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Linearly Polarized Gluon Distribution in J/psi Production at the EIC

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We calculate the cos 2φ asymmetry in J/ψ production in electron-proton collision for the kinematics of the planned electron-ion collider (EIC). This directly probes the Weisz¨acker-Williams (WW) type linearly polarized gluon distribution. Assuming generalized factorization, we calculate the asymmetry at next-to-leading-order (NLO) when the energy fraction of the J/ψ satisfies z < 1 and the dominating subprocess is γ* + g ⟶ c + ¯c + g. We use non-relativistic QCD based color singlet (CS) model for J/ψ production. We investigate the small x region which will be accessible at the EIC. We present the upper bound of the asymmetry, as well as estimate it using a (i) Gaussian type parametrization for the TMDs and (ii) McLerran-Venugopalan (MV) model at small x. We find small but sizable asymmetry in all the three cases.

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