ACCELERATOR SEMINAR

Sabrina Appel
GSI Helmholtzzentrum für Schwerionenforschung GmbH

Thursday, 14th September at 4 p.m.

KBW side room lecture hall
Planckstraße 1, 64291 Darmstadt

"Novel beam injection optimization"

The horizontal multi-turn injection (MTI) into the SIS18 is one of the bottlenecks for providing ion beams of unprecedented intensities and qualities for FAIR. An optimized injection is also crucial for an excellent interfacing between injector linac and synchrotron. The loss-induced vacuum degradation and associated life-time reduction is one of the key intensity limiting factors for SIS18. Beam loss during injection can trigger the pressure bump instability. An optimized injection can also relax the dynamic vacuum problem. Various techniques solution like the skew injection scheme to improve the injection performance will be discuss and compared. The injection into the SIS18 has to respect Liouville's theorem - avoiding the already occupied phase space area. Introducing a controlled linear coupling through skew quadrupole would allow to exploited also the vertical phase space. In order to find optimal injection parameters novel optimization methods like genetic algorithms (GA) and particle swarm algorithms (PSO) has been used. The outcome of extensive optimization studies to define suitable injector brilliances for significant improvement of MTI performance will be present. This crucial information gives more flexibility for the injector upgrade layout.

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