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Effect of electron orbit ripple on proton emittance growth in EIC

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Proton bunches will collide with electron bunches in the Electron-Ion Collider (EIC) to produce a luminosity of up to $10^{34} \text{ cm}^{-2}\text{s}^{-1}$. Various sources can lead to electron orbit ripple at the interaction point (IP). This ripple will cause emittance growth of the proton beam via beam-beam interaction. This paper presents weak-strong simulations for the case where a strong electron beam experiences orbit ripple. The frequency of the ripple is scanned to obtain the maximum tolerable amplitude. At the low frequency, different proton parameters are tested to reduce the emittance growth. These results will inform the engineering design of the Electron Storage Ring (ESR) in the EIC.

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Footnotes

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