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## Design of dipole magnets for luminosity pair spectrometer subsystem at the detectors of Electron Ion Collider

*Tuesday, 21 May 2024 16:00 (2 hours)*

The EIC will collide high energy and highly polarized hadron and electron beams with luminosities up to  $1e+34$  /cm<sup>2</sup>/s. Bremsstrahlung photons from the Bethe-Heitler process at the interaction point (IP) need to be counted to determine the delivered luminosities. The pair spectrometer luminosity detector utilizes photon conversions (e<sup>+</sup> and e<sup>-</sup> pairs) in the far-backward region. A sweeper dipole magnet was designed to sweep away the photon conversions that occur at the thick exit window. An analyzer dipole magnet was designed with an integrated field of 1.13 T\*m to deflect the electrons and positrons that will be analyzed by the tracker and calorimeter detectors. Both magnets were designed and simulated using the 3-dimensional (3D) finite element method (FEM). The effects of notch size and locations on the iron yoke to the magnetic field quality were studied. The tracker performance, including tracker position resolutions and tracker energy resolutions, were analyzed based on the field map of the designed dipole magnets.

### Footnotes

### Funding Agency

### Paper preparation format

### Region represented

North America

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