Search for a generic heavy Higgs at the LHC

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A generic heavy Higgs has both dim-4 and effective dim-6 interactions with the Standard Model (SM) particles. The former has been the focus of LHC searches in all major Higgs production modes, just as the SM one, but with negative results so far. If the heavy Higgs is connected with Beyond Standard Model (BSM) physics at a few TeV scale, its dim-6 operators will play a very important role - they significantly enhance the Higgs momentum, and reduce the SM background in a special phase space corner to a level such that a heavy Higgs emerges, which is not possible with dim-4 operators only. We focus on the associated VH production, where the effect of dim-6 operators is the largest and the SM background is the lowest. Main search regions for this type of signal are identified, and substructure variables of boosted jets are employed to enhance the signal from backgrounds. The parameter space of these operators are scanned over, and expected exclusion regions with 300 fb^{-1} and 3 ab^{-1} LHC data are shown, if no BSM is present. The strategy given in this paper will shed light on a heavy Higgs which may be otherwise hiding in the present and future LHC data.

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