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Investigating the trilinear Higgs coupling through triple Higgs production

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Triple Higgs production is of interest because it involves the quartic Higgs coupling 4, which however will be very difficult to constrain experimentally during the next decades, but also because of its significant dependence on the trilinear Higgs coupling 3. The latter dependence could be used to improve the experimental sensitivity on 3 in combination with the experimental information that can be obtained from di-Higgs production. The impact of triple Higgs production in this context is limited by the small signal cross section and the large QCD background rates that contribute. We explore the prospects for constraining 3 via triple Higgs production at the HL-LHC by considering different final state signatures under idealised conditions, and investigate signal-background discrimination through Neural Networks, which are necessitated in order to fully exploit the available information in the data.

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