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Testing Bell inequalities and probing quantum entanglement at CEPC

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The (Circular Electron Positron Collider) CEPC is proposed in China, which is one of the most attractive future colliders. It ' s also an ideal platform to search for new physics, test the standard model, and research a set of advanced focus in physics as a future Higgs factory. To test Bell inequalities, we construct observable for the H $\longrightarrow$ ZZ* process in CEPC through the use of (Collins-Gisin-Linden-Massar-Popescu) CGLMP inequality, which can derive its value from the density matrix of Z boson pairs from di-boson Higgs decay. With the application of Monte Carlo simulations, we study the observable I_3 of the CGLMP inequality for our signal processes, which provides reliable evidence of Bell inequalities violations. In this study, we investigate and simulate the possible backgrounds on CEPC at a collision energy of 250 GeV.

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