

Integrated reflectivity inferred from crystal response measurement for several NIF X-ray spectrometers

Maylis Dozières¹, Christine Krauland¹, Jeremy Huckins², John Seely³,
Joshua Tabimina², Mai Beach², Marilyn B. Schneider², Nathaniel
Thompson², Stanislav Stoupin²

¹*General Atomics, USA*

²*Lawrence Livermore National Laboratory, USA*

³*Syntek Technologies Inc., USA*

The spectrometer calibration station at LLNL is used to characterize and calibrate the many crystals used in the various geometries of the x-ray spectrometers regularly used at the National Ignition Facility (NIF). Such absolute calibration is essential for every experiment in order to extract meaningful results and properly diagnose the plasmas. We present the calibration of three NIF spectrometers, the Imaging Spectroscopy Snout (ISS) used at magnification of 12X, its homologue dedicated to low magnification (ISS-LM) and the NIF X-ray Spectrometer (NXS).

The ISS can be equipped with up to four different transmission Quartz crystals in Cauchois geometry, each offering different energy ranges from ≈ 7.5 keV to ≈ 12 keV with high spectral resolutions while the ISS-LM is using Silicon transmission crystals. Meanwhile, the NXS utilizes different crystal materials in an elliptical Bragg-reflection geometry allowing for a choice in spectral range ≈ 1.5 keV to ≈ 20 keV, each with a wide bandwidth and low spectral resolution. This work will present and compare the measurements of crystal's responses in $\text{eV}\cdot\mu\text{sr}/\text{mm}^2$ for Qz(100) and Si(111) in both ISS and NXS geometries as well as results for PET (002) in NXS configuration. The inferred integrated reflectivity will also be presented and compared, in some cases, to theoretical calculations made with pyTTE program.

Acknowledgements

This work performed under the auspices of the U.S. Department of Energy by General Atomics under Contract 89233119CNA000063 and by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.
LLNL-ABS-840130.

Presenting Author Email Address: *doziersayba1@llnl.gov*