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Measurements of longitudinal Loss of Landau damping in the CERN Proton Synchrotron

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Landau damping represents the most efficient stabilization mechanism in hadron synchrotron accelerators to mitigate coherent beam instabilities. Recent studies allowed expanding the novel analytical criteria of loss of Landau damping (LLD) to the double harmonic RF system case above transition energy, providing an analytical estimate of the longitudinal stability. The threshold has a strong dependence on the voltage ratio between the harmonic and the main RF systems. Based on that, measurements of single bunch oscillations after a rigid-dipole perturbation have been performed in the CERN Proton Synchrotron (PS). Several configurations have been tested thanks to the multi-harmonic RF systems available in the PS. Higher-harmonic RF systems at 20 MHz and 40 MHz, both in phase (bunch shortening mode) and in counter-phase (bunch lengthening mode) with respect to the principal one at 10 MHz, have been measured.

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Footnotes

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Yes

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