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Observation of a synchro-betatron instability in Fermilab booster

Wednesday, 22 May 2024 16:00 (2 hours)

In preparation for PIP2, there has been interest in running the Fermilab Booster at a higher current more indicative of the PIP2 era operation. In July 2023 an experiment was performed to study collective instabilities over the transition crossing at the Fermilab Booster. Over the transition crossing, the synchrotron tune becomes small and synchro-betatron instabilities become possible. During the experiment, an intensity threshold was observed, above which a dipole instability with losses concentrated in the tail of the bunch. These losses are consistent with the Convective Instability*.

Footnotes

*Burov, Alexey. "Convective instabilities of bunched beams with space charge", PHYSICAL REVIEW ACCELERATORS AND BEAMS 22, 034202 (2019); doi: 10.1103/PhysRevAccelBeams.22.034202

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