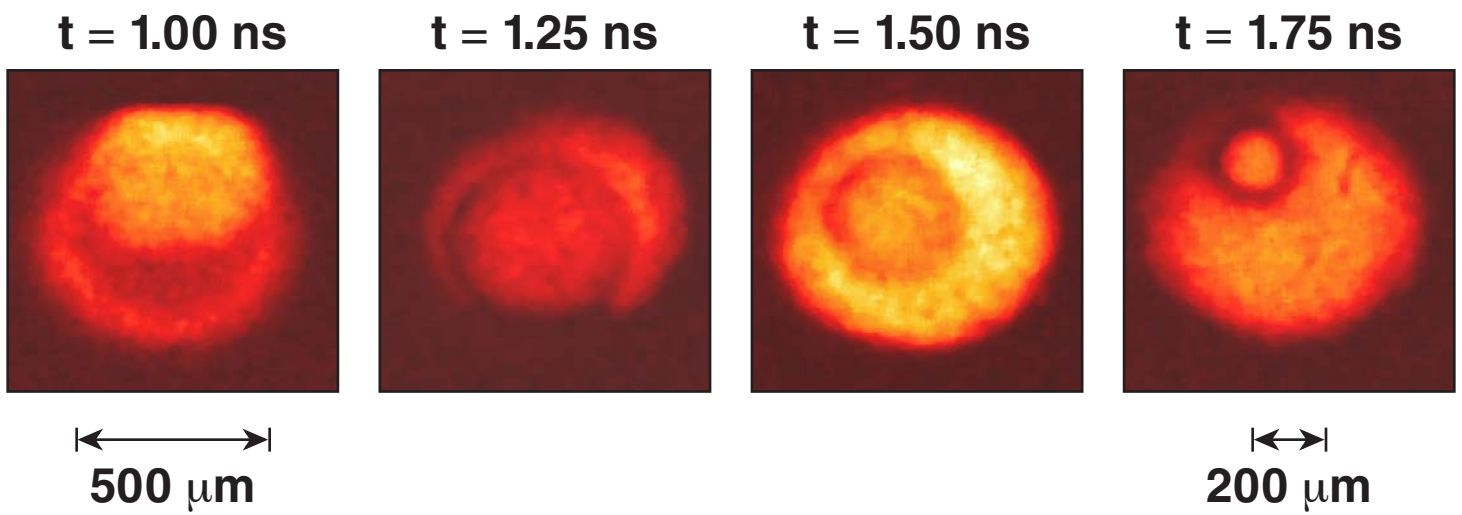
Polar-Direct-Drive (PDD) Experiments on OMEGA



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American Physical Society
Division of Plasma Physics
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Collaborators

UR LLE

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D. W. Jacobs-Perkins, P. B. Radha, T. C. Sangster, W. Seka,
S. Skupsky, V. A. Smalyuk, and C. Stoeckl

Related papers:
R. S. Craxton (Invited Paper), BI2-002
R. Epstein, HO1-013
J. Marozas, HO1-014

