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Solenoid Transport and Final Focusing System for High Intensity Ion Beams

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# Solenoid Transport and Final Focusing System for High Intensity Ion Beams

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Several applications of solenoids to transport and focus high intensity ion beams are currently under consideration by the USA-HIFS-VNL. These include beam transport in high current injectors that use either a standard switched electrostatic accelerator column or a Pulse Line Ion Accelerator, transport in induction linacs, and transport in neutralized drift compression and final focus systems. The USA-HIFS-VNL has designed and is operating the Solenoid Transport Experiment (STX) to test the equilibrium and stability and to benchmark the numerical simulations of high intensity ion beam manipulations in solenoids. The beam line consists of a  $K^+$  ion gun that can operate between 200—400 kV to deliver 15—40 mA of a high brightness beam. This beam is injected into a four-solenoid lattice which is designed to transport the beam in a state as close as possible to a Brillouin flow, i.e. cold in the transverse plane and spinning at the Larmor frequency. The same lattice can be operated to final focus the ion beam to be used in the NDCX series of experiments where the beam will be focused transversely as well as longitudinally. We will present the physics design of the STX experiment as well as numerical simulations of the beam dynamics for transport and final focusing of high intensity ion beams.

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