

Probing Sea Quarks and Gluons: The Electron-Ion Collider Project

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The 21st century holds great promise for reaching a new era for unlocking the mysteries of the structure of the atomic nucleus and the nucleons inside it governed by the theory of strong interactions (QCD). In particular, much remains to be learned about the dynamical basis of the structure of hadrons and nuclei in terms of the fundamental quarks and gluons. One of the main goals of existing and nearly completed facilities is to map out the spin flavor structure of the nucleons in the valence region. A future Electron-Ion Collider (EIC) would be the world's first polarized electron-proton collider, and the world's first e-A collider, and would seek the QCD foundation of nucleons and nuclei in terms of the sea quarks and gluons, matching to these valence quark studies. The EIC will provide a versatile range of kinematics and beam polarization, as well as beam species, to allow for mapping the spin and spatial structure of the quark sea and gluons, to discover the collective effects of gluons in atomic nuclei, and to understand the emergence of hadronic matter from color charge. I will summarize the physics goals and present an overview of the proposed EIC.