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Interaction region effects on the EIC's electron storage ring's dynamic aperture

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The Electron-Ion Collider, to be constructed at Brookhaven National Laboratory, requires a large dynamic aperture (DA) of the electron storage ring (ESR) for stable operation of 10 beam sigma for the transverse aperture and 10 times the RMS momentum spread in the longitudinal plane. In particular for operations at the top energy of 18 GeV this has not been easy to achieve, and the DA has proven sensitive to small changes. Nevertheless, a chromaticity-correction scheme has been developed for the bare lattice. There are several important effects in the interaction region that are potentially damaging to the ESR's DA, including the beam-beam interaction, crab cavity kicks, the detector solenoid field, and skew quadrupoles for coupling compensation. In this contribution, these effects are modelled to evaluate their impact on the dynamic aperture of the ESR at 18GeV.

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Footnotes

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Yes

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