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Prospects for measurements of the HZZ vertex tensor structure in $H \rightarrow ZZ^* \rightarrow 4l$ decay channel with ATLAS

In this note, the prospects for experimental studies of the general HVV tensor coupling using the $H \rightarrow ZZ^* \rightarrow 4l$ decay are presented. The sensitivity of the ATLAS experiment to non-Standard Model contributions to the HZZ vertex is estimated for 300 fb⁻¹ and 3000 fb⁻¹ of LHC data at $\sqrt{s} = 14$ TeV. The exclusion limits on the non-Standard Model CP-even coupling g_2 and CP-odd coupling g_4 , given the Standard Model Higgs boson signal, are estimated. The sensitivity of the ATLAS experiment to the complex structure of the non-Standard Model couplings is demonstrated. The exclusion limits are established for individual components of g_2 and g_4 : $|g_2|/g_1$, $|g_4|/g_1$, $R(g_2)/g_1$, $I(g_2)/g_1$, $R(g_4)/g_1$ and $I(g_4)/g_1$. The obtained results are translated to the $(fg_2, fg_4, \varphi g_2, \varphi g_4)$ parametrisation as $fg_2 < 0.29$ (0.12) at 95% CL and $fg_4 < 0.15$ (0.037) at 95% CL for 300 fb⁻¹ (3000 fb⁻¹) respectively.

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