Search for resonances decaying to Higgs boson pairs at $\sqrt{s} = 13.6$ TeV with the CMS experiment

Abstract

The Higgs boson, since its discovery, has been a powerful probe of physics beyond the standard model of particle physics. The CMS experiment at the Large Hadron Collider is analysing the data from the ongoing proton-proton collisions at $\sqrt{s} = 13.6$ TeV, which provides an unprecedented opportunity to search for the production of Higgs boson pairs through the decays of heavy resonances. The analysis to be presented here targets such new physics signatures in the final state with four bottom quarks. Cutting-edge machine-learning techniques are employed for the reconstruction of Higgs boson pairs and the estimation of standard model background. We present the expected sensitivity for a large range of resonance masses, using data corresponding to an integrated luminosity of 170 fb^{-1}.