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Feasibility of Spin Interference Gluon Tomography at the EIC with EPIC

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One of the primary goals of the EIC is to deepen our understanding the multidimensional structure and distribution of gluons within nucleons and nuclei. The recent discovery of entanglement enabled spin interference in photonuclear heavy-ion collisions offers a powerful new avenue for exploring gluon distributions at high energy with RHIC and the LHC in the years leading up to the EIC. Most importantly, these novel polarization dependent observables provide direct access to information for constraining gluon transverse spatial distribution inside large nuclei. This poster discusses calculations of polarization dependent diffractive J/ψ production at RHIC and LHC energies using the color glass condensate effective theory. The predictions have been extended to EIC energies and conditions, showing that strong azimuthal modulations are expected due to the initial photon polarization in diffractive photonuclear production at the EIC. In this poster, we assess the practicality and feasibility of these measurements considering the design characteristics of the EPIC experiment detector. As a final note, we comment on the complementary physics insights that can be gained from similar measurements via other vector meson production channels at existing experiments and at the future EIC.

Category

Theory

Collaboration (if applicable)

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