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The influence of QCD at weak scattering in electron-(proton/positron) collider, using dipole formalism to describe hadron production from boson-(proton/boson).

Recently, the FPF LHC neutrino detector recorded its first measurements, opening new possibilities for studying weak interactions. In this work, we explore related observable, such as the proton structure function (F_2) from weak interactions, and the cross section of $W^+W^- \to X$ and $\gamma W^- \to X$, which could be significant for future colliders. We employ QCD dynamics equations, dipole formalism, and light cone wave functions of $W^\pm \to q\bar{q}'$ to calculate the exclusive hadron production with heavy quarks in the final state. These processes offer intriguing opportunities for studying the evolution of QCD and its relationship with neutrino physics in a new energy regime that has never been explored before.

In the high-energy regime, using light cone coordinates, it is possible to calculate the probability of boson (γ, $W^\pm$, and Z^0) fluctuating into a quark-antiquark pair, which in turn can be approached through the dipole formalism. In this work, we present important observable that will be essential to study the background contributions of future electron-positron accelerators, such as contributions from interactions between two boson in ultraperipheral collisions measured at the LHC.

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