Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

Neutron Time-of-Flight Measurements of Charged-Particle Energy Loss in Inertial Confinement Fusion Plasmas[1] DANIEL SAYRE, CHARLIE CERJAN, LAURA BERZAK HOPKINS, JOSEPH CAGGIANO, LAURENT DIVOL, MARK ECKART, FRANK GRAZIANI, GARY GRIM, ED HARTOUNI, ROBERT HATARIK, SEBASTIEN LE PAPE, ANDREW MACKINNON, DIETER SCHNEIDER, SCOTT SEPKE, Lawrence Livermore National Laboratory — Neutron time-of-flight measurements of inflight $\mathrm{T}(d,n)\alpha$ reactions created during an implosion of a deuterium gas target have been performed at the National Ignition Facility, with order of magnitude improvements in statistics and resolution over past experiments. In the implosion, energetic tritons emitted by thermonuclear fusion within the deuterium plasma produced over 10^{11} inflight $\mathrm{T}(d,n)\alpha$ reactions. The yield and particle spectrum of inflight reactions are sensitive to the triton's energy loss in the plasma, which, in this implosion, consisted of multi-keV temperatures and number densities above 10^{24} cm^{-3}. Radiation-hydrodynamic simulations of the implosion were adjusted to match the yield and broadening of the $\mathrm{D}(d,n)^3\mathrm{He}$ neutron peak. These same simulations give reasonable agreement with the measured $\mathrm{T}(d,n)\alpha$ yield and neutron spectrum, and this provides a strong consistency check of the simulated plasma conditions and energy loss model.

[1]This research was performed under the auspices of the U. S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

Daniel Sayre
Lawrence Livermore National Laboratory

Date submitted: 24 Jul 2015 Electronic form version 1.4