

Abstract Submitted
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The National Ignition Facility's Soft X-ray Opacity Spectrometer Design Upgrades¹ MS WALLACE, RA KNIGHT, AM DURAND, JM HEINMILLER, R LARA, DA MAX, EC DUTRA, E HUFFMAN, Nevada Natl. Security Site, RF HEETER, J AYERS, J EMIG, Lawrence Livermore Natl. Lab, TS PERRY, T ARCHULETA, TJ URBATSCH, Los Alamos Natl. Lab — The soft x-ray Opacity Spectrometer (OpSpec) used on the National Ignition Facility (NIF) has recently incorporated an elliptically shaped crystal. The original OpSpec used two convex cylindrical crystals for time-integrated measurements of point-projection absorption spectra from 540 to 2100eV. However, with the convex geometry, the low-energy portion of the spectrum suffered from high backgrounds due to scattered x-rays as well as reflections from alternate crystal planes. The use of an elliptically shaped crystal allows an acceptance aperture at the crossover focus between the crystal and the detector, which reduces background and eliminates nearly all reflections from alternate crystal planes. The current elliptical design is an improvement from the convex cylindrical design, but has a usable energy range from 900 to 2100eV. In addition, OpSpec is currently used on 18 NIF shots per year, in which both crystals are typically damaged beyond reuse, so efficient production of 36 crystals/year is required. Design efforts to improve the existing system focus on mounting reliability, reducing crystal strain to increase survivability between mounting and shot time, and extending the energy range of the instrument down to 500 eV. The elliptical design, results, and future options are presented.

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