Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

Magnetic Field Measurements In Magnetized Plasmas Using Zeeman Broadening Diagnostics SHOWERA HAQUE, MATTHEW WALLACE, University of Nevada, Reno, RADU PRESURA[1], Voss Scientific, LLC, PAUL NEILL, University of Nevada, Reno — The Zeeman effect has been used to measure the magnetic field in high energy density plasmas. This method is limited when plasma conditions are such that the line broadening due to the high plasma density and temperature surpasses the Zeeman splitting. We have measured magnetic fields in magnetized laser plasmas under conditions where the Zeeman splitting was not spectrally resolved. The magnetic field strength was determined from the difference in widths of two doublet components, using an idea proposed by Tessarin et al. (2011). Time-gated spectra with one-dimensional space-resolution were obtained at the Nevada Terawatt Facility for laser plasmas created by 20 J, 1 ns Leopard laser pulses, and expanding in the azimuthal magnetic field produced by the 0.6 MA Zebra pulsed power generator. We explore the response of the Al III 4s $^2S_{1/2}$ – 4p $^2P_{1/2,3/2}$doublet components to the external magnetic field spatially along the plasma. Radial magnetic field and electron density profiles were measured within the plasma plume. This work was supported by the DOE/OFES grant DE-SC0008829 and DOE/NNSA contract DE-FC52-06NA27616.

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Date submitted: 17 Jul 2017 Electronic form version 1.4