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SPS fixed target spill quality improvements in the longitudinal plane

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The SPS proton fixed target beams are spilled via a third integer resonant extraction, for which high momentum spread is beneficial. To increase the momentum spread prior to the slow extraction, the bunches are stretched at the unstable phase by inverting the sign of the RF voltage. The RF phase is then flipped back, and the voltage is turned off when the bunch distribution is rotated to the maximum momentum spread. The past production scheme additionally relied on uncontrolled longitudinal blow-up of the unstable beam during the acceleration ramp. After the major upgrade of the main RF system and a successful impedance reduction campaign, the spill quality was significantly compromised. This contribution summarizes the efforts to recover, and improve, the spill quality. The use of the fourth harmonic RF system and controlled longitudinal emittance blow-up are used for beam stabilization along the ramp. Moreover, RF counter phasing is applied during the first part of the de-bunching to profit from the cavity impedance reduction of the feedback systems.

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Footnotes

I have read and accept the Privacy Policy Statement

Yes

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