Summary

Initial OMEGA PDD experiments confirm simulation and modeling predictions

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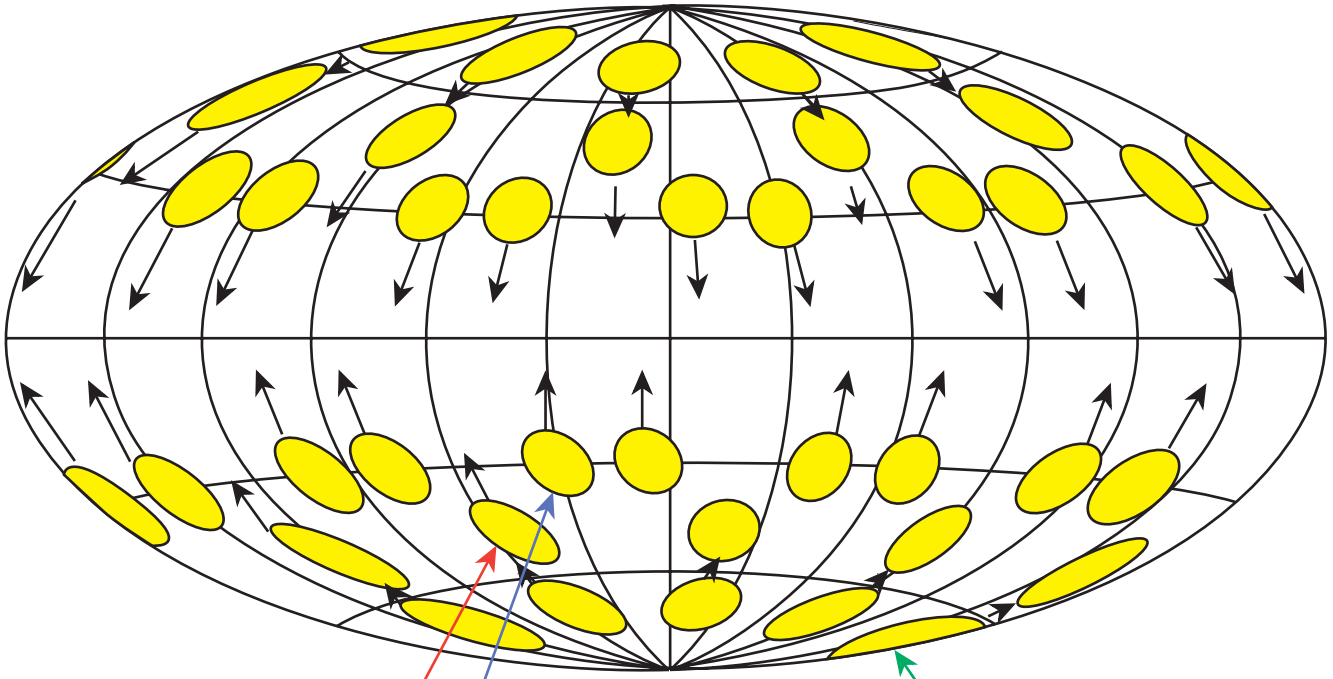
- Initial OMEGA PDD experiments were carried out with 40-beam illumination.
- Absorption and drive measurements are consistent with hydrocode predictions.
- X-ray emission and absorption images show expected low-ℓ mode asymmetries.
- The first "Saturn" configuration PDD experiments show promise for control of low-ℓ mode nonuniformities.

OMEGA PDD Configuration

The NIF 48-quad PDD configuration was simulated on OMEGA by repointing 40 beams



42° beams moved to 66.6°

58.8° beams moved to 83.5°

21° beams moved to 33.4°

PDD beam pointing was determined with 4-mm-diam pointing targets

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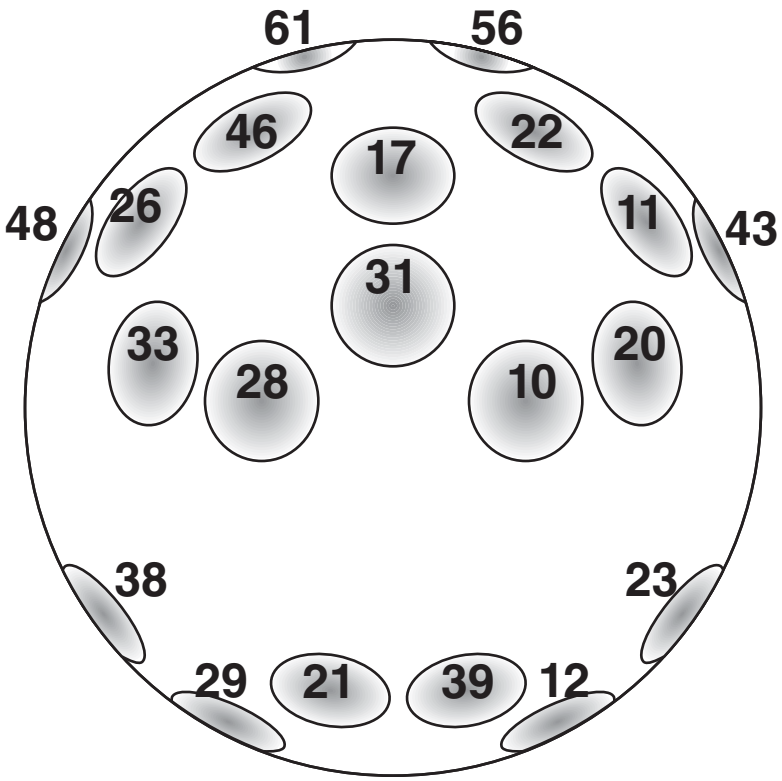
OMEGA Shot 34667



