

SHAPE OBSERVATIONS USING DIXI, A 10 PS X-RAY FRAMING CAMERA, AT THE NIF

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The dilation x-ray imager (DIXI) [1-3] is a new, high-speed x-ray framing camera at the National Ignition Facility (NIF) sensitive to x-rays in the range of ~2-17 keV. DIXI uses the pulse-dilation technique to achieve a temporal resolution of less than 10 ps, a ~10X improvement over conventional framing cameras currently employed on the NIF (~100 ps resolution), and otherwise only attainable with 1D streaked imaging. A pinhole array at ~10 cm from target chamber center (tcc) projects images onto the photocathode situated outside the NIF chamber wall with a magnification of ~64X.

DIXI provides important capabilities for studying warm-dense-matter physics, high-energy-density science and inertial confinement fusion, providing data on the temporal evolution of hot-spot formation, x-ray emission, fuel motion and mix levels in the hot-spot at neutron yields of up to 10^{17} .

At the NIF DIXI sits along the equator, similar to the nominal time resolved x-ray imaging diagnostic. However, DIXI and the longer (100 ps) gate width camera have lines of sight that are separated by 22 degrees.

Here we present the first results using DIXI on ignition-relevant experiments at NIF. In particular we discuss the effects of induced drive asymmetries on the x-ray hot spot shape, including observation differences due to line of sight as well as spectral sensitivity and temporal resolution.

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[1] T.J. Hilsabeck et al., "Pulse-dilation enhanced gated optical imager with 5 ps resolution," *Rev. Sci. Instrum.* 81, 10E317 (2010).

[2] S.R. Nagel et al., "Dilation x-ray imager a new/faster gated x-ray imager for the NIF," *Rev. Sci. Instrum.* 83, 10E116 (2012).

[3] S.R. Nagel et al., "Investigating high speed phenomena in laser plasma interactions using dilation x-ray imager," *Rev. Sci. Instrum.* 85, 11E504(2014).