Abstract Submitted
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On the onset of kinetic effects in ICF implosions[1] PETER AMENDT, CLAUDIO BELLEI, SCOTT WILKS, LLNL, CHIKANG LI, HANS RINDERKNECHT, MICHAEL ROSENBERG, HONG SIO, RICHARD PETRASSO, PSFC, MIT — Central hot spot ignition requires the careful sequencing of several shocks that coalesce in the gaseous deuterium-tritium fuel to form a high Mach number shock. Near the instant of shock convergence at the origin (or "shock flash"), the ion mean free path may be a significant fraction of the hot spot radius, leading to a potential violation of the fluid approximation that generally underlies mainline radiation-hydrodynamic simulation tools. Understanding this physical regime may have consequences on subsequent hot spot formation and ignition performance margins. Recent data obtained on the Omega laser facility point to a transition in direct-drive exploding pusher implosion behavior below a threshold pressure where the ion mean free path is on the order of the fuel radius at shock flash [1]. Adaptation of a Guderley-type shock solution in a converging geometry to include finite mean-free-path effects is undertaken to understand this kinetic regime.

[1] Courtesy of M. Rosenberg, Ph.D. candidate

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