Accuracy = 18-μm rms

Energy Coupling

Absorption and drive measurements confirm simulation predictions for PDD configuration

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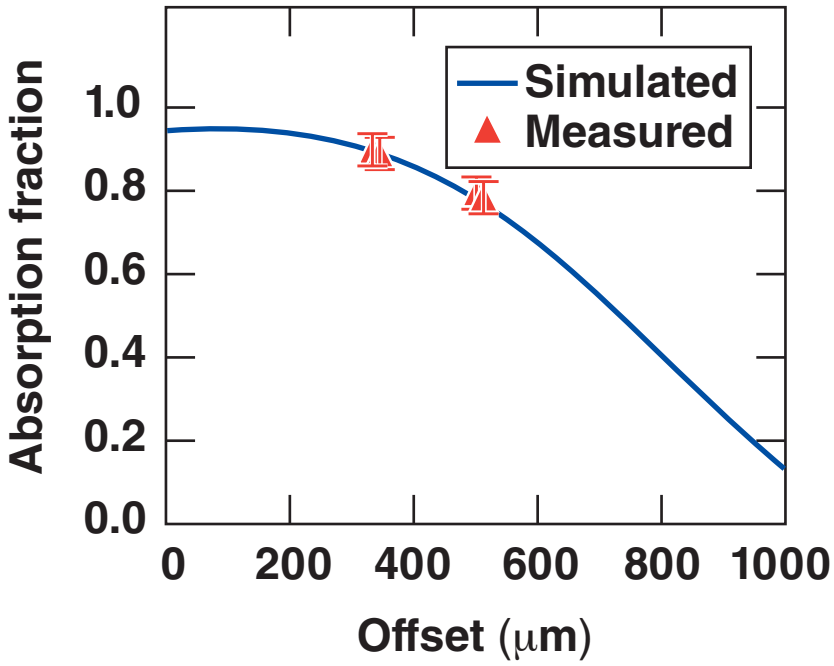
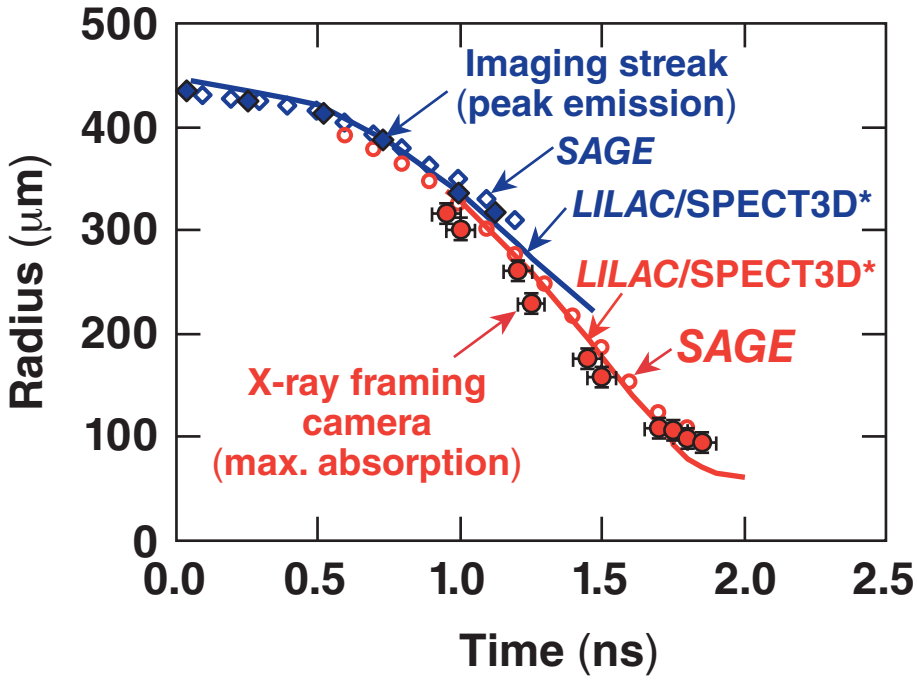
Oblique incidence absorption on large CH solid spheres



