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Calibration of a High Resolution X-ray Spectrometer for High-Energy-Density Plasmas on NIF[1] B. KRAUS, L. GAO, K. W. HILL, M. BITTER, P. EFTHIMION, Princeton Plasma Physics Laboratory, M. B. SCHNEIDER, H. CHEN, J. AYERS, P. BEIERSDORFER, D. LIEDAHL, A. G. MACPHEE, D. B. THORN, R. BETTENCOURT, R. KAUFFMAN, H. LE, Lawrence Livermore National Laboratory, D. NELSON, Laboratory for Laser Energetics — A high-resolution, DIM-based (Diagnostic Instrument Manipulator) x-ray crystal spectrometer has been calibrated for and deployed at the National Ignition Facility (NIF) to diagnose plasma conditions and mix in ignition capsules near stagnation times. Two conical crystals in the Hall geometry focus rays from the Kr He-α, Ly-α, and He-β complexes onto a streak camera for time-resolved spectra, in order to measure electron density and temperature by observing Stark broadening and relative intensities of dielectronic satellites. Signals from these two crystals are correlated with a third crystal that time-integrates the intervening energy range. The spectrometer has been absolutely calibrated using a microfocus x-ray source, an array of CCD and single-photon-counting detectors, and K- and L-absorption edge filters. Measurements of the integrated reflectivity, energy range, and energy resolution for each crystal will be presented. The implications of the calibration on signal levels from NIF implosions and x-ray filter choices will be discussed.

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