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Particle transport in laser-produced HED plasmas in the presence of a megagauss magnetic field[1] GRIFFIN GLENN, CODY CHANG, SEAN LEWIS, TODD DITMIRE, HERNAN QUEVEDO, UT Austin, ALEXEY AREFIEV, UCSD, SHANE SPEAS, AARON LOMBROZO, ROBERT HOHLFELDER, JOHN PORTER, Sandia National Laboratories — We present a planned experimental effort to study two basic features in previously unexplored regimes in a laser-generated HED plasma embedded in a strong magnetic field: 1) radial confinement of the bulk hot ion population, and 2) cross field transport of an energetic electron minority. We will generate a cylindrical plasma with variable electron and ion energies using a laser-irradiated clustering gas jet where a 50 TW, 130 fs laser pulse can be efficiently absorbed to generate keV temperatures. We will use a portable current source developed at Sandia National Laboratories to generate the megagauss-scale magnetic field required to produce a β_{mag} $\sim$1 condition where electrons will be magnetized and ions will not. The subsequent plasma dynamics will be examined using time-resolved optical interferometry and time-integrated diagnostics for energy spectra. We have already made initial Rayleigh scattering measurements using a ns-pulsed laser that confirmed that the clusters from our pulsed gas jet source survive the shock which might be induced by the magnetic coil. Sandia National Laboratories is refurbishing and improving the pulsed power source, and we will also show progress on that effort.

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