

Abstract Submitted
for the DPP10 Meeting of
The American Physical Society

Laser Generated Neutron Source for Temperature Measurement

D.C. SWIFT, J.M. MCNANEY, D.S. HEY, S. LE PAPE, A. MACKINNON, LLNL, D.P. HIGGINSON, T. BARTAL, UCSD/LLNL, L.C. JARROTT, D. MARISCAL, F.N. BEG, UCSD, K.L. LANCASTER, CLF (UK), N. NAKANII, H. NAKAMURA, R. KODAMA, K.A. TANAKA, ILE (Japan) — Neutron Resonance Spectroscopy (NRS) is a robust temperature measurement tool for shocked matter in the 0.1-3 eV range, with error bars as low as ± 100 Kelvin, using neutrons from a particle accelerator. Using NRS at high-energy laser facilities requires the development and optimization of a laser-generated neutron source. In this experiment, the Titan laser (150J/0.7ps) was used to accelerate protons from the rear of a Cu foil. The protons were incident on a LiF foil, which used the ${}^7\text{Li}(p,n){}^7\text{Be}$ reaction to create up to 1.8×10^9 neutrons. Absolute measurements of neutron yields are used to validate simulations of the proton deceleration and reaction. This allows for optimization of neutron generation on Titan and for predicted yields at higher energy facilities. For example, $\sim 2 \times 10^{10}$ neutrons are predicted at Omega EP. This work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

D.C. Swift
LLNL

Date submitted: 16 Jul 2010

Electronic form version 1.4