

DNNs and Jet Substructure for Improved Double-Higgs Searches at the HL-LHC and Beyond

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Searches for pairs of Higgs bosons will be, in all likelihood, important tools both to precisely measure the properties of the Higgs boson and to probe new physics at the High-Luminosity LHC and beyond. This process allows to measure the boson's self-coupling λ_{hhh} , which would reveal clues about the early universe and the dynamics of electroweak symmetry breaking. We extend current experimental techniques to search for this process in the $hh \rightarrow b\bar{b}b\bar{b}$ final state, in various ways, including the implementation of a deep-neural-network-based approach to separate signal and background where we apply recent advances in machine learning interpretability, and a comparison of the traditional 4 b -jet reconstruction to final states with 1 or 2 large-radius jets, among other factors.

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