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Wakefield tracking in Bmad and applications to instability studies for the EIC

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The Electron-Ion Collider (EIC) aims to achieve unprecedented precision in understanding the structure of nucleons and nuclei. As part of this effort, mitigating collective instabilities induced by wakefields is critical for maintaining beam quality in high-current operation. In this work, we have implemented wakefield tracking in the Bmad to support custom short-range wakefields or impedances. Benchmarks against analytical solutions and other simulation codes validate the accuracy of the wakefield tracking. Applications to the EIC reveal critical insights into the wakefield-induced instabilities and lattice design choices.

Footnotes

Paper preparation format

LaTeX

Region represented

America

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