

Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

X-ray Spectropolarimetry of Z-pinch Plasmas with a Single-Crystal Technique¹ MATT WALLACE, SHOWERA HAQUE, PAUL NEILL, University of Nevada, Reno, NINO PEREIRA, Ecopulse, Inc., RADU PRESURA, National Security Technologies — When directed beams of energetic electrons exist in a plasma the resulting x-rays emitted by the plasma can be partially polarized. This makes plasma x-ray polarization spectroscopy, spectropolarimetry, useful for revealing information about the anisotropy of the electron velocity distribution. X-ray spectropolarimetry has indeed been used for this in both space and laboratory plasmas. X-ray polarization measurements are typically performed employing two crystals, both at a 45° Bragg angle. A single-crystal spectropolarimeter can replace two crystal schemes by utilizing two matching sets of internal planes for polarization-splitting. The polarization-splitting planes diffract the incident x-rays into two directions that are perpendicular to each other and the incident beam as well, so the two sets of diffracted x-rays are linearly polarized perpendicularly to each other. An X-cut quartz crystal with surface along the [11-20] planes and a paired set of [10-10] planes in polarization-splitting orientation is now being used on aluminum z-pinches at the University of Nevada, Reno. Past x-ray polarization measurements have been reserved for point-like sources. Recently a slotted collimating aperture has been used to maintain the required geometry for polarization-splitting enabling the spectropolarimetry of extended sources. The design of a single-crystal x-ray spectropolarimeter and experimental results will be presented.

¹Work was supported by U.S. DOE, NNSA grant DE-NA0001834 and cooperative agreement DE-FC52-06NA27616.

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Date submitted: 14 Jul 2017

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