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Cavity loops Influence on the single-bunch Instability thresholds of the CERN PS Booster

Wednesday 4 June 2025 16:00 (2 hours)

The CERN Proton Synchrotron Booster (PSB) delivers a wide range of high-brightness and high-intensity proton beams for the Large Hadron Collider (LHC) and fixed-target experiments. Following the RF system upgrades during the Long Shutdown 2 (LS2), discrepancies in longitudinal stability between predictions from macro-particle simulations and beam measurements were observed, highlighting the need for a deeper understanding of the longitudinal impedance and related effects in the PSB. Longitudinal single-bunch instability studies have therefore been conducted to evaluate the beam coupling impedance through the intensity and energy thresholds for various RF system configurations. This contribution presents experimental results that explore instability mechanisms and the effect of the beam loading compensation feedback. They are used to benchmark an updated cavity loop simulation model, which enables more detailed studies of the accelerator impedance.

Footnotes

Paper preparation format

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Author: MARCHI, Mariangela (Sapienza University of Rome)

Co-authors: BARRIENTOS, Diego (European Organization for Nuclear Research); GNEMMI, Giulia (European Organization for Nuclear Research); ALBRIGHT, Simon (European Organization for Nuclear Research)

Presenter: MARCHI, Mariangela (Sapienza University of Rome)

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