Abstract Submitted
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X-ray Thomson scattering of warm dense matter on the Z-accelerator[1] TOMMY AO, ERIC HARDING, JAMES BAILEY, MICHAEL DESJARLAIS, STEPHANIE HANSEN, RAYMOND LEMKE, GREGORY ROCHAU, DANIEL SINARS, IAN SMITH, MARCUS KNUDSON, JOSEPH RENEKER, MATTHEW KERNAGHAN, Sandia National Laboratories, GIANLUCA GREGORI, University of Oxford — Experiments on the Z-accelerator have demonstrated the ability to produce warm dense matter (WDM) states with unprecedented uniformity, duration, and size. Significant progress to combine x-ray Thomson scattering (XRTS), a powerful diagnostic for WDM, with the extreme environments created at Z has been accomplished. The large Z current is used to magnetically launch Al flyers to impact CH_2 foam (0.12 g/cm^3). The uniformly-shocked CH_2 volume is 5-10 mm^3, and the steady shock phase lasts 10-100 ns, which are roughly 1500 & 100 times larger, respectively, than typical laser shocked samples. The Z-Beamlet laser irradiates a 5 μm thick Mn foil near the load to generate 6.181 keV Mn-He-α x-rays that penetrate into the WDM state and scatter from it. A new high sensitivity x-ray scattering spherical spectrometer (XRS^3) with both high spatial ($\sim$75 μm) and spectral ($E/\Delta E \sim 1500$) resolution is fielded that enables benchmark quality data by simultaneously measuring x-rays scattered from shocked and ambient regions of the CH_2 foam, and the Mn x-ray source.

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Tommy Ao
Sandia National Laboratories

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