Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

Neutron beams driven by the Texas Petawatt laser[1] JUAN C. FERNANDEZ, D.C. GAUTIER, A. FAVALLI, S.A. JUNGHANS, M.A. SANTIAGO, Los Alamos National Lab., G. DYER, E. MCCARY, R. ROYCROFT, X. JIAO, B. BOWERS, G. TIWARI, L. LISI, B.M. HEGELICH, Univ. of Texas, Austin — Intense laser-driven ion beams produced in the relativistically-induced transparency regime have been used to generate intense γ-ray and neutron beams [1]. For neutrons, a laser-driven deuteron beam is directed at a Be disk "converter", where deuterons split producing mainly forward-directed neutrons. The aforementioned experiments have been done at the Trident laser using a 0.5 ps laser pulse of 1 μm wavelength focused up to 10^{21} W/cm^2 onto nanofoils of deuterated-plastic (CD_x where x=1−2), making 1x10^{10} neutrons/sr at $\sim$ MeV average energies [2]. Here we report on the first experiments to explore the same regime at the Texas Petawatt (TPW) laser facility. With one plasma mirror, TPW delivers high-contrast laser pulses as short as 0.15 ps at intensities up to 2x10^{21} W/cm^2. CD and Al/CD multilayer targets of thickness in the range of 50 – 750 nm have been used. This setup has delivered up to 5x10^9 neutrons/sr. The dependence of neutron yield on target composition and thickness, and on laser pulse length is presented and discussed. . . . . [1] J.C. Fernández et al., *Laser-plasmas in the relativistic-transparency regime: Science and applications,* Phys. of Plasmas **24**, 056702 (2017) [2] M. Roth et al., *Bright Laser-Driven Neutron Source Based on the Relativistic Transparency of Solids,* Phys.Rev. Lett. **110,** 044802 (2013)

[1]This work is sponsored by the NNSA of the USDOE.

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Date submitted: 18 Jul 2017 Electronic form version 1.4