

## **Chasing symmetry: 3D shape characteristics of ignition shots at the National Ignition Facility**

M. Durocher<sup>1</sup>, V. Geppert-Kleinrath<sup>1</sup>, M. S. Freeman<sup>1</sup>, C. R. Danly<sup>1</sup>, C. H. Wilde<sup>1</sup>,  
G. J. Saavedra<sup>1</sup>, V. E. Fatherley<sup>1</sup>, N. M. Hoffman<sup>1</sup>, J. J. Kuczek<sup>1</sup>, E. F. Mendoza<sup>1</sup>, L. R. Tafoya<sup>1</sup>,  
D. Fittinghoff<sup>2</sup>, M. Rubery<sup>2</sup>, P. L. Volegov<sup>2</sup>

<sup>1</sup>*Los Alamos National Laboratory, Los Alamos, NM 87545, USA*

<sup>2</sup>*Lawrence Livermore National Laboratory, Livermore, CA 94550, USA*

Corresponding Author Email: [mdurocher@lanl.gov](mailto:mdurocher@lanl.gov)

The Nuclear Imaging System (NIS) has been capturing neutron images of Inertial Confinement Fusion (ICF) driven implosions for over a decade at the National Ignition Facility (NIF). This imaging system has evolved from one Line of Sight (LoS) to three nearly orthogonal LoS, thus allowing for the study of three-dimensional shape characteristics of ignition shots. Limited view tomography algorithms help visualize the burning hotspot in 3D, including the density distribution of the cold fuel surrounding the burning plasma. Recently, two of three LoS have been equipped to capture gamma-ray images, thus creating the opportunity to characterize the remaining ablator in 3D and to study its density. From the X-ray and gamma-ray image reconstructions, implosion information - such as the presence of higher Z material - can be extracted to assess fusion efficiency. NIS has provided critical insight on mechanisms that have limited implosion performance, such as fill tube diameter for ignition-type targets. This now comprehensive diagnostic suite opens a window into shape characteristics of ignition shots and how symmetry affects ICF implosion performance.

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