

Inaugural US Muon Collider Meeting

Fermilab, August 7-9, 2024

indico.fnal.gov/e/usmc2024

Contribution ID: 27

Type: **not specified**

Top Yukawa coupling determination at high energy muon collider

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 to a modified $VV \rightarrow t\bar{t}$ 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.

Primary authors: MAHBUB, Ishmam (University of Minnesota); LYU, Kunfeng; WANG, Liantao (University of Chicago); LIU, Zhen (University of Minnesota)

Presenter: MAHBUB, Ishmam (University of Minnesota)

Session Classification: Poster Session and Reception