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Simulation test of various crab dispersion closure bumps for the hadron storage ring of the Electron-Ion Collider

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The Electron-Ion Collider (EIC) presently under construction at Brookhaven National Laboratory will collide polarized high energy electron beams with hadron beams with luminosities up to 10ˆ34cmˆ{-2}sˆ{-1} in the center mass energy range of 20-140 GeV. To compensate the geometric luminosity loss due to a large crossing angle in the EIC, crab cavities are to be installed on both sides of interaction point (IP) to construct a local closed crabbing bump. However, for the current design lattice of the Hadron Storage Ring, the crab dispersion bump is not closed because the ideal 180 degree horizontal phase advance between the crab cavities on both sides of IP cannot be achieved. We carried out numerical simulations to evaluate the negative impacts with this imperfectly closed crab dispersion bump. We also simulated various schemes to close the crab dispersion.

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Footnotes

I have read and accept the Privacy Policy Statement

Yes

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