

Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

Single crystal X-ray spectropolarimeter for HED plasmas and its use on wire array z-pinches¹ MATT WALLACE, SHOWERA HAQUE, PAUL NEILL, University of Nevada, Reno, ALAN KASTENGREN, Argonne National Lab, NINO PEREIRA, Ecopulse Inc., RADU PRESURA², Voss Scientific — When energetic electrons in a plasma have a preferred direction the resulting X-rays can be polarized. This makes plasma X-ray polarization spectroscopy, spectropolarimetry, useful for revealing information about the anisotropy of the electron velocity distribution, and X-ray spectropolarimetry has indeed been used for this in both space and laboratory plasmas. For pulsed plasmas the spectrum's polarization is typically measured by obtaining each component of polarization separately, with two crystals both at a 45 degree Bragg angle or one on successive shots. However, obtaining the two orthogonal polarizations can be done using one crystal. Crystals with hexagonal symmetry present pairs of internal planes that diffract incident X-rays in two directions that are perpendicular to each other and the incident ray. The polarization splitting properties of quartz crystals were confirmed with linearly polarized X-rays from the APS. An X-cut crystal with (10-10) planes in polarization splitting orientation is now being used on wire array z-pinches at UNR. The design of a single crystal X-ray polarimeter, and what data obtained so far indicate about the anisotropy of wire array z-pinch plasmas will be presented.

¹*Work supported by U.S. DOE, NNSA grant DE-NA0001834 and coop. agreement DE-FC52-06NA27616. Use of APS supported by U.S. DOE, OBES, Contract No. DE-AC02-06CH11357.

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Date submitted: 15 Jul 2016

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