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Analytic Analysis of Convergent Shocks to Multi-Gigabar Conditions J.J. RUBY, J.R. RYGG, G.W. COLLINS, Laboratory for Laser Energetics, U. of Rochester, B. BACHMANN, T. DOEPPNER, Y. PING, J. GAFFNEY, A. LAZICKI, A.L. KRITCHER, D. SWIFT, J. NILSEN, O.L. LANDEN, R. HATARIK, N. MASTERS, S. NAGEL, P. STERNE, T. PARDINI, S. KHAN, P.M. CELLIERS, P. PATEL, LLNL, D. GERICKE, University of Warwick, R. FALCONE, University of California, Berkeley — The gigabar experimental platform at the National Ignition Facility is designed to increase understanding of the physical states and processes that dominate in the hydrogen at pressures from several hundreds of Mbar to tens of Gbar. Recent experiments using a solid CD_2 ball reached temperatures and densities of order 10^7 K and several tens of g/cm^3, respectively. These conditions lead to the production of D–D fusion neutrons and x-ray bremsstrahlung photons, which allow us to place constraints on the thermodynamic states at peak compression. We use an analytic model to connect the neutron and x-ray emission with the state variables at peak compression. This analytic model is based on the self-similar Guderley solution of an imploding shock wave and the self-similar solution of the point explosion with heat conduction from Reinicke. Work is also being done to create a fully self-similar solution of an imploding shock wave coupled with heat conduction and radiation transport using a general equation of state. This material is based upon work supported by the Department of Energy National Nuclear Security Administration under Award Number DE-NA0001944.

G.W. Collins
Laboratory for Laser Energetics, U. of Rochester

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