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Beam-based characterization of longitudinal coupled-bunch instabilities at SIRIUS storage ring

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SIRIUS is the 4th generation synchrotron light source of the Brazilian Synchrotron Light Laboratory (LNLS). In mid 2024 the storage ring had a major upgrade on the rf system, with the replacement of the PETRA 7-Cell rf cavity by two superconducting (SC) CESR-B cavities. It was antecipated that after the upgrade the longitudinal coupled-bunch instabilities (LCBIs), previously driven by the higher-order-modes (HOMs) of the PETRA 7-Cell cavity, would not longer occur. However, different LCBIs were observed at currents as low as 90mA. In this work, we report on the experimental methods and results to characterize these LCBIs through beam-based measurements using the bunch-by-bunch feedback system. We also present simulations to evaluate the expected impact of the harmonic cavity planned for the next operational phase.

Footnotes

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