

Probing orbital angular momentum distributions with elastic dijet production in ep collisions

Tuesday 24 June 2025 11:10 (25 minutes)

We calculate the elastic production of dijets from electron collisions with a longitudinally polarized proton target at small values of the Bjorken x variable. Building on the pioneering proposals of Hatta et al and Bhattacharya et al for measuring the quark and gluon orbital angular momentum (OAM) distributions, our focus is on both the longitudinal double spin asymmetry (DSA) and longitudinal single spin asymmetry (SSA). We compute the numerators of these asymmetries in the small- x formalism of the light cone operator treatment. Utilizing the small- x expressions for the OAM distributions derived earlier, we demonstrate that the DSA provides a robust probe for both the quark and gluon OAM distributions within the proton. In contrast, we find that while the SSA is also sensitive to the OAM distributions, extraction of the latter from the SSA would require new developments in small- x theory and phenomenology, and is probably not feasible at this point in time. These findings highlight the potential of DSA measurements in elastic dijet production at the future Electron-Ion Collider to provide the first-ever direct access to the quark and gluon OAM distributions at small x , paving the way for new insights into the proton spin puzzle.

Authors: MANLEY, Brandon (The Ohio State University); Prof. KOVCHEGOV, Yuri

Presenter: MANLEY, Brandon (The Ohio State University)

Session Classification: Tuesday Session