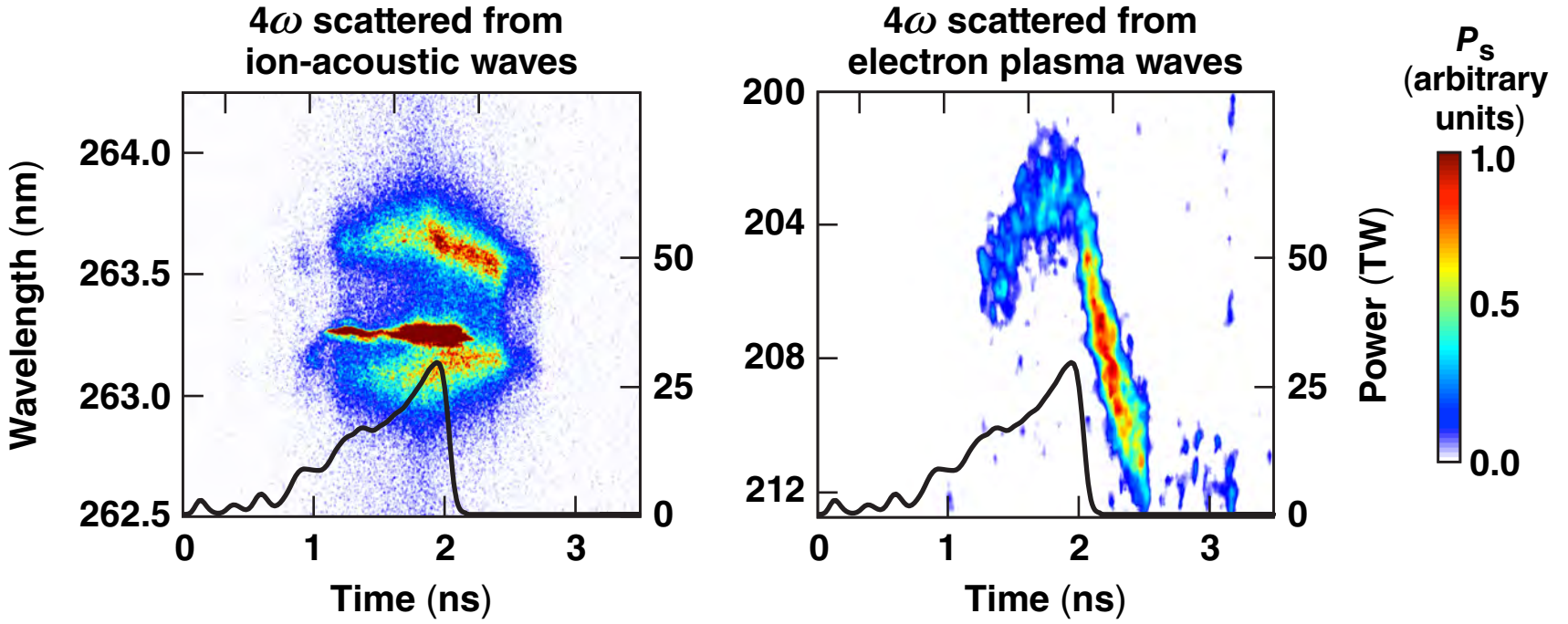
Ultraviolet Thomson Scattering from Direct-Drive Coronal Plasmas



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Summary

Time-resolved UV Thomson-scattering spectra show that multilayer targets have higher coronal electron temperatures than CH targets

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- Experiments compared layered spherical shells containing Si-doped CH, Si, and Be to CH targets in direct-drive implosions
- Measurements from UV Thomson scattering show that multilayer targets have 10% higher electron temperatures than CH targets at the end of the drive
- Multilayer targets reduce the hot electrons from two-plasmon decay (TPD)

