

FRONTIERS IN DISCOVERY SCIENCE ON NIF*

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High energy density (HED) science is an area of research that is still in its infancy. Its possibilities are only starting to be explored, as the HED experimental facilities that exist have only recently set up fundamental science or discovery science programs. Most recently, the National Ignition Facility (NIF) has formed its Discovery Science Program, within which facility access is granted based on competitive proposals from the international science community. The topics being pursued under NIF Discovery Science span hydrodynamic instabilities in inertial confinement fusion and turbulent flows; high pressure material science and warm dense matter properties relevant to planetary and brown dwarf interiors and planetary formation dynamics; radiative dynamics relevant to star forming regions in molecular clouds and supernova explosions; collisionless shock dynamics relevant to astrophysical shocks from protostellar jets, supernova remnants, galactic jets, starburst galaxies, mergers of galaxy clusters, and gamma-ray bursts; magnetogenesis through the turbulent dynamo mechanism as the source of magnetic fields in the universe; and big bang and stellar nucleosynthesis. In combination with similar fundamental research programs at other HED facilities around the world, a wide range of research topics are being pursued. I will present a summary of research being done as part of the NIF Discovery Science Program, and provide a brief look forward at experiments planned to start in the coming year.

*This work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.