HIF RESEARCH ON THE UNIVERSITY OF MARYLAND ELECTRON RING (UMER)*

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The understanding of collective interactions of particles in an intense beam by means of long range forces is crucial for successful development of heavy ion inertial fusion. Designs for a heavy ion fusion drivers call for beam brightness and intensity surpassing traditional limits. Collective effects such as halo formation and emittance growth impose stringent limits on the driver and can raise the costs of the machine. The University of Maryland Electron Ring (UMER), currently near completion, is designed to be a scaled model (3.6-m diameter) for exploring the dynamics of such intense beams. The ring configuration permits the investigation of dispersion and other effects that would occur in bends and a recirculator machine, in addition to those occurring in a straight lattice. Using a 10 keV electron beam, other parameters are scaled to mimic those of much larger ion accelerators, except at much lower cost. An adjustable current in the 0.1-100 mA range provides a range of intensities unprecedented for a circular machine. By design, UMER provides a low-cost, well-diagnosed research platform for driver physics, and for beam physics in general. UMER is augmented with a separate setup, the Long Solenoid Experiment (LSE) for investigating the longitudinal beam dynamics and the evolution of energy spread due to Coulomb collisions in a straight geometry.

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