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Higgs-to-Invisible Searches for the CMS experiment at the LHC

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Although the observed 125 GeV boson is compatible with the SM Higgs boson, the existence of non-SM properties is not excluded due to the relatively large uncertainties. There is extensive evidence for the existence of dark matter. Invisible Higgs decay modes are realized in models allowing interactions between the Higgs boson and dark matter, for example, "Higgs-portal" models. Searches for invisibly decaying Higgs bosons are possible through missing energy signatures, exploiting various production modes: gluon-gluon fusion, vector-boson fusion, and vector-boson associated production. A search focused on the vector-boson fusion (VBF) production mode, in which two quarks besides the Higgs boson are present in the final state, using the 13 TeV dataset collected by the CMS detector at the LHC in 2016 is presented. The combination with other relevant analyses to further improve the sensitivity to the Higgs to invisible branching fraction ($\mathcal{B}(H \rightarrow \text{inv.})$) is also presented.

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