Preparing for Polar-Drive Imprint Experiments at the National Ignition Facility

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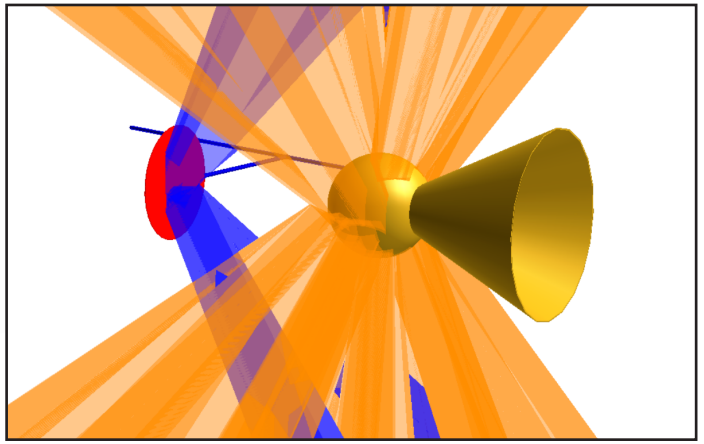
Cone-in-shell CH target

CH shell driven by 34 quads



A. Shvydky
University of Rochester
Laboratory for Laser Energetics

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Summary

Laser-imprint studies in laser-driven spherical shell targets will be performed at the National Ignition Facility (NIF) in Q1 and Q2 of FY15

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- Experiments will use cone-in-shell CH targets to evaluate various levels of corrugations using slit and hole x-ray imaging diagnostics
- Setup of the polar-drive spherical-imprint experiments is based on the NIF Hydro Growth platform*
- Two-dimensional *DRACO* simulations indicate a sufficient optical depth (OD) in the experiments and will guide in the setup of the diagnostics

* V. A. Smalyuk *et al.*, Phys. of Plasmas 21, 056301 (2014).

Collaborators

M. Hohenberger, P. B. Radha, R. S. Craxton, V. N. Goncharov,
J. P. Knauer, J. A. Marozas, F. J. Marshall, P. W. McKenty,
D. D. Meyerhofer, and T. C. Sangster

University of Rochester
Laboratory for Laser Energetics

Spherical-imprint experiments employ cone-in-shell CH target and simultaneous x-ray radiography and side-on self-emission imaging

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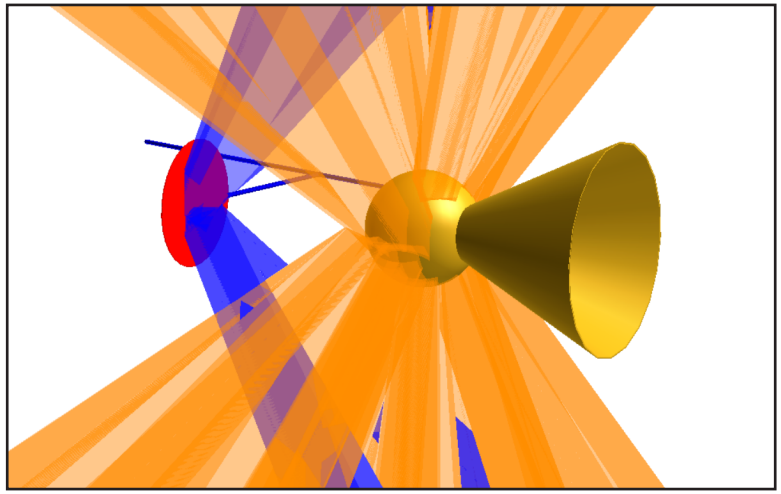
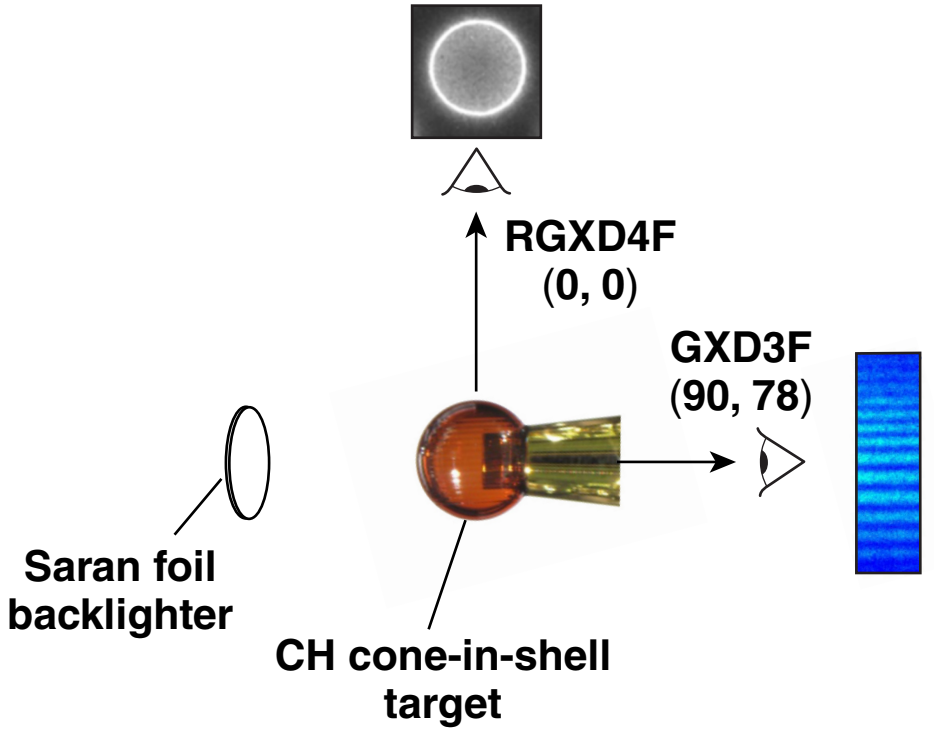
CH shell driven by 34 quads





