Results from the High Current Experiment for Heavy Ion Fusion*

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The High Current Experiment (HCX) located at Lawrence Berkeley National Lab and carried out by the HIF-VNL is designed to explore the physics of intense beams with line-charge density of 0.1-0.2 □C/m and pulse duration □≈ 5 □s, close to the values of interest for a fusion driver. Experiments are performed near driver injection energy (1-1.8 MeV). HCX beam transport is at present mainly based on electrostatic quadrupole focusing, which provides the most efficient option at low energy and provide clearing fields, which sweep out unwanted electrons. Magnetic transport experiments will also be performed to gain operational experience and to explore special limitations associated with magnetic focusing, in particular the onset of transport-limiting effects due to electrons trapped in the potential well of the ion beam[1].

The expected advances in the understanding of the physics of intense ion beam transport and acceleration will enable determination of the optimal beam clearance to the vacuum wall, tolerance on beam alignment and on beam envelope control. Measurements of the phase space evolution and beam halo will be presented, with new diagnostics and with implications for the design of future induction linear accelerators for IFE research.

[1] See A. W. Molvik et al., these proceedings.

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