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Plans for the JLab12 era and beyond

During this talk, I will describe the research of Thomas Jefferson National Accelerator Facility (TJNAF, or JLab) where we explore the nature of QCD and matter at its most fundamental level of quarks and gluons. Understanding the amazing world inside a nucleon requires tremendous technical capabilities embodied in the large accelerator facility and advanced detector technology known as CEBAF (the Continuous Electron Beam Accelerator Facility). These capabilities allow us to peer inside the proton to understand the motion and structure of the quarks within. I will describe recent results coming from the 12 GeV era, and also our plans for new experimental capabilities at the facility. The versatility of CEBAF also allows for investigations that touch on other fields of science. For example, the MOLLER experiment will measure the parity-violating asymmetry in electron-electron scattering which will accurately determine the electroweak mixing angle. JLab also recently focused attention on astrophysical phenomena: for example, a precise measurement of the thickness of the neutron skin in Pb has implications in the astrophysics associated with neutron-star mergers. This interplay is but one demonstration of how the world of the small, even at the sub nuclear level, affects the most violent of collisions in the universe.

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