Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

Self-generated Magnetic Fields in ICF Implosion due to the Fill-tube CHRISTOPHER WALSH, KRIS MCGLINCHEY , AIDAN CRILLY, BRIAN APPELBE, JEREMY CHITTENDEN, Centre for Inertial Fusion Studies, Imperial College London — Magnetic fields self-generated during ICF implosions are not typically considered in the design or post-shot analysis of experiments and have the potential to explain discrepancies between simulations and experimental results. During target stagnation, the fields are anticipated to grow to greater than 10,000T [1], magnetizing the plasma at the hot-spot edge. The magnetic field transport and subsequent plasma magnetization is highly dependent on the perturbation type. This talk extends previous work by simulating a fill-tube perturbation, with subsequent modifications to the performance degradation and diagnostic signatures due to magnetic fields studied. Front-to-back simulations using a surrogate fill-tube show magnetic fields self-generated around the perturbation, predominantly in the layer with large temperature/density gradients, which is hard to magnetize. However, the large ablation of plasma from the spike into the hot-spot overcomes the de-magnetizing Nernst process and results in magnetic field loops injected into the hot-spot core. As the hot-spot core is easier to magnetize, the field loop sustains a large region of cooled plasma ahead of the spike. The Righi-Leduc effect deflects heat-flow away from the spike, allowing it to propagate deeper into the core. References [1] C.A.Walsh, et al., Physical Review Letters 118, 155001 (2017)

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Date submitted: 03 Jul 2019 Electronic form version 1.4