Collaborators

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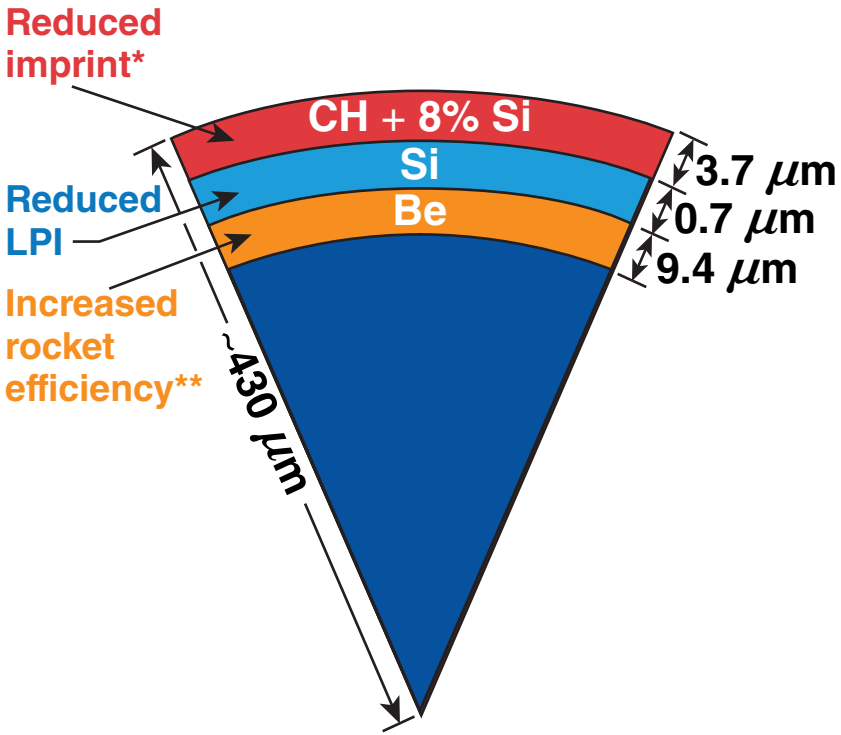
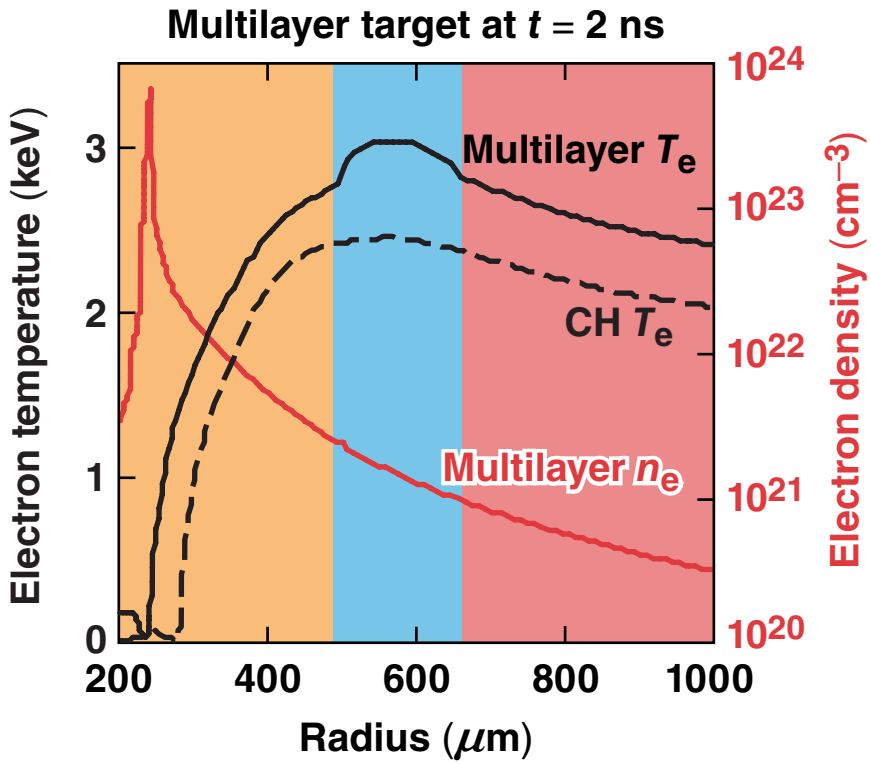
Motivation

Multilayer targets are designed to reduce imprint and laser–plasma instabilities (LPI's), and increase the hydrodynamic efficiency

