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Diffractive quarkonium production with target break-up at an EIC

Tuesday 23 March 2021 11:15 (15 minutes)

Diffractive events can be divided in two categories. First, in so called coherent diffraction the target remains on its ground state. In incoherent diffraction, on the other hand, the target breaks up, but the event is still diffractive, i.e. there is no net color charge transfer to the target. One advantage of diffractive processes is that the total momentum transfer can be measured by measuring the quarkonium transverse momentum. As the momentum transfer is Fourier conjugate to the impact parameter, diffractive processes enable studies of the spatial distribution of partons in the target hadrons. A second advantage is that at lowest order at least two gluons need to be exchanged in a diffractive event, which makes the cross section approximatively sensitive to the squared gluon distribution of the target and as such a powerful probe of the small-x dynamics.

In this talk, we focus on incoherent quarkonium production in deep inelastic scattering. We discuss how it is possible to study, not only the average, but also the event-by-event fluctuating spatial structure of protons and nuclei at high energy. We demonstrate how the HERA and LHC data point towards significant event-by-event fluctuations in the spatial structure of protons, and discuss some phenomenological implications of these findings. In addition to spatial structure, we also discuss how to access non-linear saturation dynamics in incoherent scattering, and how it is possible to determine centrality and study saturation effects in the densests parts of the heavy nuclei at an Electron-Ion Collider.

Primary author: Dr MÄNTYSAARI, Heikki (University of Jyväskylä)

Presenter: Dr MÄNTYSAARI, Heikki (University of Jyväskylä)

Session Classification: Day 2 (mostly exclusive reactions)

Track Classification: Exclusive reactions & tools for GPDs & Wigner functions,...