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Measuring Areal Density Using n-T Elastic Scattering C.J. FORREST, Dept. of Physics and Astronomy, U. of Rochester, V.YU. GLEBOV, V.N. GONCHAROV, J.P. KNAUER, D.D. MEYERHOFER, P.B. RADHA, T.C. SANGSTER, C. STOECKL, Laboratory for Laser Energetics, U. of Rochester — We propose to infer the areal density (ρR) in cryogenic DT implosions on OMEGA by measuring the number of primary neutrons scattered off the dense triton (T) distribution during peak burn. Areal density measurements are currently inferred on OMEGA and the NIF by measuring the number of neutrons scattered off the DT plasma in the 10- to 12MeV range. Recent experiments show evidence that the low-energy portion of the elastic (n,T) scattering distribution (below 5 MeV) can be inferred above background components. We estimate that for a DT implosion with a yield of 5×10^{12} and a burn-average ρR of 200 mg/cm^2, 1×10^5 (n,T) neutrons are produced between 3.2 and 5 MeV. This yield can be directly measured with good statistical accuracy using a standard neutron time-of-flight (nTOF) detector with an advanced scintillator that minimizes the delayed light emission from the primary neutrons. A description of this new "kinematic endpoint" ρR concept and the nTOF detector being developed to measure it will be discussed. This work was supported by the U.S. Department of Energy Office of Inertial Confinement Fusion under Cooperative Agreement No. DE-FC52-08NA28302.

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