

How Higgs is the Higgs? - A Study of Vector Boson Scattering at μ TRISTAN

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Vector boson scattering (VBS) provides a direct window into the dynamics of electroweak symmetry breaking. In the Standard Model, the observed Higgs boson unitarizes the scattering of longitudinally polarized weak gauge bosons, keeping VBS cross sections under control even at high energies. If, however, the Higgs couplings deviate from their Standard Model values, the scattering amplitude grows with energy, indicating the presence of additional dynamics beyond the Higgs sector.

In this talk, I discuss the potential of the future $\mu^+ \mu^+$ collider μ TRISTAN to probe such deviations through measurements of longitudinal VBS at multi-TeV energies. I show that the clean environment and high energy reach of muon colliders enable precise tests of the unitarization mechanism of VBS. These measurements provide a stringent criterion for assessing whether the observed Higgs boson alone is responsible for electroweak symmetry breaking, or whether new interactions are at work.

Presenter: OKABE, Risshin