

Compton Polarimetry at the Electron-Ion Collider

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The US-based future Electron-Ion Collider is a novel tool to address some of the unexplained physics of nucleons, including how their constituents contribute to their properties like spin, mass, etc., by colliding highly polarized electron beams with polarized beams of protons or ions. The high-energy interactions between the electrons and protons help in understanding the internal structure of the proton and one needs to know the polarization of the electron beam used. This is possible using a Compton polarimeter, facilitating Compton scattering of this electron beam with a circularly polarized laser beam. The physical quantities measured in the scattering will correlate to the degree of polarization of the electron beam. My research involves the simulation of transverse and longitudinal polarization of the electron beam with more focus on the effect of transverse beam smearing on transverse polarization measurement. I also have extended the work to evaluate beam synchrotron radiation at different locations at the interaction point in the polarimeter. In this talk, I will be presenting some of the results obtained using the Monte Carlo method in Geant4 simulations.

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