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Single-Bunch Instabilities Driven by Space Charge During Low-Energy Cooling at Injection in the EIC Hadron Storage Ring

Tuesday 12 August 2025 16:00 (2 hours)

This paper presents a simulation-based study of single-bunch dynamics at the injection energy of 23.8 GeV for protons in the EIC hadron storage ring, focusing on the impact of space-charge–driven instabilities. The analysis demonstrates that at this energy, the proton bunch experiences significant transverse space-charge forces, which can reduce the stability margin in the presence of the geometric and resistive wall impedance. Various collective effects were considered, with particular attention to the nonlinear nature of the transverse space charge. To stabilize the beam, high chromaticity and octupoles were introduced and their effects analyzed using the ELEGANT code. The results provide a quantitative assessment of the stability thresholds and offer guidance for the machine design and operational strategy at injection.

Please consider my poster for contributed oral presentation

No

Would you like to submit this poster in student poster session on Sunday (August 10th)

No

Footnotes

Funding Agency

I have read and accept the Privacy Policy Statement

Yes

Author: BAXEVANIS, Panagiotis (Brookhaven National Laboratory)

Co-authors: BLEDNYKH, Alexei (Brookhaven National Laboratory); BLASKIEWICZ, Michael (Brookhaven National Laboratory)

Presenter: BLEDNYKH, Alexei (Brookhaven National Laboratory)

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