RGXD4F: rotated gated x-ray detector 4F
GXD3F: gated x-ray detector 3F

TC11542

A slotted cone will be used for 1-D radiography, while a circular hole cone will be used for 2-D radiography

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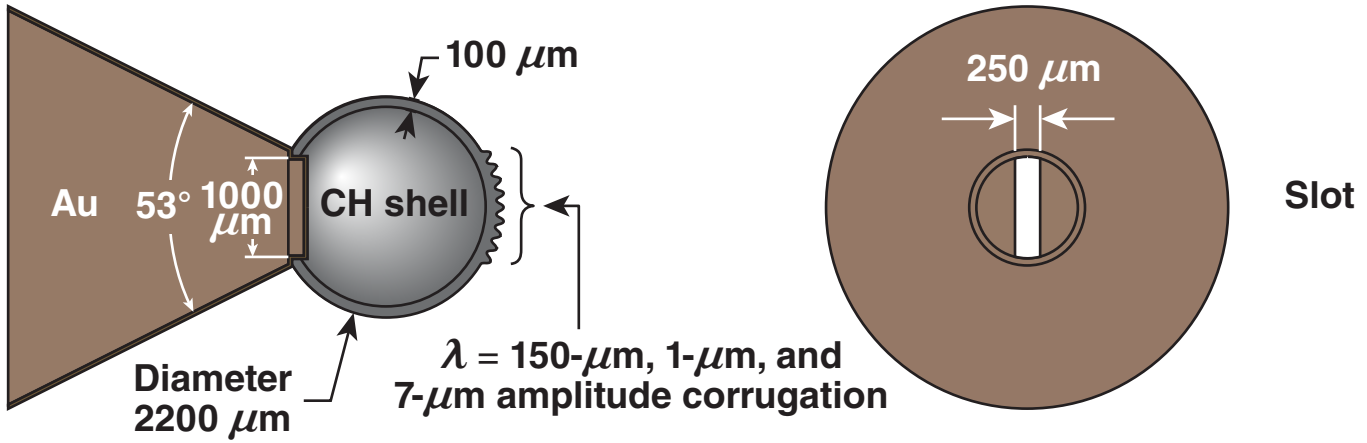
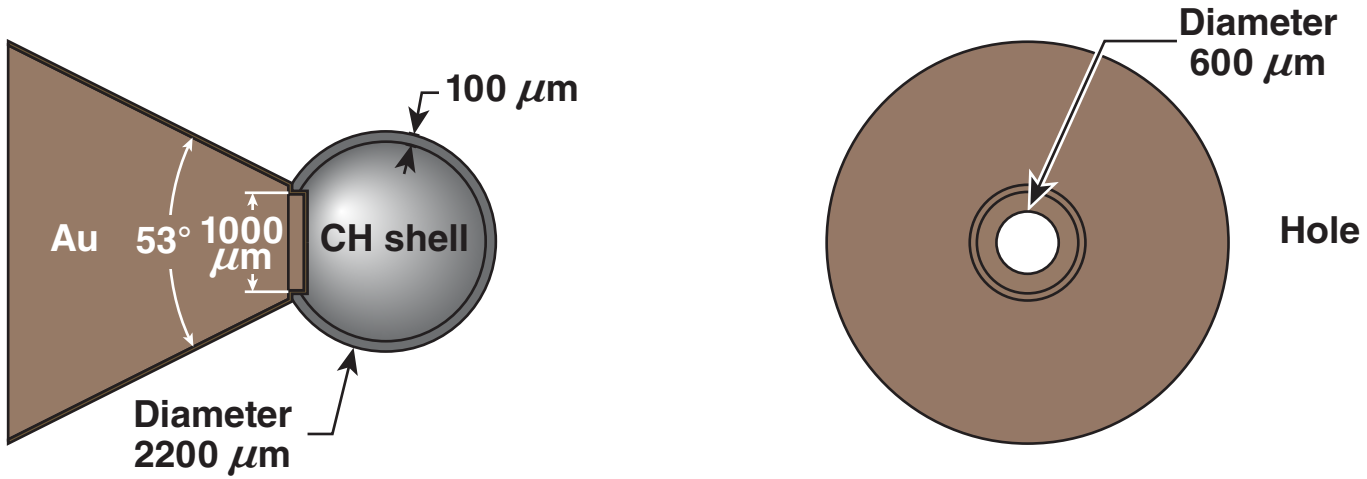
One-dimensional imaging for single-mode perturbation growth diagnostic



