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Particle Trapping in Stable Islands of Transverse Phase Space CHRISTOPHER FRYE, University of Central Florida — At CERN, particles are transferred from the Proton Synchrotron (PS) to the Super Proton Synchrotron (SPS) as they accelerate to high energies for subsequent fixed target or neutrino experiments. Since the SPS has a circumference eleven times that of the PS, beams from the PS must be "stretched out" in order to fill the SPS. Traditional methods of carrying out this beam transfer, such as fast extraction and continuous transfer, create either strong transient effects (fast extraction) or suffer from large losses of particles during transfer and a lack of control over optical parameters of the extracted beam (continuous transfer). As a result, a novel method called multi-turn extraction (MTE) has been investigated and implemented in recent years, in which nonlinear magnetic fields create stable islands in the beam's horizontal phase space, thus separating the beam into parts for clean extraction. We analyze, both analytically and through simulations, a simple model of this phenomenon in order to understand the separate effects of moving and enlarging these phase-space islands. We then apply our conclusions to optimize beam-splitting in a more realistic model.

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