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Diagnosing cryogenic D_2 and DT implosions at OMEGA using charged-particle spectrometry J.A. FRENJE, D.T. CASEY, C.K. LI, J.R. RYGG, F.H. SÉGUIN, R.D. PETRASSO, MIT, P.B. RADHA, V.YU. GLEBOV, D.D. MEYERHOFER, T.C. SANGSTER, UR-LLE — Charged-particle spectrometry is a well established technique for determining areal density (ρR) in cryogenic D2 implosions at OMEGA. From the energy-down shift of the secondary D^3He-proton spectrum, measured in several different directions, ρR and ρR asymmetries have been successfully determined. Inferring ρR and ρR asymmetries in cryogenic DT implosions is more challenging as it requires new spectrometry techniques to be developed. Currently, a novel neutron spectrometer for down-scattered neutron measurements is being developed at OMEGA and the NIF. In this paper, we describe the complementary charged-particle-spectrometry techniques available and under development at OMEGA for simultaneous measurements, in several different directions, of knock-on deuterons, knock-on tritons, (n,2n)-protons, and primary D3He protons produced in cryogenic DT implosions. It will be shown that ρR and ρR asymmetries in moderate ρR ($<$200 mg/cm^2) implosions can be determined from the set of measured charged-particle spectra. This work was supported in part by UR-LLE, LLNL, the U.S. DoE, and the N.Y. State Energy Research and Development Authority. This work was supported in part by LLE, LLNL, the U.S. DoE, and the N.Y.State Energy Research and Development Authority.

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