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The JLab/MEIC Detector Design and Integration with the Accelerator Lattice

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The MEIC design includes two Interaction Points (IPs), each of which can operate simultaneously at full luminosity. Each IP is located near the downstream ends of the ion arc and of the electron straight section. This minimizes backgrounds from both synchrotron radiation and ion beam-gas interactions. The detector and beam-line optics for IP1 are designed to be nearly hermetic for all particles outside the presumed 10-sigma admittance of the figure-8 accelerator lattice. The IP2 layout is designed to be consistent with the EIC detector concept based on the BaBar solenoid.

The integration of the IP1 detector with the lattice extends ~40 m downstream of the IP in both the electron and ion directions. The central region of the detector is a new 4 m long 3 m diameter 3 Tesla solenoid. However, the detector design is geometrically compatible with the CLEO solenoid (1.5 T) that will soon be delivered to JLab for the SoLID project. Particle ID is provided by TOF, DIRC, and EM calorimetry in the barrel region, Cerenkov, RICH, and EM calorimetry in the electron End-Cap, and RICH, TOF, and EM calorimetry in the ion End-Cap (with an option to include hadronic calorimetry). Analysis in the forward ion directions is enhanced by the 50 mrad crossing angle at the IP, and a two-stage spectrometer integrated into the first 36 m of the accelerator lattice. On the electron downstream side, after the electron Final Focus Quad triplet, there is a four dipole chicane which provides the optics for both tagging of quasi real photo-production at the IP and a Compton polarimeter.

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