

Abstract:

Injection System for SLS 2.0 Based on Non-Linear Injection Kicker and Efficient Emittance Exchange

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The injection scheme for the SLS upgrade takes advantage of the already low horizontal emittance delivered by booster synchrotron which is further reduced by exchanging horizontal and vertical emittance before extraction. Thus the SLS 2.0 injection scheme can be based on a thin septum, enlarged horizontal beta function, and a 4 kicker injection bump or, without the bump, fast stripline kicker magnets sharing the momentum of the injected beam with the already stored beam. The combination of both schemes would reduce the aperture requirement down to a level where, until now, on-axis injections appeared to be the method of choice. In the future, with even faster kickers, on-axis longitudinal (off-phase) injections might be feasible. The required strength of these fast stripline kickers would be reduced considerably in such a cascaded injection scheme.

As an academic exercise a potentially more transparent injection system for the SLS upgrade will be discussed. In this scheme the 4 kicker bump is replaced by a non-linear kicker, NLK. The limitations of the combination with aperture sharing will be discussed briefly. As will be shown, the emittance exchange in the booster synchrotron by crossing the linear coupling resonance will not be the limiting factor.

The combination of two injection principles opens the path to inject into lattices with very small dynamic apertures. With a NLK as the first step instead of the 4 kicker injection bump top-up injections could reach a level of transparency which would be appreciated by the users.