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Recent updates in the impedance characterization of the CERN PS Booster Finemet® RF system

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During the last long shutdown of the accelerators at CERN (LS2), the main radio frequency system of the Proton Synchrotron Booster (PSB) was upgraded. A wideband system with Finemet® magnetic alloy cavities driven by solid-state amplifiers replaced several different ferrite-loaded cavities. In measurements post-LS2, the longitudinal beam stability did not match predictions, which triggered a survey of the PSB impedance model. This started with the Finemet® RF system, which are expected to be the dominant impedance contribution. Single stretched wire measurements were carried out on a 6-cell Finemet® cavity test stand with different amplifier configurations. Measurement results and electromagnetic simulations are presented in this paper and compared to the previous impedance model. The total impedance of the cavity and amplifier system is discussed and analyzed with a combined CST studio and PSpice simulation. The electromagnetic characterization presented in this contribution will complement the beam-based impedance and low-level RF measurements as an input for the simulations of beam stability.

Footnotes

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