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Longitudinally polarized ZZ scattering at a muon collider

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Measuring longitudinally polarized vector boson scattering in, e.g., the ZZ channel is a promising way to investigate the unitarization scheme from the Higgs and possible new physics beyond the Standard Model. However, at the LHC, it demands the end of the HL-LHC lifetime luminosity, $3000 fb^{-1}$, and advanced data analysis technique to reach the discovery threshold due to its small production rates. Instead, there could be great potential at future colliders. We perform a Monte Carlo study and examine the projected sensitivity of longitudinally polarized ZZ scattering at a TeV scale muon collider. We conduct studies at 14TeV and 6TeV muon colliders respectively and find that a 5 standard deviation discovery can be achieved at a 14TeV muon collider, with $3000 fb^{-1}$ of data collected. While a 6TeV muon collider can already surpass HL-LHC, reaching 2 standard deviations with around $4 ab^{-1}$ of data. The effect from lepton isolation and detector granularity is also discussed, which may be more obvious at higher energy muon colliders, as the leptons from longitudinally polarized Z decays tend to be closer.

In-person or Virtual?

Virtual

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