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Constraints on anomalous HVV couplings from the production of Higgs bosons decaying to tau lepton pairs

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Group Author(s): CMS Collaboration
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PHYSICAL REVIEW D
 Volume: 100 Issue: 11
 Article Number: 112002
 DOI: 10.1103/PhysRevD.100.112002
 Published: DEC 4 2019
 Document Type: Article
[View Journal Impact](#)

Abstract

A study is presented of anomalous HVV interactions of the Higgs boson, including its CP properties. The study uses Higgs boson candidates produced mainly in vector boson fusion and gluon fusion that subsequently decay to a pair of tau leptons. The data were recorded by the CMS experiment at the LHC in 2016 at a center-of-mass energy of 13 TeV and correspond to an integrated luminosity of 35.9 fb⁻¹. A matrix element technique is employed for the analysis of anomalous interactions. The results are combined with those from the H → 4l decay channel presented earlier, yielding the most stringent constraints on anomalous Higgs boson couplings to electroweak vector bosons expressed as effective cross section fractions and phases: the CP-violating parameter f(a3) cos(φ(a3)) = (0.00 ± 0.27) × 10⁻³ and the CP-conserving parameters f(a2) cos(φ(a2)) = (0.08)(-0.21)(+1.04) × 10⁻³, f(Lambda 1) cos(φ(Lambda 1)) = (0.00)(-0.09)(+0.53) × 10⁻³, and f(Lambda 1)(Z gamma) cos(φ(Z gamma)(Lambda 1)) = (0.0(-1.3)(+1.1)) × 10⁻³. The current dataset does not allow for precise constraints on CP properties in the gluon fusion process. The results are consistent with standard model expectations.

Keywords

KeyWords Plus: BROKEN SYMMETRIES; SEARCH; MASS

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