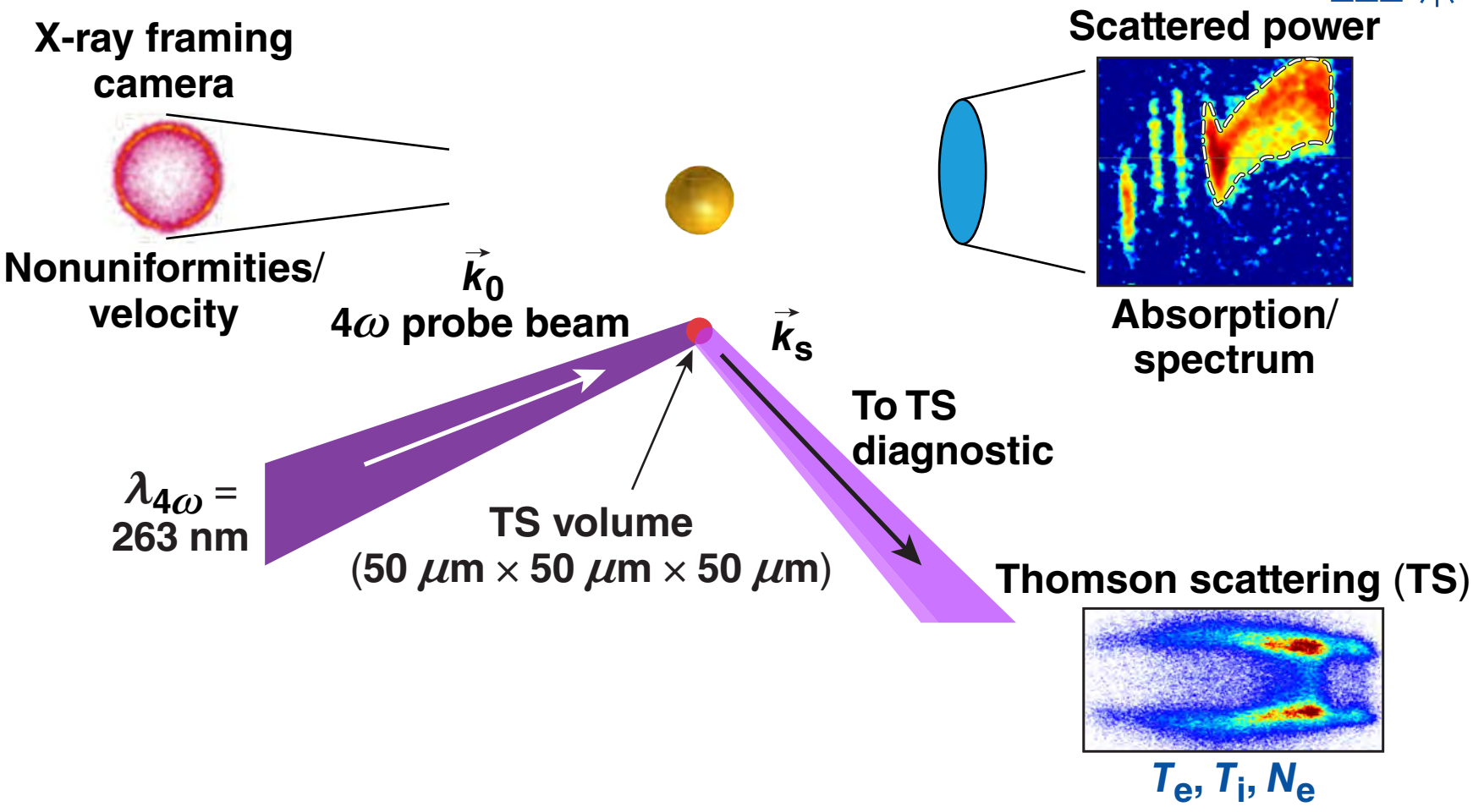




* S. X. Hu *et al*. Phys. Rev. Lett. 108, 195003 (2012); G. Fiksel *et al*., Phys. Plasmas 19, 062704 (2012).
** D.T. Michel *et al*. "Demonstration of the Improved Rocket Efficiency in Direct-Drive Implosions using Different Ablator Materials," submitted to Physical Review Letters; D. T. Michel *et al*., NO7.00002, this conference; V. N. Goncharov, GI3.00001, this conference.

E22574

Plasmas are well characterized by a suite of diagnostics at the Omega Laser Facility



Thomson scattering was used to take local measurements of temperature and density in the corona.