Streaked and framed imaging on shells imploded with PPD configuration



*SPECT3D, PRISM Computational Sciences, Inc., Madison, WI

"Saturn" Target

A "Saturn" ring is used to refract light onto the target equator

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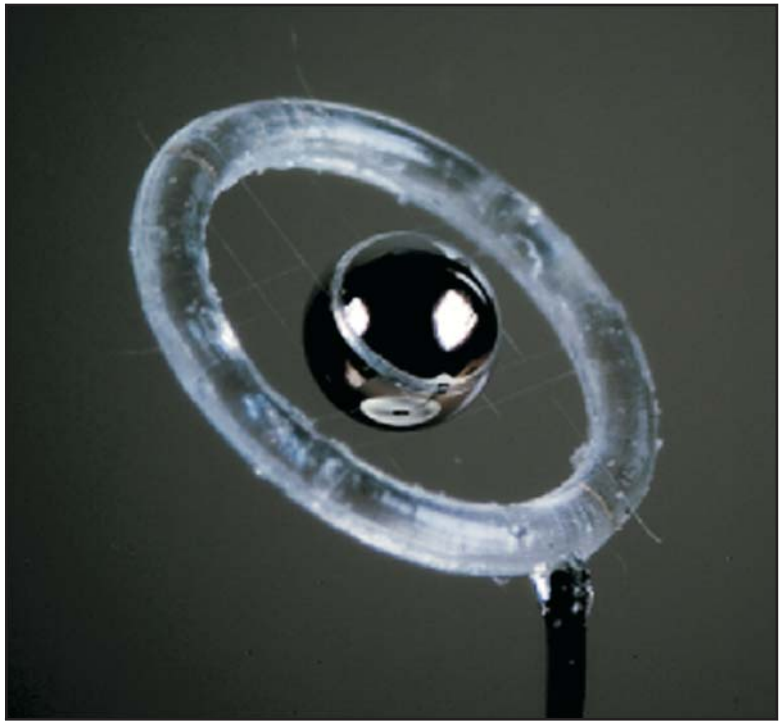
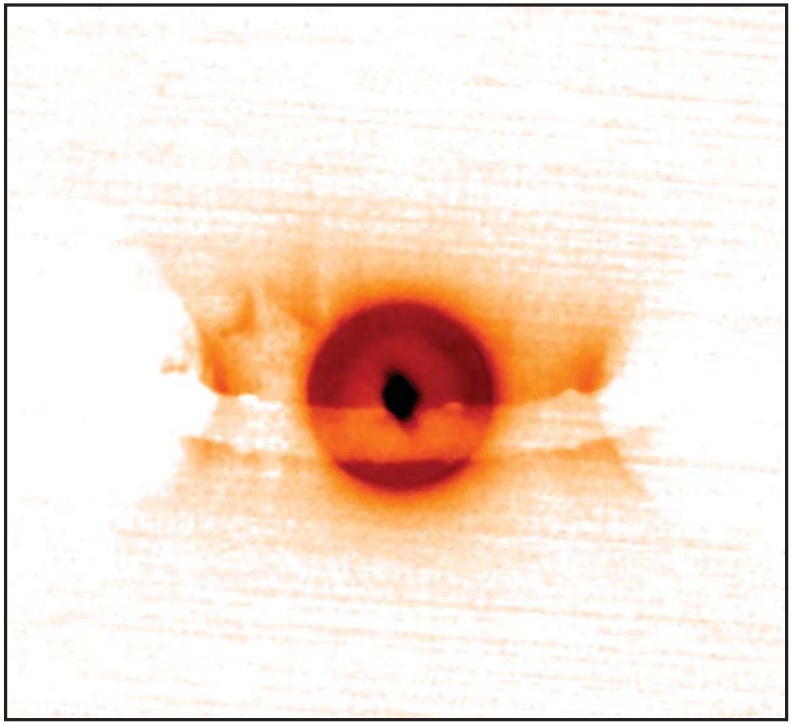
Visible light image



X-ray pinhole camera image (2 to 5 keV)



