APR20-2020-000269

Abstract for an Invited Paper
for the APR20 Meeting of
the American Physical Society

Towards the Ideal Electron Scattering Experiment to Probe the Fundamental Structure of Matter

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Electron scattering from the nucleon and nuclei offers the most effective experimental approach to determine their fundamental quark and gluon structure. The precisely known and calculable QED interaction is used to probe the rich QCD structure of hadrons. Polarized beams and targets are essential to isolation of key observables. Polarized gas targets internal to electron storage rings have been successfully used over a range of incident electron beam energies to measure spin-dependent electron scattering from polarized nucleons and nuclei. They reduce systematic uncertainties due to extraneous target material as typically arises in experiments on external targets. The presentation will review the HERMES, BLAST and OLYMPUS experiments and indicate the path they lead to a future electron-ion collider.