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Electron Cloud measurements in Heavy-Ion Driver for HEDP and Inertial Fusion Energy*

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The High Current Experiment (HCX) at LBNL is a driver scale single beam injector that provides a 1 MeV K⁺ ion beam current of 0.18 A for 5 μ s. It should be able to transport high-current beams with large fill factor (ratio of the beam to the tube radius) and low emittance growth in order to keep the cost of the power plant competitive and satisfy the target requirements of focusing high-power density.

Beam interaction with the background gas and walls desorbs electrons that can multiply and accumulate, creating an electron cloud. This ubiquitous effect grows at higher fill factors and degrades the quality of the beam. Simulations show that the electron cloud has a quadrant structure inside the magnetic quadrupoles and drift to the gaps. A variety of diagnostics were placed inside the magnetic transport section to measure electron production, accumulation and its properties.

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