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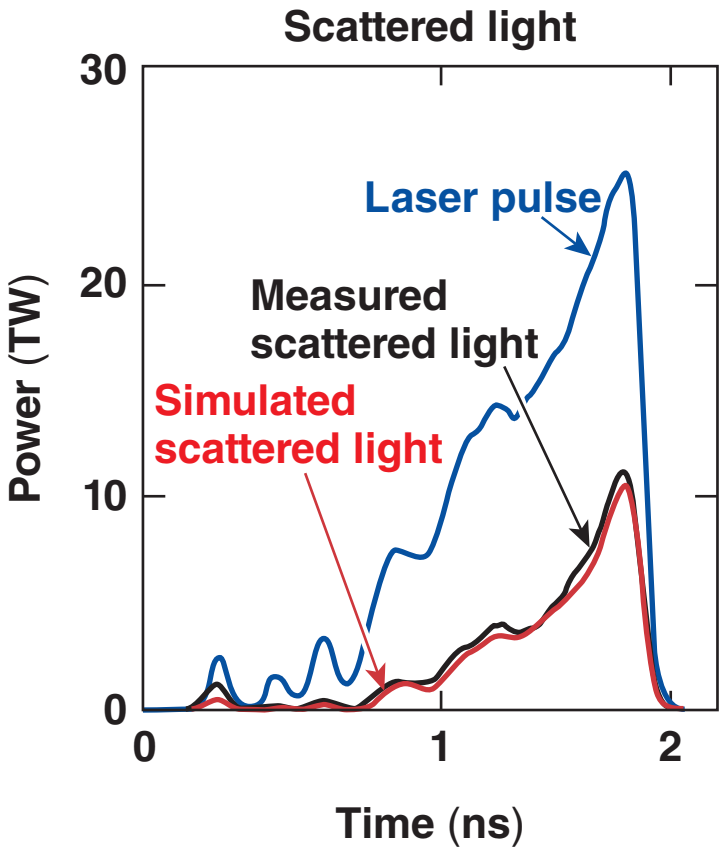
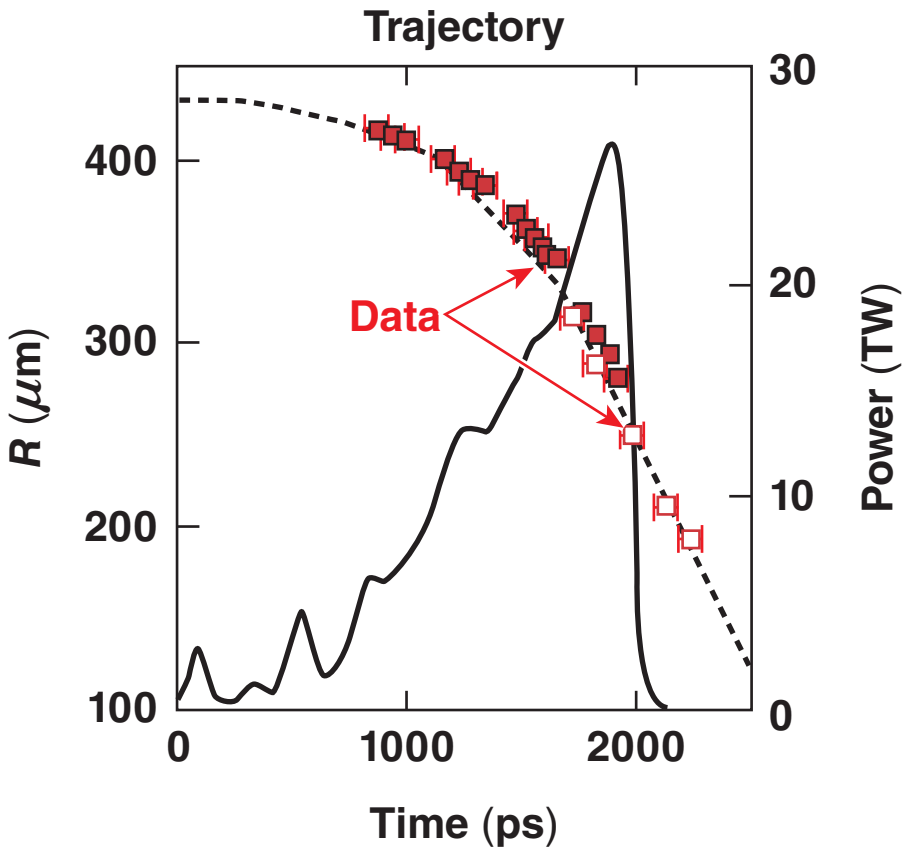
Simulations of scattered light and trajectories are in agreement with the measurements





