

Abstract Submitted  
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**Laser and Pulsed Power Electron Density Imaging Through Talbot-Lau X-ray Deflectometry.**<sup>1</sup> MARIA PIA VALDIVIA LEIVA, DAN STUTMAN, Johns Hopkins University, CHRISTIAN STOECKL, CHAD MILEHAM, ILDAR BEGISCHEV, WOLFGANG THEOBALD, JAKE BROMAGE, SEAN REGAN, Laboratory for Laser Energetics, SALEE KLEIN, University of Michigan, GONZALO MUOZ-CORDOVEZ, MILENKO VESCOVI, VICENTE VALENZUELA-VILLASECA, FELIPE VELOSO, Pontificia Universidad Catlica de Chile — A Talbot-Lau X-ray Deflectometer was deployed using laser driven and x-pinch x-ray backlighters. The Talbot-Lau X-ray Deflectometer is an ideal electron density diagnostic for High Energy Density plasmas with the potential to simultaneously deliver x-ray refraction, attenuation, elemental composition, and scatter information from a single image with source limited resolution. Grating survival and electron density mapping was demonstrated for 10-29 J, 8-30 ps laser pulses using Cu foil targets at the Multi-TeraWatt facility. An areal electron density of  $\sim 0.050$  g/cm<sup>2</sup> was obtained at the center of a fluoro-nylon fiber of  $\sim 300$  mm diameter with a source FWHM of  $\sim 80$  m and resolution of  $\sim 50$  m. Grating survival and Moiré pattern formation was demonstrated using a Cu x-pinch plasma of FWHM  $\sim 27$  m, driven by the 350 kA, 350 ns Llampudken pulsed power generator. These results closely match simulations and laboratory results. It was demonstrated that the technique can detect both sharp and smooth density gradients in the range of  $\sim 2 \times 10^{23}$  to  $\sim 2 \times 10^{25}$  cm<sup>-3</sup>, thus allowing implementation of the electron density technique as a HED plasma diagnostic in both laser and pulsed power experiments

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