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HL-LHC prospects for the search of boosted Higgs boson pair production via vector-boson fusion in the 4b final state at the ATLAS experiment

Projection studies for non-resonant Higgs boson pair production via vector-boson fusion in the 4b final state with the luminosity-upgraded ATLAS detector at the High Luminosity LHC (HL-LHC) are presented. These studies are the first HL-LHC prospects on the boosted di-Higgs topology, where each Higgs boson is constructed as a single large-radius jet. The latest Run 2 analysis results using 140 fb−1 of proton–proton collision data at √ = 13 TeV recorded by the ATLAS detector at the Large Hadron Collider are considered as a baseline point. Sensitivities are projected assuming a center-of-mass energy of √ = 14 TeV for a variety of integrated luminosities ranging from 1000 fb−1 to 3000 fb−1. Various systematic uncertainty scenarios are explored. With (without) systematic uncertainties, the allowed 68% confidence interval for the modifier 2 is expected to be [0.84, 1.19] ([0.86, 1.17]), while the 95% confidence interval is expected to be [0.75, 1.27] ([0.79, 1.23]), for a 3000 fb−1 data sample.

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