DNP13-2013-020091

Abstract for an Invited Paper
for the DNP13 Meeting of
the American Physical Society

Electron Ion Collider - Capabilities and Physics Highlights

J.H. LEE, Brookhaven National Laboratory

Quantum Chromodynamics has established itself as a successful theory of strong interactions, yet the details of the underlying mechanism of the theory have not been fully characterized. Despite gluons being the mediator of the strong force and mostly responsible for the visible mass of the universe, their dynamics are far from being completely understood. The proposed Electron-Ion Collider (EIC) is a new high-energy and high-luminosity electron-ion machine with a versatile range of kinematics and beam polarizations, as well as beam species. The design offers unprecedented access to explore the nature of QCD matter and strong color fields. The physics goals for the machine have been set by identifying critical questions in QCD that remain unanswered despite the significant experimental and theoretical progress made over the past decade.[1] The key questions are: How are the sea quarks and gluons and their spins, distributed in space and momentum inside the nucleon? Where does the saturation of gluon densities set in? How does the nuclear environment affect the distribution of quarks and gluons and their interactions in nuclei? In this talk, a summary of those scientific goals with a brief description of the key measurements and accelerator and detector required to achieve them is presented.

[1]A. Accardi *et al.*, Electron Ion Collider: The Next QCD Frontier - *Understanding the glue that binds us all* (EIC White Paper), BNL-98815-2012-JA; JLAB-PHY-12-1652; arXiv:1212.1701 (2012).