Two-dimensional imaging for broadband imprint diagnostic



TC11543

Up to 20 of the NIF's quads can be omitted without seriously affecting uniformity over the experimental field of view

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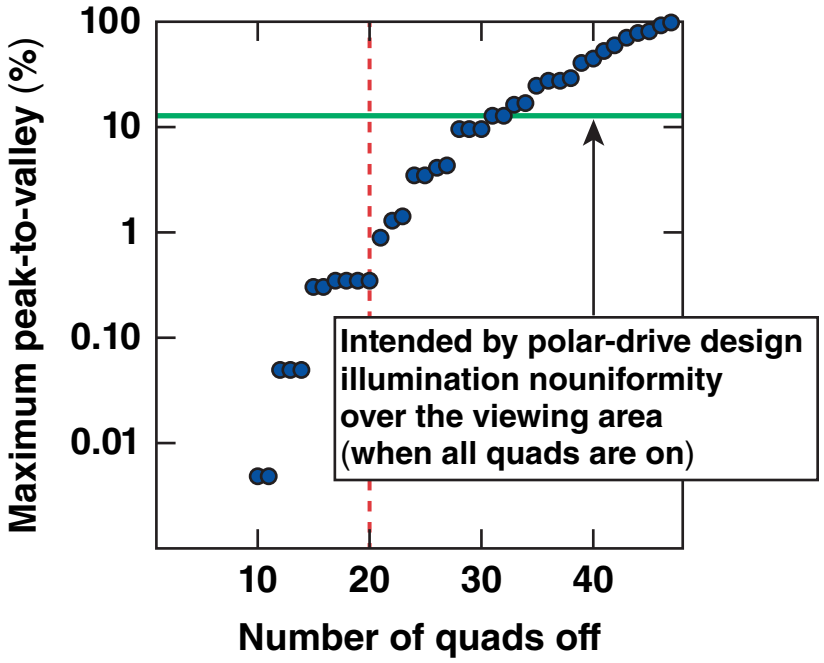
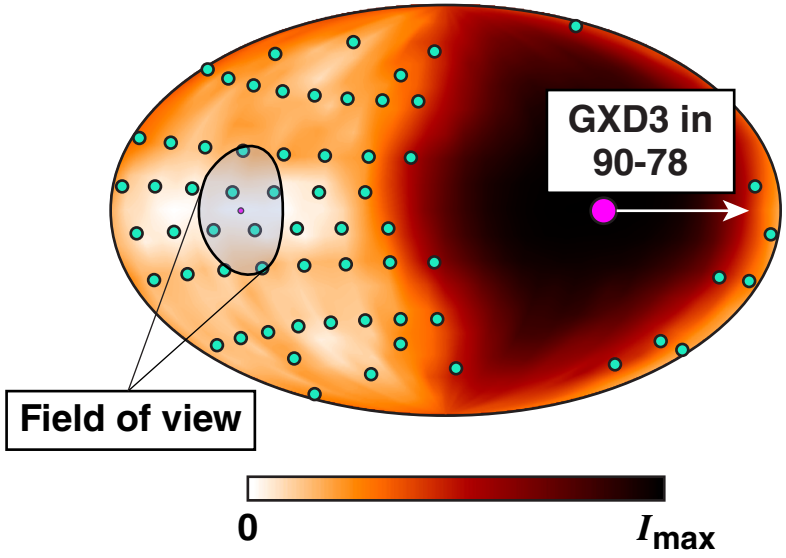
Additional nonuniformity versus number of quads off

