

Exploring the Depths of Nuclear Matter at the Electron-Ion Collider

The Electron-Ion Collider (EIC) represents a groundbreaking frontier in nuclear physics research, poised to provide fundamentally new insights into the inner-workings of nuclear matter. As an innovative particle accelerator facility, the EIC is designed to collide high-energy electrons with protons and various heavy ions, at unprecedented energies and luminosities. This facility enables scientists to probe the innermost constituents of atomic nuclei with unprecedented precision and detail.

The unique capabilities of the EIC allow for the exploration of the complex dynamics of quarks and gluons, the elementary particles that compose protons, neutrons, and other hadrons. By studying the behavior of these fundamental particles within the atomic nucleus, we aim to unravel longstanding mysteries surrounding the strong force that binds them together. In this talk I will discuss the ongoing design of the electron-ion collider, ePIC, the primary experimental detector at the EIC. I will motivate the discussion of the EIC with my own related research utilizing a recently discovered manifestation of quantum entanglement in ultra-peripheral heavy-ion collisions. Finally, I'll discuss the next-generation measurements that will be possible at the EIC, and highlight some of the desired outcomes.