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Quark and Gluon Contents of a Lepton at High Energies

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After the triumph of discovering the Higgs boson at the CERN Large Hadron Collider, people are getting increasingly interested in studying the Higgs properties in detail and searching for the physics beyond the Standard Model (SM). A multi-TeV lepton collider provides a clean experimental environment for both the Higgs precision measurements and the discovery of new particles. In high-energy leptonic collisions, the collinear splittings of the leptons and electroweak (EW) gauge bosons are the dominant phenomena, which could be well described by the parton picture. In the parton picture, all the SM particles should be treated as partons that radiated off the beam particles, and the electroweak parton distribution functions (EW PDFs) should be adopted as a proper description for partonic collisions of the initial states. In our work, both the EW and the QCD sectors are included in the Dokshitzer-Gribov-Lipatov-Altarelli-Parisi (DGLAP) formalism to perturbatively resum the potential large logarithms emerging from the initial-state radiation (ISR). I will show the results of QCD jet production as well as some other typical SM processes at a possible high-energy electron-positron collider and a possible high-energy muon collider obtained using the PDFs.

Summary

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