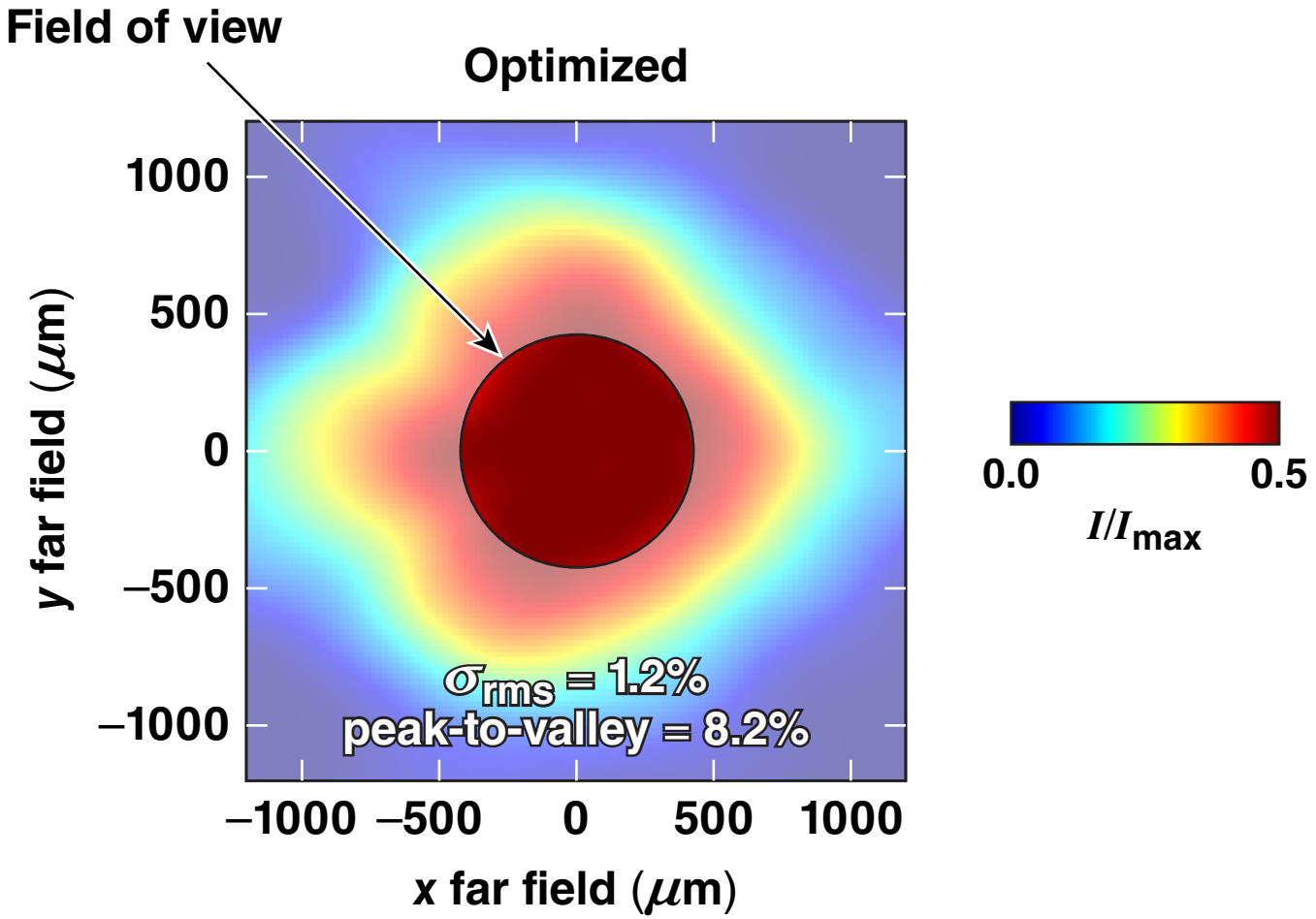


Intensity on target with 20 quads off



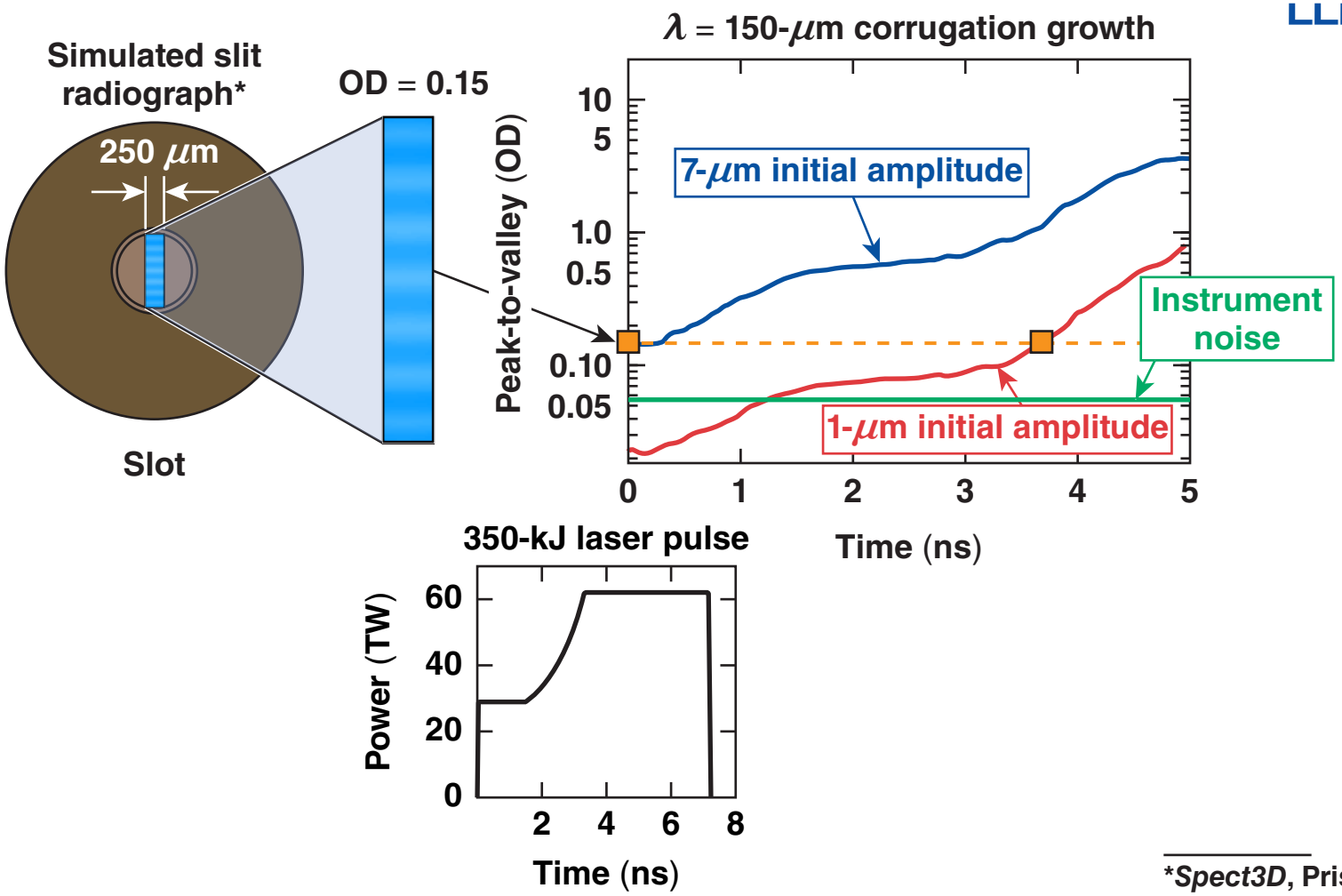
TC11544

Pointing of the backlighter beams has been optimized to improve the backlighter uniformity



