

Abstract Submitted
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Interpreting the peak shape of a neutron spectrum¹ DAVID MUNRO, JOHN FIELD, BRIAN SPEARS, Lawrence Livermore National Laboratory — The width of the DT or DD peak in a neutron spectrum has long been used to measure ion temperature in burning plasmas. We relate the moments of the neutron spectrum observed along a given line of sight to moments of the fluid temperature and velocity distributions. The variance of the spectral peak depends not only on the mean fluid temperature, but also on the variance of the fluid velocity. A mean fluid velocity shifts the peak centroid, correlations between fluid temperature and velocity skew the peak, and the variance of the fluid temperature distribution produces kurtosis in the peak. Hydrodynamic simulations of implosions predict that burn occurs over a broad distribution of fluid temperatures, which should produce observable kurtosis of order 0.25 in typical laser fusion implosions.

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