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Projections for di-Higgs measurements in the bbZZ(4l) final state with the CMS experiment at the HL-LHC

Prospects for the study of Higgs boson pair (HH) production in the HH→bb4l (l = e, μ) channel are studied in the context of the High-Luminosity LHC. The analysis is performed using a parametric simulation of the Phase-2 CMS detector response provided by the Delphes software and assuming an average of 200 proton-proton collisions per bunch crossing at a center-of-mass energy of 14 TeV. Assuming a projected integrated luminosity of 3000 fb^{-1}, the expected significance for the non-resonant Standard Model (SM) signal is 0.37 σ; a 95% confidence level (CL) upper limit on its cross section is set to 6.6 times the SM prediction. The statistical combination of five decay channels (bbbb, bbWW, bbττ, bbγγ, and bbZZ) results in an expected significance for the standard model HH signal of 2.6 σ and an expected 68% and 95% CL intervals for the self-coupling modifier κλ=λ$_{HHH}$/λ$_{HHH}^{SM}$ of [0.35, 1.9] and [−0.18, 3.6], respectively.

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