TC11545

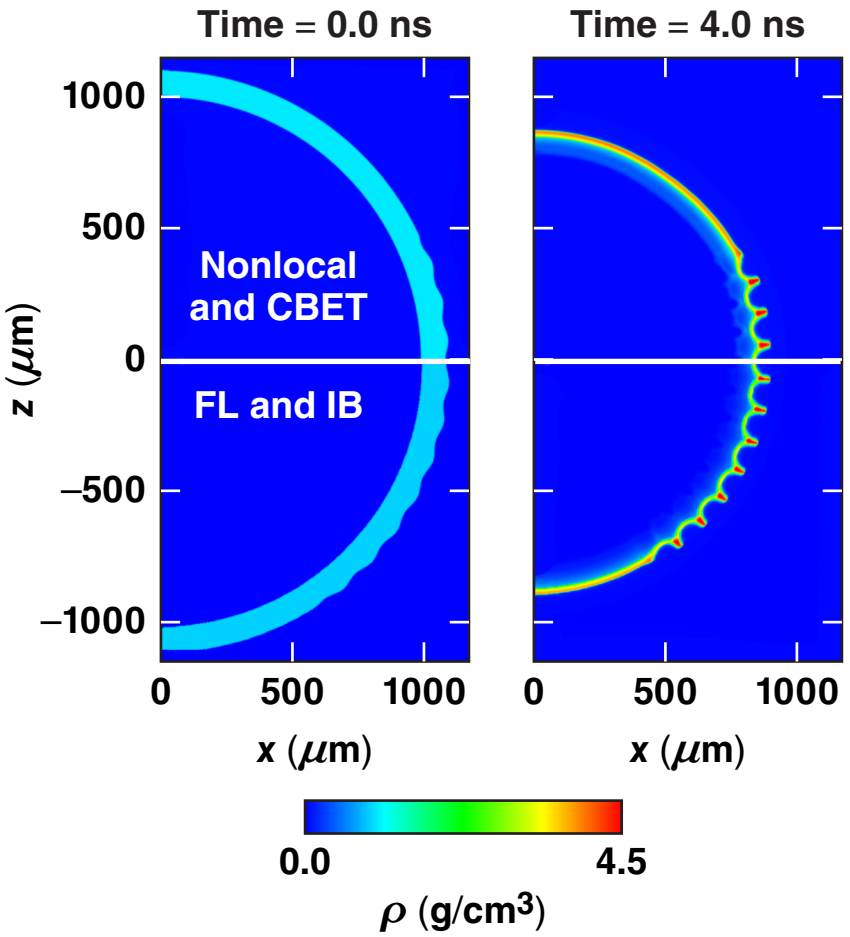
Two-dimensional *DRACO* simulations indicate sufficient OD modulations to diagnose the initial shell compression and the Rayleigh–Taylor (RT) growth of imposed surface perturbations

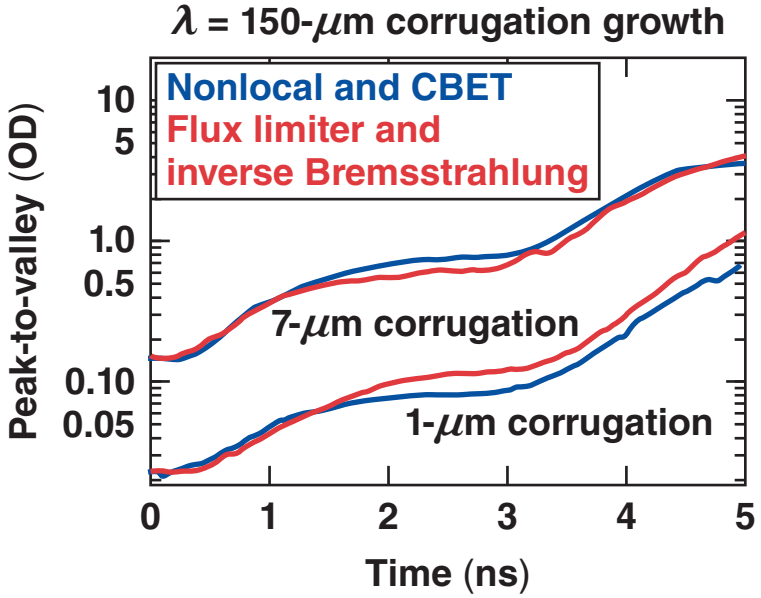


TC11547

*Spect3D, Prism Inc.

