

Probing Cold QCD: Jefferson Lab eA program today and prospects at 22 GeV and EIC

The Jefferson Lab eA program, initiated with the 5 GeV electron beam, is now continued at 12 GeV and proposed for a possible extension to the 22 GeV upgrade. Its aim is to investigate the underlying mechanisms of medium-induced modifications to quark propagation and hadron formation using semi-inclusive deep-inelastic scattering. These effects, quantified through the measurements of hadronic multiplicity ratios and transverse momentum broadening, require multidimensional analyses on a broad kinematical range. In this talk, I will summarize key results from the Jefferson Lab eA program, along with prospects for the potential 22 GeV upgrade and future measurements at the EIC.