Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

**Burn Propagation in ICF and MIF Plasmas.** BRIAN APPELBE, Imperial College London, MARK SHERLOCK, Lawrence Livermore National Laboratory, CHRIS WALSH, AIDAN CRILLY, JEREMY CHITTENDEN, Imperial College London — High energy gain in Inertial Confinement Fusion and Magneto-Inertial Fusion requires the propagation of a burn wave from hot plasma into a cold, dense fuel layer. The speed and efficiency of this propagation determines the energy gain that can be achieved. This work focuses on the physical processes occurring in burn wave propagation and the factors which determine the speed of propagation. Highly resolved hydrodynamic and magneto-hydrodynamic simulations of burn fronts are carried out to study the effects of heat and magnetic field transport at the burn front. It is found that electron heat flow plays an important role in the region behind the burn front, transporting energy from regions in which rapid self-heating is occurring to cooler regions. When a magnetic field is present the suppression of heat flow significantly reduces burn propagation speed. It is also found that magnetic field transport at the burn front is dependent on fuel magnetization. For low values of the electron Hall parameter, the magnetic field can be compressed by the propagating burn front, but for high values rarefaction of the field occurs due to expansion of the heated plasma.

Brian Appelbe
Imperial College London

Date submitted: 10 Jul 2019

Electronic form version 1.4