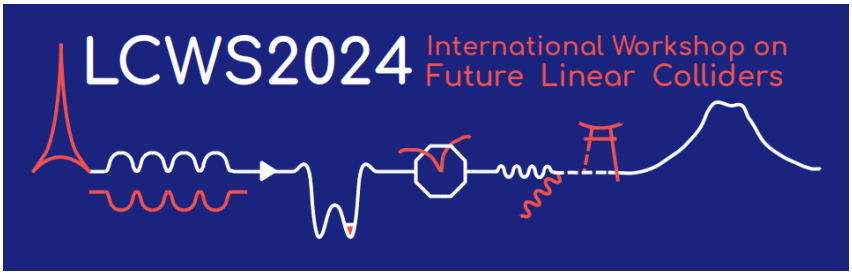

Contribution ID: **103** Type: **Oral presentation (in person)**

CP-violating top-Higgs coupling in SMEFT

Wednesday 10 July 2024 16:55 (20 minutes)

The total cross section of the process $\mu^-\mu^+ \to \nu_\mu\bar{\nu}_\mu t\bar{t}H$ has strong dependence on the CP phase of the top Yukawa coupling. We study the cause of the strong energy dependence and identify its origin as the E/m_W growth of the weak boson fusion subamplitudes, $W^-W^+ \to t\bar{t}H$, when the two W's are longitudinally polarized. We repeat the study in the SMEFT framework where EW gauge invariance is manifest and find that the highest energy cross section is reduced to a quarter of the complex top Yukawa model result at high energies. By applying the Goldstone boson (GB) equivalence theorem, we identify the origin of this strong energy growth of the SMEFT amplitudes as associated with the dimension-6 $ttH\pi\pi$ vertex, where π's are the GB of $W^\pm$. We obtain the unitarity bound on the coefficient of the SMEFT operator by studying all $2 \to 2$ and $2 \to 3$ cross sections in the $J = 0$ channel.

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