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Progress on the normal conducting magnets for the Electron-Ion Collider

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The electron-ion collider (EIC) at Brookhaven National Laboratory (BNL) is designed to deliver a peak luminosity of $1e+34$ 1/cm² 1/sec. The EIC will take advantage of the existing Relativistic Heavy Ion Collider (RHIC) facility. Two additional rings will be installed: an electron storage ring (ESR) and a rapid cycling electron synchrotron ring (RCS).

This paper presents an update on the normal conducting magnet designs required for both the ESR and RCS rings. The ESR will store polarized electron beams up to 18 GeV and utilizes a triplet of dipole magnets to increase the emittance at 5 GeV and generate excess bending to create additional radiation damping to allow a larger beam-beam tune shift. The RCS will accelerate single bunches of spin-polarized electrons at various energies from 5 GeV to 18 GeV, with a ramp rate of 100 ms and 1 Hz repetition rate. Both rings require dipole, quadrupole and sextupole magnets with different specifications.

Footnotes

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