the exact determination of the Higgs couplings to bosons and fermions is crucial to establish if the properties of this particle are compatible with the theoretical predictions. In order to achieve a good sensitivity in couplings measurements it is important to consider those production modes where the Higgs boson is produced in association with W/Z bosons or top pairs. Despite the lower cross section with respect to the gluon-gluon fusion mechanism, these production modes have a very characteristic signature, such as jets, b jets and leptons in the final state. This allows to perform an exclusive analysis, crucial for accurate measurements of couplings. In this work we present an exclusive analysis of Higgs-associate production modes in the diphoton decay channel using data collected by the CMS experiment during 2012. The status of this analysis and interpretations of this result in the SM framework is reported. Possible improvements and beyond-SM interpretations are also discussed.

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