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Synchronised PS-SPS transfer with barrier buckets

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For the future intensity increase of the fixed-target beams in the CERN accelerator complex, a barrier bucket scheme has been developed to reduce the beam loss during the 5-turn extraction from the PS towards the SPS, the so-called Multi-Turn Extraction. The low-level RF system must synchronize the phase of the barrier with the PS extraction and SPS injection kickers to minimize the number of particles lost during the rise times of their fields. As the RF voltage of the wide-band cavity generating the barrier bucket would be too low for a conventional synchronization, a combination of a feedforward cogging manipulation and the real-time control of the barrier phase has been developed and tested. A deterministic frequency bump has been added to compensate for the imperfect circumference ratio between PS and SPS. This contribution presents the concept and implementation of the synchronized barrier-bucket transfer. Measurements with high-intensity beam demonstrate the feasibility of the proposed transfer scheme.

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