

Abstract Submitted  
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**X-Ray Line-Shape Diagnostics and Novel Stigmatic Imaging Schemes for the National Ignition Facility**<sup>1</sup> M. BITTER, K.W. HILL, N.A. PABLANT, L.F. DELGADO-APARICIO, PPPL, Princeton, NJ, USA, P. BEIERSDORFER, E. WANG, LLNL, Livermore, CA, USA, M. SANCHEZ, ESRF, Grenoble, France — The concepts of a high-resolution x-ray imaging crystal spectrometer (XICS) and novel stigmatic imaging schemes for accurate measurements of x-ray line shapes and the x-ray emission profiles at the National Ignition Facility (NIF) will be presented. The XICS will allow measurements of the line shapes of x-ray lines from high-Z impurities, such as krypton or tungsten, which can be added as trace elements to the ICF target. The goal is to determine the ion temperature in the plasma by separating the Doppler broadening from the Stark broadening. In addition to line-shape measurements, it may also be possible to determine the electron temperature from a measurement of line intensity ratios. The novel stigmatic imaging systems consist of matched pairs of spherically bent crystals, whereby the astigmatism is fully eliminated, so that stigmatic images of an x-ray source can be obtained for almost arbitrary angles of incidence. These imaging schemes will have a much higher optical throughput than existing x-ray pinhole cameras.

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