

Search for Rare Higgs Decays into Z Bosons and J/Psi Mesons or into Quarkonium Pairs with the CMS Experiment

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Rare decays of the Higgs boson are promising laboratories to search for physics beyond the standard model (BSM). Such BSM physics might alter Yukawa couplings to lighter quarks and add loop diagrams, possibly resulting in higher decay rates than predicted by the standard model. For the first time in four-lepton final states, decays of the Higgs boson into a ZJ/ψ or $Z\psi(2S)$ final states are searched for. In addition, Higgs decays into J/ψ pair, Υ pair, $\psi(2S)J/\psi$, or $\psi(2S)\psi(2S)$ final states are studied. Events with subsequent decays of the Z boson into lepton pairs (e^+e^- or $\mu^+\mu^-$) and J/ψ or Υ mesons into muon pairs are selected using online event filters. Final states with $\psi(2S)$ mesons are accessed via the inclusive decay of $\psi(2S)$ into J/ψ . A data sample of proton-proton collisions collected at a center-of-mass energy of 13 TeV with the Compact Muon Solenoid detector at the Large Hadron Collider that corresponds to an integrated luminosity of about 137 fb^{-1} is used. This talk will present recent searches and implications for future searches of such BSM signatures with higher luminosities.

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Yes

Author: Mr ACHARYA, Himal (University of Tennessee (US))

Presenter: Mr ACHARYA, Himal (University of Tennessee (US))

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