

Abstract Submitted
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Unique Regimes of High Energy Density Physics Through the NIF Discovery Science Program¹ BRUCE A. REMINGTON, Lawrence Livermore National Laboratory — The Discovery Science program at the National Ignition Facility (NIF) laser at Lawrence Livermore National Laboratory (LLNL) offers access to unique regimes of high energy density (HED) science. Examples from recent Discovery Science experiments include VISAR measurements of the equation of state (EOS) of carbon up to 50 Mbar, [1] iron at 14 Mbar, [2] and hydrogen up to 6 Mbar [3]. We have also measured the absolute EOS of polystyrene to 60 Mbar with radiography of a spherically converging shock wave. [4] And using two-dimensional, face-on, time resolved radiography of accelerated, Rayleigh-Taylor unstable foils, we have inferred the strength of ductile metals at peak pressures of 3 Mbar or higher, and strain rates of 1×10^7 1/s. [5, 6, 7] Examples from these experiments on NIF will be given.

[1] R.F. Smith, Nature 511, 330 (2014).

[2] Raymond F. Smith et al., Nature Astronomy 2, 452 (2018).

[3] Peter M. Celliers et al., Science 361, 677 (2018).

[4] Tilo Doeppner et al., PRL 121, 025001 (2018).

[5] Hye-Sook Park et al., PRL, in preparation (2019).

[6] A. Krygier et al., PRL, submitted (2019).

[7] B.A. Remington et al., Proceedings of the U.S. National Academy of Sciences (PNAS), Published: 2018-Jun-26 (Epub 2018 Jun 26).

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