Contribution ID: **2** Type: **not specified**

Top Yukawa Coupling Determination at High Energy Muon Collider

Sunday 15 October 2023 13:05 (18 minutes)

The Top Yukawa coupling profoundly influences several core mysteries linked to the electroweak scale and the Higgs boson. We study the feasibility of measuring the Top Yukawa coupling at high-energy muon colliders by examining the high-energy dynamics of the weak boson fusion to top quark pair processes. A deviation of the Top Yukawa coupling from the Standard Model would lead modified $VV \to t\bar{t}$ process, violating unitarity at high energy. Our analysis reveals that utilizing a muon collider with a center-of-mass energy of 10 TeV and an integrated luminosity of 10 ab^{-1} allows us to investigate the Top Yukawa coupling with a precision surpassing 1.5\%, more than one order of magnitude better than the precision from $t\bar{t}h$ channel at muon colliders. This precision represents a notable enhancement compared to the anticipated sensitivities of the High-Luminosity LHC (3.4\%) and those at muon colliders derived from the $t\bar{t}H$ process.

Authors: LIU, Zhen (University of Minnesota (US)); LYU, Kunfeng (University of Minnesota); WANG, Liantao; MAHBUB, Ishmam (University of Minnesota Twin Cities)

Presenter: MAHBUB, Ishmam (University of Minnesota Twin Cities)

Session Classification: Collider 2