

eeFACT 2025 - 70th ICFA Advanced Beam Dynamics Workshop on High Luminosity Circular e+e-Colliders



Contribution ID: 21

Type: **Invited Oral Presentation**

Beam-beam simulation studies for the Electron-Ion Collider

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The Electron-Ion Collider (EIC), to be constructed at Brookhaven National Laboratory, will collide polarized high-energy electron beams with polarized hadron beams, achieving luminosities up to $1 \times 10^{34} \text{ cm}^{-2} \text{ s}^{-1}$ in the center-of-mass energy range of 29-140 GeV. To achieve such high luminosity, we adopt high bunch intensities for both beams, small and flat transverse beam sizes at the interaction point (IP), and a large full crossing angle of 25 mrad with crab cavities. In this talk, we will present the challenges to the EIC beam-beam design parameters and compare them with previous e-p collider HERA and other colliders, such as the KEK-B factory and the Relativistic Heavy Ion Collider (RHIC). We will present the beam-beam interaction related design parameter optimization, optics and magnet imperfections, and noises from power supply ripples, crab cavity noises, and intra-beam scattering (IBS).

Footnotes

beam-beam talk on EIC

Funding Agency

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Yes

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Session Classification: Beam-beam & Instabilities

Track Classification: WG4 : Beam-beam & Instabilities