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Simulations Demonstrating Extended MHD Effects During the Laser Preheat Stage of MagLIF Experiments and Electro-Thermal Instability Growth Within MagLIF Liners with an Applied Axial Field AIDAN BOXALL, JEREMY CHITTENDEN, BRIAN APPELBE, Imperial College London — We present results from simulations of MagLIF experiments at Sandia National Laboratory, using an extended MHD version of the 3D Gorgon code which includes the full Braginskii form of Ohm's law and associated magnetized heat flow. The effects of the Nernst, cross-Nernst and magnetized heat flow on the laser preheat stage of the implosion are investigated. Electro-thermal instability growth in the presence of an axial field is also studied. Resistive volumetric perturbations were added to replicate the effects of liner impurities. The volumetric perturbations redirect the current to flow around them. With an applied axial field the total magnetic field on the liner edge is helical. Redirected current flowing parallel to the helical field experiences a reduced Lorentz force compared to current redirected to flow perpendicular to the magnetic field. This variation in the Lorentz force alters the vaporization rate of the liner. This may provide a helical bias to the electrothermal instability growth to seed the helical MRT growth observed in experiments.

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