Contribution ID: **72** Contribution code: **TUP055** Type: **Poster Presentation**

IOTA Experiment for Proton Pulse Compression at Extreme Space-Charge

Tuesday 12 August 2025 16:00 (2 hours)

The longitudinal compression of intense proton bunches with strong space-charge force is an essential component of a proton driver for a muon collider. We propose a proton bunch compression experiment at the Integrable Optics Test Accelerator (IOTA) storage ring at Fermilab to explore optimal radio frequency (RF) cavity and lattice configurations. IOTA is a compact fixed-energy storage ring dedicated to beam physics R&D that can circulate a 2.5-MeV proton beam with extreme space-charge. Using ImpactX and its 3D space-charge solver, simulations indicate that bunch length can be rapidly reduced by a factor of at least two, without appreciable degradation in transverse beam quality, even under strong space-charge conditions. However, longitudinal defocusing presents a large effect in short-pulsed proton beams, and the optimization of bunch compression under such conditions is discussed.

Please consider my poster for contributed oral presentation

Yes

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

Yes

Footnotes

Funding Agency

I have read and accept the Privacy Policy Statement

Yes

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