

Multidimensional imaging of the partonic structure of hadrons with an Electron-Ion Collider

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The American 2015 nuclear physics long-range plan endorsed the realization of an electron-ion collider (EIC) as top priority for a next large construction project in the United States.

With the design of an EIC, advancements in theory and further development of phenomenological tools, we are now preparing for the next step in subnuclear tomographic imaging. The collider's large range of center-of-mass energies in combination with very high luminosity and polarization of both the lepton and the hadron beams, will open a unique opportunity for very high precision measurements of both cross sections and spin-asymmetries. This will allow us for a detailed investigation of the partonic substructure of hadrons in multi-dimensions, as well as addressing the role of orbital angular momentum with respect to the nucleon spin.

Generalized parton distributions (GPDs) and transverse momentum dependent (TMDs) describe the multi-dimensional partonic structure of a nucleon in coordinate and momentum space respectively, providing new information about the internal dynamics of quarks and gluons. Measurements of GPDs with hard exclusive processes and TMDs in semi-inclusive deep inelastic scattering, with all related probes, are an essential element of the EIC science program. This talk will highlight key measurements, experimental challenges, and nally discuss the EIC's expected impact over the current knowledge of the partonic 3D-structure of hadrons.

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