

Electron-Ion Collider - A Giant CT Scanner for Nucleons and Nuclei

Friday, 20 October 2023 11:00 (30 minutes)

The proton and neutron, known as nucleons, are the fundamental building blocks of all atomic nuclei that make up essentially all the visible matter in the universe. In Quantum Chromodynamics, nucleons have complex internal structures and emerge as strongly interacting and relativistic bound states of quarks and gluons, the dynamics of which are only beginning to be revealed in modern experiments. Both theory and experimental technology have now reached a point where we are capable of exploring the inner structure of nucleons and nuclei at sub-femtometer distance, leading to the newly emerging science of nuclear femtography. In this talk, I will demonstrate that Electron-Ion Collider (EIC), which the US Department of Energy recently approved for construction at Brookhaven National Lab, will be an excellent new facility for exploring the science of nuclear femtography. I will highlight new developments in theory to precisely match the observed nucleons to quarks and gluons within them, allowing the EIC to be a powerful tomographic scanner and/or microscope able to precisely image the inner structure of nucleon and nuclei with a sub-femtometer resolution. The precise knowledge of confined quark/gluon structure of nucleons/nuclei will help us address the most compelling unanswered questions about the elementary building blocks of our visible world, and are capable of taking us to the new frontier of the Standard Model.

Parallel Session

Invited Plenary Talk

Primary author: QIU, Jianwei (Jefferson Lab)

Presenter: QIU, Jianwei (Jefferson Lab)

Session Classification: Plenary talk