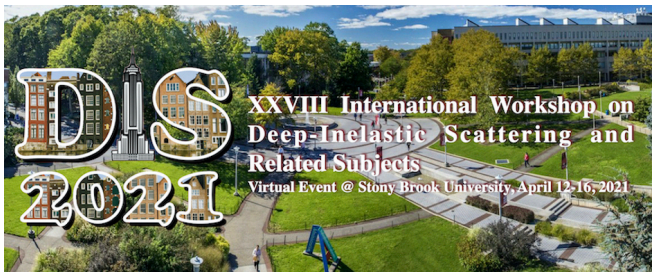

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Azimuthal asymmetries in J/ψ leptoproduction within the color octet model at the Electron-Ion collider

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Proton at high energy is a hugely complex many-body quantum system where gluons are the dominant degrees of freedom. The information of the three-dimensional structure of the proton is encoded in the transverse Momentum Dependent Parton distribution function (TMDs). Transverse Momentum Dependent Parton distribution functions (TMDs) are among the key subjects to be fully investigated at current and future Electron-Ion Collider (EIC) facilities including JLabs 12 GeV Upgrade, eRHIC and the planned EIC. A lot of work has been done for the extraction of quark TMDs but relatively very little is known about the gluon TMDs. Quarkonium production processes provide good opportunities to study gluon TMDs. There are three models that have been used to study the production mechanism of quarkonium: The color octet, color singlet, and color evaporation model.

Here we are calculating the $cos2\phi$ asymmetry in J/ψ production in an unpolarised electron-proton collision using the NRQCD based color octet model within the kinematical range of the planned Electron-Ion Collider (EIC). This can directly probe the linearly polarized gluon distribution in the unpolarized proton. The asymmetry is calculated within the kinematical region $z < 1$, where the NLO subprocess $\gamma * +g \rightarrow J/\psi + g$ gives the leading contribution. We calculated the upper bound of the asymmetry as well as estimate it using a Gaussian-type parametrization for the transverse momentum dependent Parton distributions and McLerran-Venugopalan model at small x. We present the numerical results.

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