

## Gradient Effects on High-Resolution X-ray Spectra from a Polar Direct Drive Exploding Pusher on NIF

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An absolutely-calibrated, high-resolution x-ray Bragg crystal spectrometer has been deployed at the National Ignition Facility (NIF) to diagnose plasma conditions in a polar direct drive exploding pusher (PDXP) implosion near stagnation. Two conical crystals focus the Kr He- $\alpha$  and He- $\beta$  complexes onto a streak camera for time-resolved spectra, and spectral intensities are calibrated via a cylindrical von Hamos crystal that time-integrates the intervening energy range between 12.7 and 15.6 keV. The evolution of electron density and temperature are inferred through Stark broadening and the relative intensities of dielectronic satellites. Emissivity and opacity predictions of relevant plasma conditions are computed with collisional-radiative codes SCRAM and CRETIN, and are then incorporated into onion-skin radiation transport models and compared to the relative and absolute line intensities and widths of measured spectra. These calculations benchmark predicted plasma parameter profiles from one- and two-dimensional hydrodynamic simulations of the PDXP platform.

This work was performed under the auspices of the U.S. Department of Energy by Princeton Plasma Physics Laboratory under contract DE-AC02-09CH11466 and by Lawrence Livermore National Laboratory under contract DE-AC52-07NA27344.