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Searches for CP symmetry violation in the top quark sector with CMS at the LHC, and the tracker Endcap upgrade for the High Luminosity LHC

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The Standard Model (SM) is unable to explain the predominance of matter over antimatter in our present universe. Matter and antimatter are linked by a CP-symmetry transformation, and current explanations involve a new source of CP symmetry breaking. An effective field theory (EFT) will be used to describe CP-symmetry violation, which will be searched for by analyzing the production and decay of single top quark in the t-channel. A Phenomelogy study is conducted to asses the impact of the EFT on the production and decay of the single top quark. This analysis is based on full LHC Run2 dataset of proton-proton collisions at a center-of-mass energy of 13 TeV, collected at the Compact Muon Solenoid (CMS) experiment.

The CMS tracker Endcap will be upgraded to sustain the high radiation environment of the High Luminosity LHC (HL-LHC), a project called TEDD (Tracker Endcap Double-Discs). The TEDD is composed of several Dees, which are the mechanical structures that holds the detection modules. In this work, we analyze metrological properties of the Dees and prepare for the future Dee production.

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