Predicted surface-perturbation growth is relatively insensitive to the thermal-transport model and cross-beam energy transfer (CBET)





TC11546

Preliminary imprint simulations indicate that the level of imprint-seeded nonuniformities are comparable to nonuniformities seeded by 1-μm corrugations

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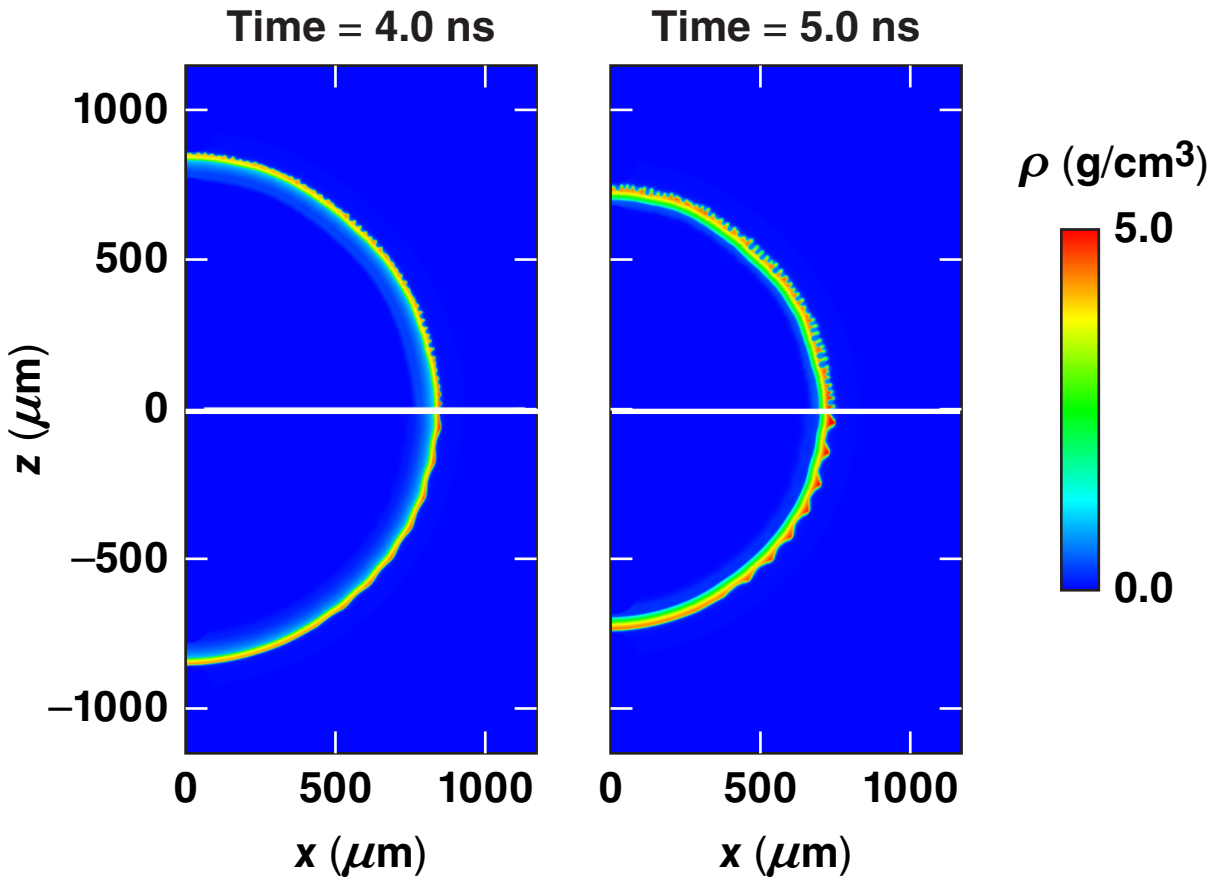
$l \leq$ 200 imprint simulation

1-μm corrugation simulation



TC11549

Summary/Conclusions

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