

Abstract Submitted
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Investigation of CP-Violation in the Top-Higgs Yukawa Interaction via High-Energy Muon Collisions¹ MORGAN CASSIDY, IAN LEWIS, KYOUNGCHUL KONG, COSMOS DONG, YA-JUAN ZHENG, JENNY ZHANG, University of Kansas — The Standard Model of particle physics, though remaining a consistent theory with the discovery of the Higgs boson, fails to address several questions about nature, such as the accelerated expansion of the universe, dark matter, and the asymmetry of matter and anti-matter. Of interest, and a goal of particle physics, is to look for new interactions in order to provide explanation to these questions. This project studies a new source for CP-violating interactions via the top quark and Higgs through high-energy muon collisions. The signal processes include $\mu\mu \rightarrow t\bar{t}h$, $\mu\mu \rightarrow t\bar{t}h\nu\nu$, and $\mu\mu \rightarrow t\bar{b}h\mu\nu$ decaying semi-leptonically, and are simulated using MadGraph5_aMC@NLO. A CP-Violating model is incorporated into the MadGraph5_aMC@NLO framework to account for a non-zero CP phase, unlike what is predicted in the Standard Model for the top-Higgs Yukawa interaction. The current focus studies kinematic distributions for a CP angle set at $\frac{\pi}{2}$ and $-\frac{\pi}{2}$. Looking forward, the signal processes will be set to decay hadronically and leptonically, and ultimately, this study looks to determine limits on the CP angle of the top-Higgs Yukawa interaction.

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