Abstract Submitted
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Impact of flows on ion temperatures inferred from neutron spectra produced in NIF DT implosions[1] M. GATU JOHNSON, J.A. FRENJE, R.D. PETRASSO, MIT, J.P. KNAUER, LLE, J.A. CAGGIANO, D.A. CALLAHAN, D.T. CASEY, C.J. CERJAN, T. DOEPPNER, M.J. ECKART, G.P. GRIM, E.P. HARTOUNI, R. HATARIK, D.E. HINKEL, O.A. HURRICANE, A. KRITCHER, S. LE PAPE, T. MA, D.H. MUNRO, P. PATEL, J.E. RALPH, D.B. SAYRE, B.K. SPEARS, C.B. YEAMANS, LLNL, J.D. KILKENNY, GA — Neutron spectrometers on the NIF provide accurate, directional information of the DT and DD neutron spectra from layered DT implosions. Traditionally, ion temperatures (T_{ion}), essential for assessing conditions in the hotspot of the implosions, are inferred from the broadening of primary neutron spectra. Directional motion (flow) of the fuel at burn also impacts broadening and may lead to artificially inflated "T_{ion}" values. We examine NIF neutron spectra to assess the impact of flows on measured T_{ion}. Measured DT T_{ion} is consistently higher than measured DD T_{ion}, which suggests that significant energy is lost to radial or turbulent kinetic fuel motion at peak burn. However, explaining the full observed T_{ion} difference with fuel motion, as calculated from a Ballabio[2] and Murphy[3] analysis, leads to a thermal T_{ion} too low to explain observed yields. These results have improved our understanding of hotspot formation and the concept of "stagnation" in layered NIF implosions.

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[2]Ballabio et al., Nucl. Fusion **38**, 1723 (1998).
[3]Murphy, Phys. Plasmas **21**, 072701 (2014).

Fredrick Seguin
MIT

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