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Broadband characterization of the CERN-SPS driving and detuning impedance

Wednesday 4 June 2025 16:00 (2 hours)

The CERN-SPS transverse impedance model plays an important role in predicting beam stability and guiding machine operation. This work advances the benchmarking of the SPS vertical impedance model through experimental investigations of mode-zero instability growth rates and intensity-dependent tune shifts as a function of chromaticity. Building on insights from previous measurement campaigns, this study aims to address persistent discrepancies in the high-frequency domain associated with the real driving component of the effective impedance. The 2024 campaign incorporates growth rate measurements at varied transverse tunes to eliminate potential resonance crossing effects that could artificially enhance the high-frequency mismatch. The imaginary component of the transverse impedance is likewise explored by correlating intensity-dependent tune shifts with chromaticity variations. By combining all measurements and beam dynamics simulation results, the driving and detuning impedance model of key elements will be refined, offering improved predictive capabilities for the current SPS transverse impedance model.

Footnotes

Paper preparation format

LaTeX

Region represented

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Author: DE LA FUENTE, Elena (European Organization for Nuclear Research)

Co-authors: ZANNINI, Carlo (European Organization for Nuclear Research); RUMOLO, Giovanni (European Organization for Nuclear Research); BARTOSIK, Hannes (European Organization for Nuclear Research); MASES, Ingrid (European Organization for Nuclear Research); GONZÁLEZ TORRE, Miguel (Universidad Politécnica de Madrid)

Presenter: DE LA FUENTE, Elena (European Organization for Nuclear Research)

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