OMEGA Shot 37430

*R. S. Craxton, this conference BI2-002

Two types of PDD implosions were carried out on OMEGA

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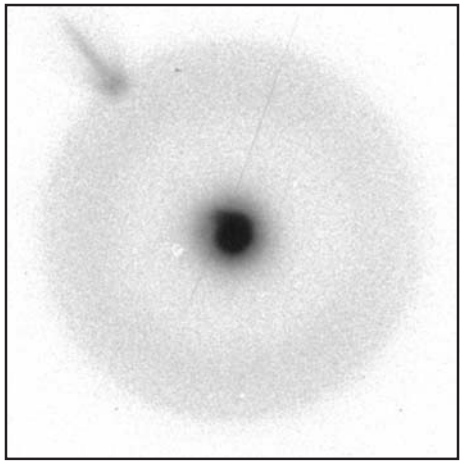
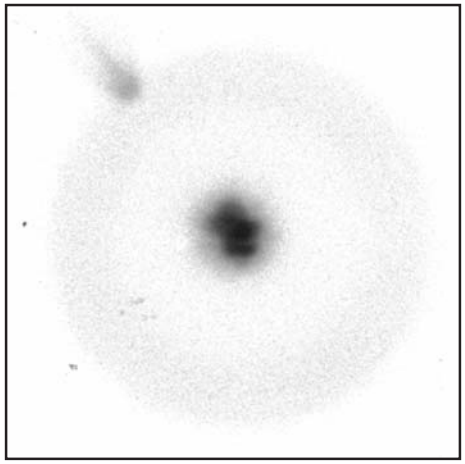
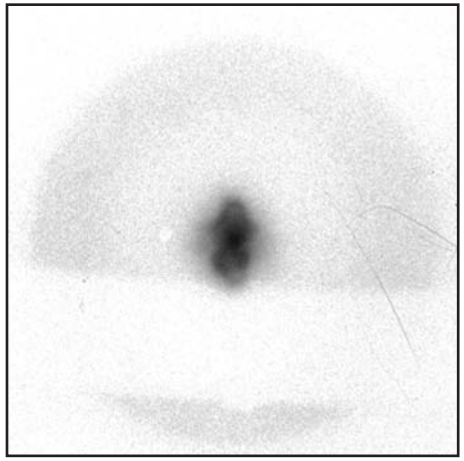
X-ray Pinhole Camera Images (2 to 5 keV)

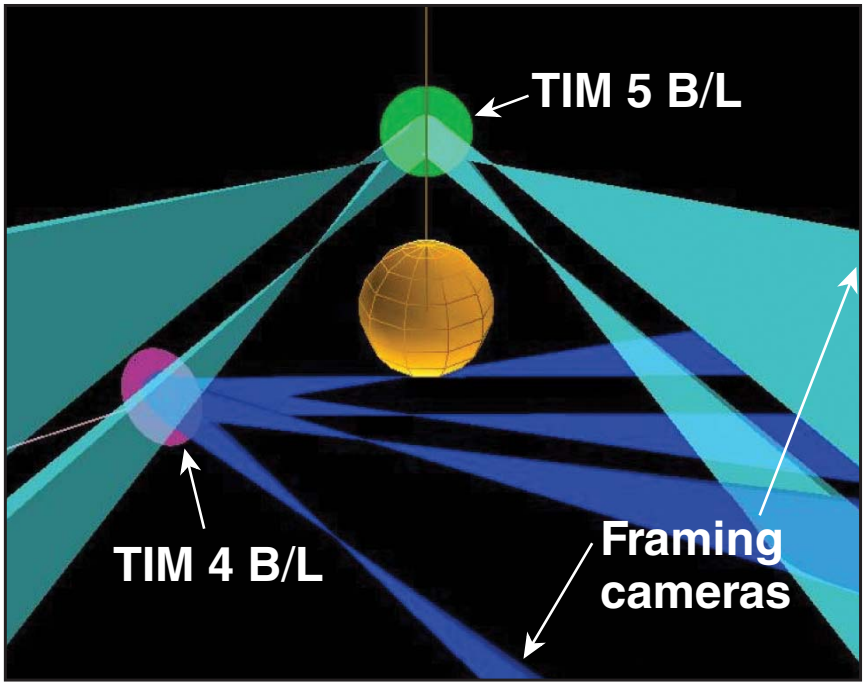
60 beam implosion	PDD 40 beam implosion	PDD 40 beam implosion with ring
		
