- IFSA2025 –

xRAGE Modeling for Xcimer Baffled Hohlraum Designs

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Xcimer Energy and Los Alamos National Laboratory are jointly developing baffled hohlraum models to optimize performance in hybrid drive inertial confinement fusion experiments. This study is part of a broader multi-institutional effort led by Xcimer Energy, with related contributions from teams at Los Alamos National Laboratory, the Institute for Nuclear Fusion at the Polytechnic University of Madrid (UPM), and the Laboratory for Laser Energetics, to explore two-sided hohlraum concepts using different modeling tools and design strategies. A two-sided target concept [1] has been introduced through collaboration between Xcimer and the Laboratory for Laser Energetics. In the indirect drive phase, X-rays uniformly heat the capsule to create a coronal plasma. The coronal plasma mitigates laser imprint from the subsequent direct drive stage, with the aim to achieve uniform compression via two-sided illumination. Understanding the behavior of the baffled hohlraum during the indirect drive is necessary and leaves room for new exploration including determination of tolerances for laser parameters, baffled lengths and thickness, and material choices. This work explores this design space using the radiation-hydrodynamics code xRAGE [2]. Results of design choices are presented.

References

[1] C. Thomas, et. al., Phys. Plasmas 31, 112708 (2024).

[2] M. L. Gittings, et. al., Comp. Sci. & Disc. 1, 015005 (2008).

This work was performed by the Los Alamos National Laboratory, operated by Triad National Security, LLC for the National Nuclear Security Administration (NNSA) of U.S. Department of Energy (DOE) under Contract No. 89233218CNA000001.