Contribution ID: **30** Type: **not specified**

Probing the odderon through η_c production in diffractive collisions at the EIC with non-linear evolution effects.

Friday 26 May 2023 15:25 (20 minutes)

The production of η_c in diffractive ep and eA collisions has been suggested as a golden probe of the C-odd QCD interaction, the odderon. Previous studies of this process have considered a linearised Bartels-Kwiecinski-Praszalowicz odderon [1-3], which is appropriate in the dilute regime where the x region probed in the proton is not too small. In this work [4], we explore this process in the dense regime, i.e., at low-x values in the proton or in large nuclei where effects of gluon saturation may become important. We treat the energy evolution of the odderon using the running coupling Balitsky-Kovchegov equation which incorporates saturation effects and present numerical estimates for eta_c production in diffractive ep and eA (Au, Cu, Al) at the Electron-Ion Collider (EIC). As the initial condition for odderon evolution, we adopt a Jeon-Venugopalan model [5] based odderon, with the overall normalisation being fixed by a group theoretic constraint [6,7] which gives us an upper bound for the size of the odderon, as well as the cross-section. By studying the dependence of eta_c production on different kinematics and nuclear size, and the relative sizes of the QCD and QED contributions, we aim to identify the ideal scenario to get a signal for the odderon at the EIC.

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Session Classification: Small-x