OMEGA Shot 37419	OMEGA Shot 37427	OMEGA Shot 37428

E_L:	15.8 kJ	15.0 kJ	15.2 kJ
Yield:	6.9×10^{10}	2.4×10^{10}	1.8×10^{10}

Implosion Symmetry

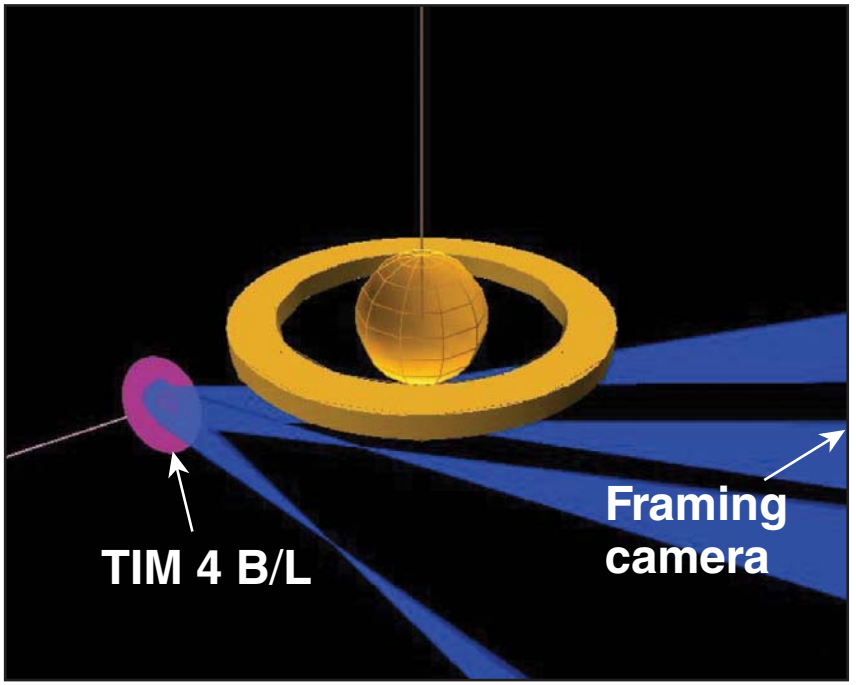
Implosion symmetry was measured with time-gated x-ray backlighting

