

Keping Xie – HEP Seminar – September 27, 2022  
University of Pittsburgh

Title: Electroweak parton distribution functions and their applications at future high-energy muon colliders

Abstract: The recent breakthrough in the muon beam cooling technology make a multi-TeV muon collider feasible in the future. Compared with a hadron or electron collider, a muon collider embraces advantages of both a high effective energy reach and a clean environment. Our recently studies suggest that the physics at a high-energy muon collider can be treated in a factorization picture. At an energy well above the electroweak scale, the collinear splitting phenomena dominate due to the large logarithm enhancement both in the initial and final state radiations. All the Standard Model particles, including electroweak gauge bosons, essentially become massless, and the electroweak gauge symmetry is gradually restored. With the Dokshitzer-Gribov-Lipatov-Altarelli-Parisi (DGLAP) formalism, we resum large logarithms in the initial state radiations as electroweak parton distribution functions (EW PDFs). The final state radiations should be treated similarly with fragmentation functions. We present several semi-inclusive cross sections as standard candles for the Standard Model processes at a high-energy muon collider. We find that the QCD partons (quarks and gluon) will make a significant contribution to the hadronic events.