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Accessing Quarks and Gluons at a Future EIC

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The Electron-Ion Collider (EIC) is envisioned as the next generation facility for exploring the strong interaction (Quantum ChromoDynamics, QCD). Our understanding of QCD has advanced enormously in the past decades. Both experimentally and theoretically, the perturbative regime in QCD has been explored and understood with precision. At the same time, lattice QCD calculations have begun to yield quantitative results on properties of hadrons. The understanding of how nucleons and nuclei are formed from their constituent quarks and gluons and their interactions has also made progress via new experiments and theoretical frameworks such as GPDs (Generalized Parton Distributions) and TMDs (Transverse Momentum Dependent distributions). Along with these developments, a new experimental facility is needed to bring the understanding of nucleon and nuclear structure and dynamics to a new level. The proposed EIC is such a facility, and has the highest priority for new nuclear physics construction in the US. The EIC will provide beams of polarized electrons and light ions, as well as unpolarized heavy ions, to fully map the spin and spatial structure of the quark and gluon sea in the nucleon, understand the emergence of hadronic matter from color charge, explore low-x phenomena, and probe the gluon fields of nuclei. This talk will present the physics to be explored at the EIC, outline the current status of the project, and discuss technical plans for the accelerator and detectors.

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