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Electroweak parton distribution functions at a high-energy muon collider YANG MA, TAO HAN, KEPING XIE, University of Pittsburgh — 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 (BSM). A multi-TeV muon collider provides a clean experimental environment for the Higgs precision measurements and for the discovery of new particles. However, in high-energy leptonic collisions well above the electroweak scale M_Z, the collinear factorization of the photon parton distribution function (PDF) based on the "equivalent photon approximation (EPA)" is not well defined anymore. 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, the Dokshitzer-Gribov-Lipatov-Altarelli-Parisi (DGLAP) formalism is employed to perturbatively resum the potential large logarithms emerging from the initial-state radiation (ISR). We present EW parton luminosities and semi-inclusive cross sections for several important SM processes at a future multi-TeV muon collider and show it is appropriate to adopt the EW PDFs for future high-energy leptonic colliders.

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