Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

Neutron Induced D Breakup in Inertial Confinement Fusion at the Omega Laser Facility C.J. FORREST, V.YU. GLEBOV, J.P. KNAUER, P.B. RADHA, S.P. REGAN, T.C. SANGSTER, C. STOECKL, Laboratory for Laser Energetics, U. of Rochester, W.U. SCHRODER, Departments of Chemistry and Physics, U. of Rochester, J.A. FRENJE, M. GATU JOHNSON, PSFC, MIT — High-resolution neutron spectroscopy is used to study the deuteron breakup reaction D(n,n′)np in the thermonuclear environment created in inertial confinement fusion experiments at the Omega Laser Facility. Neutrons with an energy of 14.1 MeV generated in the primary D–T fusion reactions scatter elastically and inelastically off the dense (cryogenic) D–T fuel assembly surrounding the central hot spot at peak fuel compression. These neutrons also induce a breakup of the fuel deuterons. The corresponding breakup cross section is measured relative to elastic n−D and n−T scattering, i.e., simultaneously in the same environment. Apart from astrophysical and technological interest, the neutron-induced deuteron breakup reaction is of interest to the physics of nucleon−nucleon forces. For example, theoretical calculations predict a noticeable influence of nucleonic three-body forces on the magnitude of the breakup cross section. Preliminary results from measurements of the neutron contribution in the 2- to 6-MeV range show reasonable agreement with the published ENDL 2008.2 semi-empirical cross-section. This material is based upon work supported by the Department of Energy National Nuclear Security Administration under Award Number DE-NA0001944.

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Date submitted: 21 Jul 2015 Electronic form version 1.4