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Beam loading compensation in the CERN SPS 200 MHz cavities. Measurements and comparison with expectations

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The High-Luminosity LHC (HL-LHC) project requires a doubling of the proton intensity transferred from its injector (SPS). Beam loading compensation in the SPS 200 MHz cavities is essential to limit losses when the beam is transferred into the LHC 400 MHz RF system. The SPS Low Level RF (LLRF) has been completely redesigned during the LHC Long Shutdown 2 (LS2, 2019 –mid 2021). The new system relies on a One-Turn delay FeedBack (OTFB) and a Feed-Forward for regulating the cavity field. The paper presents the performances achieved with the 2023 beam and compares these to the simulations performed during LS2. It also extrapolates the 2023 results to the HL-LHC beam intensity.

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Footnotes

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Yes

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