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Inference of the electron temperature in ICF implosions from the hard Xray spectral continuum[1] GRIGORY KAGAN, LANL, O.L. LANDEN, LLNL, D. SVYATSKY, LANL, H. SIO, N.V. KABADI, R.A. SIMPSON, M. GATU JOHNSON, J.A. FRENJE, R.D. PETRASSO, MIT, R.C. SHAH, T.R. JOSHI, P. HAKEL, T.E. WEBER, LANL, H.G. RINDERKNECHT, D. THORN, M. SCHNEIDER, D. BRADLEY, J. KILKENNY, LLNL — The NIF Continuum Spectrometer, scheduled to be first deployed in Fall of 2017, will infer the imploded core electron temperature from the free-free continuum self-emission spectra of photons with energies of 20 to 30 keV. However, this hard X-ray radiation is emitted by the tail of the electron distribution, which likely deviates from Maxwellian and thus obscures interpretation of the data. We investigate resulting modifications to the X-ray spectra. The logarithmic slope of the spectrum from the more realistic, non-thermal tail of the electron distribution is found to decrease more rapidly at higher photon energies, as compared to the perfectly Maxwellian case. Interpreting the spectrum with assumption of Maxwellian electrons enforced is shown to give an electron temperature that is lower than the actual one. Conversely, due to its connection with the non-thermal features in the electron distribution, hard X-ray emission can provide unprecedented information about kinetic processes in the hot DT core.

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Grigory Kagan
LANL

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