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Testing the standard model and searching for new physics at the Future Collider

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The collider experiment is the most effective means in recent years to verify the standard model and find new physics. The discovery of the Higgs in 2012 by the Large Hadron Collider (LHC), currently operating at CERN, completed the final piece of the standard Model puzzle.
Measuring the longitudinal polarization of the vector boson scattering process is an important way to explore the Higgs mechanism and find new physics. However, in the LHC experiment, due to the low case yields, it may require extremely high brightness and advanced data analysis techniques to reach the required confidence threshold. Instead, the future collider may have more potential to do so. Therefore, we use monte Carlo method to study the sensitivity of TeV level muon collider to detect longitudially polarized ZZ scattering. We found that in order to achieve a confidence level of 5 standard deviations, we could do this with data at a luminosity of about 3000Fb ˆ(-1) at the Muon Collider with 14TeV collision energy.
In addition, the recent CDF experiment has given a result of measuring W boson mass that exceeds the standard deviation by 7 times of the standard model, which has attracted widespread attention. We propose a new neutrino-lepton collider to accurately measure the mass of the W boson. The results show that although achieving high instantaneous luminosity of the neutrino beam is a challenge, we only need to achieve a total luminosity of 0.1 Fb ˆ(-1) to achieve an accuracy level of 10MeV for the W boson mass.

Summary

At a 14 TeV muon collider, a ⍰⍰ discovery of longitudinal polarization can be achieved, with ⍰=⍰⍰⍰⍰⍰ˆ(−⍰).
At a [1000, 3] GeV neutrino positron collider, a 10 MeV accuracy on ⍰_⍰ can be achieved, with ⍰=⍰.⍰⍰⍰ˆ(−⍰).

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