

Far-Forward Detector Instrumentation for the ATHENA Collaboration at the EIC

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Exclusive and diffractive final states will provide a wealth of physics at the future Electron-Ion Collider (EIC). However, measurement of these final states provide a unique challenge for detector design since many of the final-state particles wind up at very large pseudorapidities ($\eta > 4.5$), which is far beyond the acceptance of the central detector. These so-called “far-forward” particles require detectors to be integrated with the out-going hadron beamline, and therefore require special integration consideration with the accelerator complex. Here, we propose a suite of several detector subsystems which include: 1) a silicon tracking system embedded in the first, large-bore dipole magnet after the central detector, 2) two sets of “potless” Roman pot detectors for tagging protons and other charged particles over a wide range of longitudinal momenta, and 3) a zero-degree calorimeter with a W/SciFi electromagnetic calorimetry system, and a Pb/Sc sampling hadronic calorimeter for reconstructing single neutrons from nuclear breakup, and photons from π^0 decay. Each detector subsystem will be discussed in detail, including considerations for technology and the related impacts with some examples from physics impact studies.

Submitted on behalf of a Collaboration?

Yes

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