

Abstract Submitted
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Development of a High Resolution X-ray Spectrometer on the National Ignition Facility¹ L. GAO, B. KRAUS, K. W. HILL, M. BITTER, P. EFTHIMION, Princeton Plasma Physics Laboratory, M. B. SCHNEIDER, H. CHEN, J. AYERS, D. LIEDAH, A. G. MACPHEE, H. P. LE, D. THORN, Lawrence Livermore National Laboratory, D. NELSON, Laboratory for Laser Energetics — A high-resolution x-ray spectrometer has been designed, calibrated, and deployed on the National Ignition Facility (NIF) to measure plasma parameters for a Kr-doped surrogate capsule imploded at NIF conditions. Two conical crystals, each diffracting the He α and He β complexes respectively, focus the spectra onto a streak camera photocathode for time-resolved measurements with a temporal resolution of <20 ps. A third cylindrical crystal focuses the entire He α to He β spectrum onto an image plate for a time-integrated spectrum to correlate the two streaked signals. The instrument was absolutely calibrated by the x-ray group at the Princeton Plasma Physics Laboratory using a micro-focus x-ray source. Detailed calibration procedures, including source and spectrum alignment, energy calibration, crystal performance evaluation, and measurement of the resolving power and the integrated reflectivity will be presented. Initial NIF experimental results will also be discussed.

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