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Space charge effects during half-integer resonance crossing in the CERN PSB

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Space charge effects are the main performance limitation for the beam brightness in the CERN Proton Synchrotron Booster (PSB). Operating at higher vertical tunes, near or above the vertical half-integer resonance 2Qy=9, offers more space in the tune diagram to accommodate the large space charge tune spread, potentially allowing for brighter beams. In this context, an experimental campaign was performed to characterize the space charge dynamics during the controlled crossing of the half-integer resonance. This contribution summarizes the main results. The scaling of beam degradation with the space charge detuning and resonance crossing rate is analyzed, which could be relevant to any high-intensity synchrotron operating near a half-integer resonance. Finally, the achievable beam brightness in the PSB for injection above the half-integer resonance was tested experimentally and first results are reported here.

Footnotes

Funding Agency

I have read and accept the Privacy Policy Statement

Yes

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