Contribution ID: **132** Contribution code: **FRAD03** Type: **Contributed Oral Presentation**

Crabbing schemes for the Electron-Ion Collider

Friday 15 August 2025 10:10 (20 minutes)

The Electron-Ion Collider (EIC), to be constructed at Brookhaven National Laboratory, will collide polarized high-energy electron beams with polarized proton and ion beams, achieving luminosities of up to 1 × 10ˆ34 cmˆ−2 sˆ−1 in the center-of-mass energy range of 20-140 GeV. Crab cavities will be used in both EIC rings to compensate for the geometric luminosity loss due to the large crossing angle of 25 mrad in the interaction region. For the baseline design, a local crabbing scheme is adopted for both EIC rings, where crab cavities will be installed on both sides of the interaction region, and the ideal horizontal phase advance between the interaction point and the crab cavities is 90 degrees. In this article, we will study the feasibility of using a global crabbing scheme for each EIC ring, and, in particular, the case where the crab cavities in the Electron Storage Ring (ESR) will not be available during the early EIC commissioning. In this scenario, we need to reduce the electron beam's beam-beam parameter to avoid electron loss during injection.

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No

Footnotes

Funding Agency

Work supported by the U.S. Department of Energy, Office of Science under contracts DE-SC0012704 and DE-AC05-06OR23177.

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Author: LUO, Yun (Brookhaven National Laboratory)

Co-authors: MONTAG, Christoph (Brookhaven National Laboratory); XU, Derong (Brookhaven National Laboratory); WILLEKE, Ferdinand (Brookhaven National Laboratory); BERG, J. (Brookhaven National Laboratory); QIANG, Ji (Lawrence Berkeley National Laboratory); BLASKIEWICZ, Michael (Brookhaven National Labo-

ratory); NAGAITSEV, Sergei (Brookhaven National Laboratory); PTITSYN, Vadim (Brookhaven National Laboratory); MOROZOV, Vasiliy (Oak Ridge National Laboratory); HAO, Yue (Facility for Rare Isotope Beams)

Presenter: LUO, Yun (Brookhaven National Laboratory)

Session Classification: Colliders and other Particle and Nuclear Physics Accelerators (contributed)

Track Classification: MC1 - Colliders and other Particle and Nuclear Physics Accelerators