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Event Reconstruction for Diffractive Scattering at the Electron-Ion Collider

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Diffractive Deep Inelastic Scattering – defined by a colorless exchange between the target nucleus and the incoming electron – is sensitive to the geometric structure of hadrons, and hence can be used as a probe for exploring the mystery of confinement and saturation. Experimentally, this process manifests itself by a rapidity gap in the detector between the outgoing nucleus/remnants and the diffractively produced system. In this talk, we will discuss three complementary event kinematic reconstruction methods for exclusive diffractive events: the Scattered Electron method, the Jacques Blondel method, and the Double Angle method; and we will assess their impact on the physics studied in different kinematic regimes. The simulation studies are performed using an e-A event generator made exclusively for diffractive events – Sartre. The output of the Sartre generator is passed to both a fast simulation package (eic-smear) as well as a full Geant4 EIC detector simulation in order to perform the kinematics reconstruction studies. In addition, for diffractive vector meson production, there is a known dependence of the angular distribution of the vector meson decay products on the polarization of the virtual photon. We will describe how we incorporated this effect into the Sartre event generator.

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