XTVS view



PDD configuration

XTVS view



PDD with Saturn ring

Gated backlit x-ray images show a nearly symmetric target implosion

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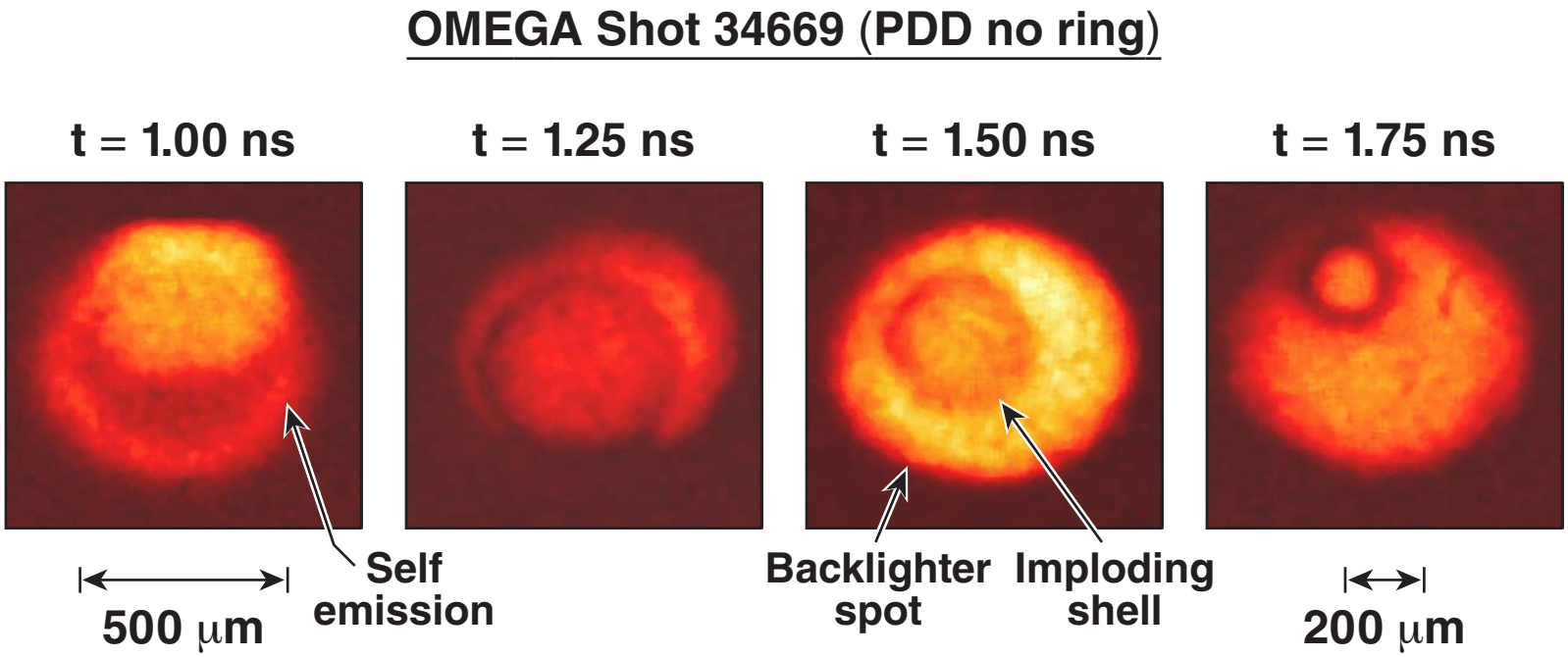
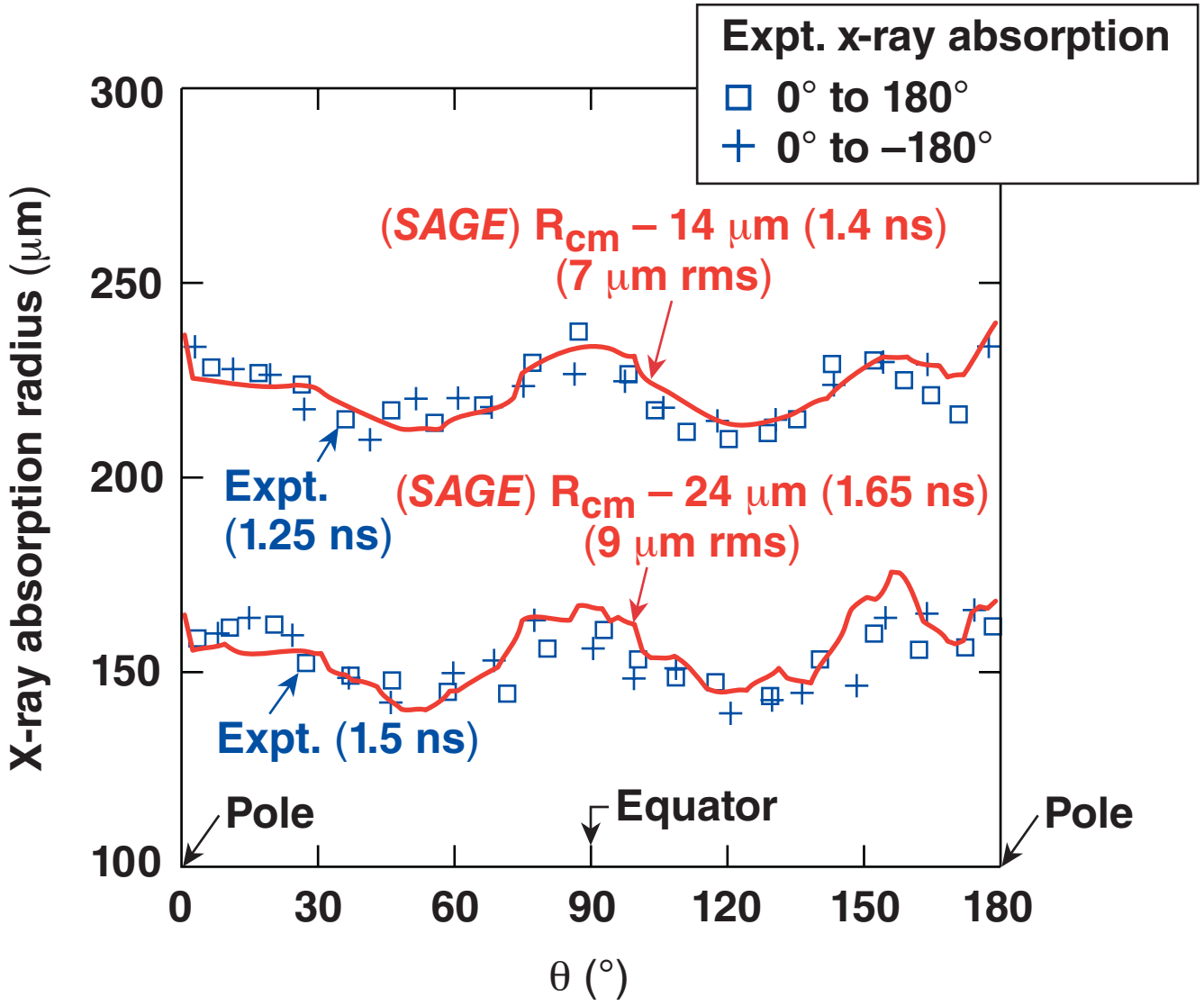
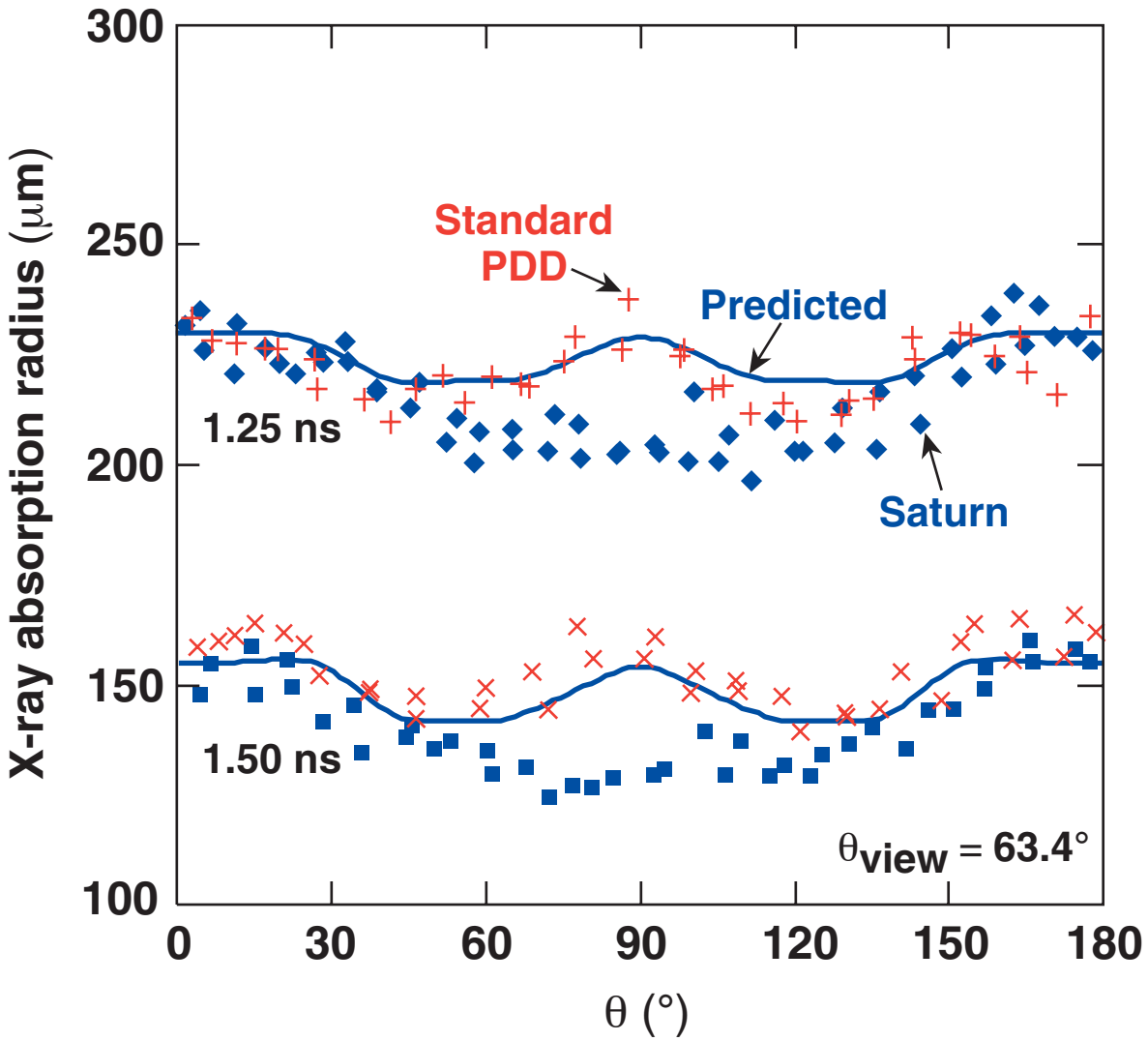


The experimental data follow the predicted center-of-mass variations very closely



TC6531c

The additional drive at the equator for the Saturn target is greater than predicted



Shots 34669, 37428
Run 4488
TC6663

Summary/Conclusions

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