Abstract Submitted
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2D x-ray imaging spectroscopic diagnostics using convex bent crystal[1] DANIEL PAPP, RADU PRESURA, MATT WALLACE, BILLY LARGENT, SHOWERA HAQUE, ANGEL ARIAS, VIJAY KHANAL, VLADIMIR IVANOV, University of Nevada, Reno — A new 2-dimensional time-integrated x-ray spectroscopic diagnostics technique was developed to create multi-monochromatic images of high-energy density Al plasmas. 2-dimensional is an advanced spectroscopic tool, providing a way to determine the spatial dependence of plasma temperature and density (T_e and n_e) in hot plasmas. The new technique uses the strong source broadening of convex cylindrically bent KAP crystal spectrometers, which contains spatial information along the dispersive direction. The perpendicular direction is imaged using a slit. The spatial resolution of the method is improved by the deconvolution of the source broadened line profiles from the lineshapes (recorded by the convex crystal spectrometer) with lineshapes of minimum instrumental broadening. The latter spectra were recorded with a concave cylindrically bent KAP crystal spectrometer, based on the Johann geometry. Spectroscopic model of the plasma x-ray emission was developed using the PrismSPECT code. The identification of suitable spectral features allows deriving T_e and n_e from line intensities. We applied this model to get temperature and density distribution maps for wire array z-pinch plasmas.

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