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New search strategies for exotic decays of the Higgs boson to four bottom quarks using vector boson fusion

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Searching for Higgs boson decays to four bottom quarks is a challenging and critical benchmark for LHC experiments. This final state is predicted by a variety of beyond the Standard Model theories, and current LHC searches focus on the associated production of a Higgs boson with a W or Z boson that subsequently decays to leptons which can be used for triggering. We evaluate the sensitivity of two Higgs production modes that have not yet been explored in detail for this final state: the vector boson fusion (VBF) channel and the VBF channel with an associated photon. We also provide guidance for designing new triggers for the current LHC data-taking period and beyond.

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