

Portraying Double Higgs at the Large Hadron Collider

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We examine the discovery potential for double Higgs production at the high luminosity LHC in the final state with two b-tagged jets, two leptons and missing transverse momentum. Although this dilepton final state has been considered a difficult channel due to the large backgrounds, we argue that it is possible to obtain sizable signal significance, by adopting a deep learning framework making full use of the relevant kinematics along with the jet images from the Higgs decay. For the relevant number of signal events we obtain a substantial increase in signal sensitivity over existing analyses. We discuss relative improvements at each stage and the correlations among the different input variables for the neural network. The proposed method can be easily generalized to the semi-leptonic channel of double Higgs production, as well as to other processes with similar final states.

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