Abstract Submitted
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Fundamental science at the extremes on NIF[1] BRUCE REMINGTON, Lawrence Livermore Natl Lab — The universe abounds with extreme phenomena and conditions. Examples include planetary core properties at extraordinary pressures and densities; star formation dynamics; stellar nucleosynthesis; supernova explosions launching powerful shocks that ripple throughout the universe for centuries to millennia, generating magnetic fields and accelerating particles; and relativistic shocks resulting from the most powerful explosions in the universe, namely, gamma-ray bursts (GRBs). Laboratory experiments on the National Ignition Facility (NIF) are improving our understanding of these extreme phenomena through the NIF Discovery Science program. I will discuss results from NIF on (1) high pressure equations of state and detailed plasma characterization at planetary core and brown dwarf interior conditions; (2) nuclear reactivities and astrophysical S-factor measurements at stellar core conditions; (3) hydrodynamic instabilities relevant to supernova explosions and stellar and planetary formation dynamics; (4) astrophysical collisionless shocks, magnetic field generation, and particle acceleration; and (5) relativistic pair plasma generation using the NIF ARC laser, relevant to aspects of GRB dynamics.

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