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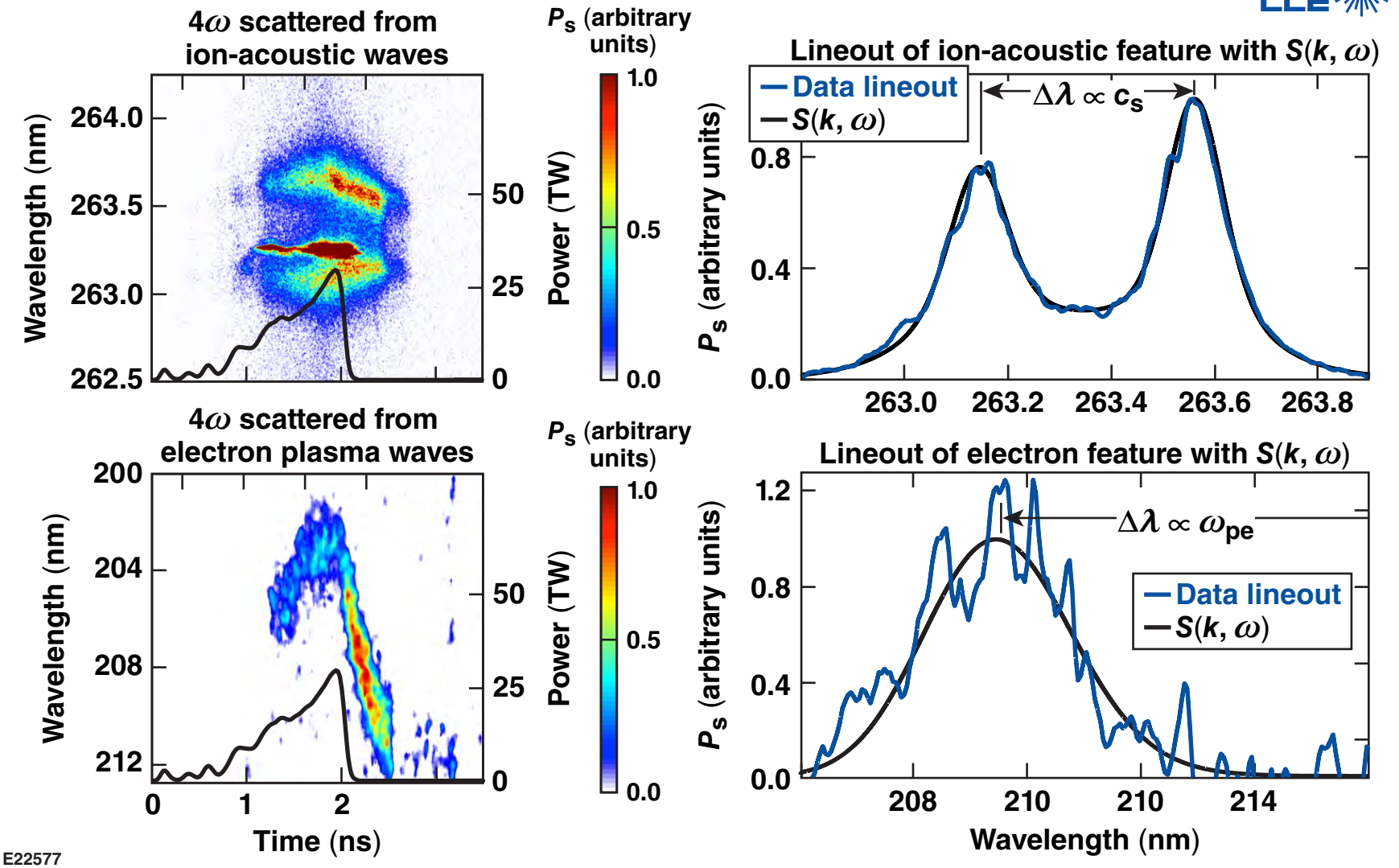
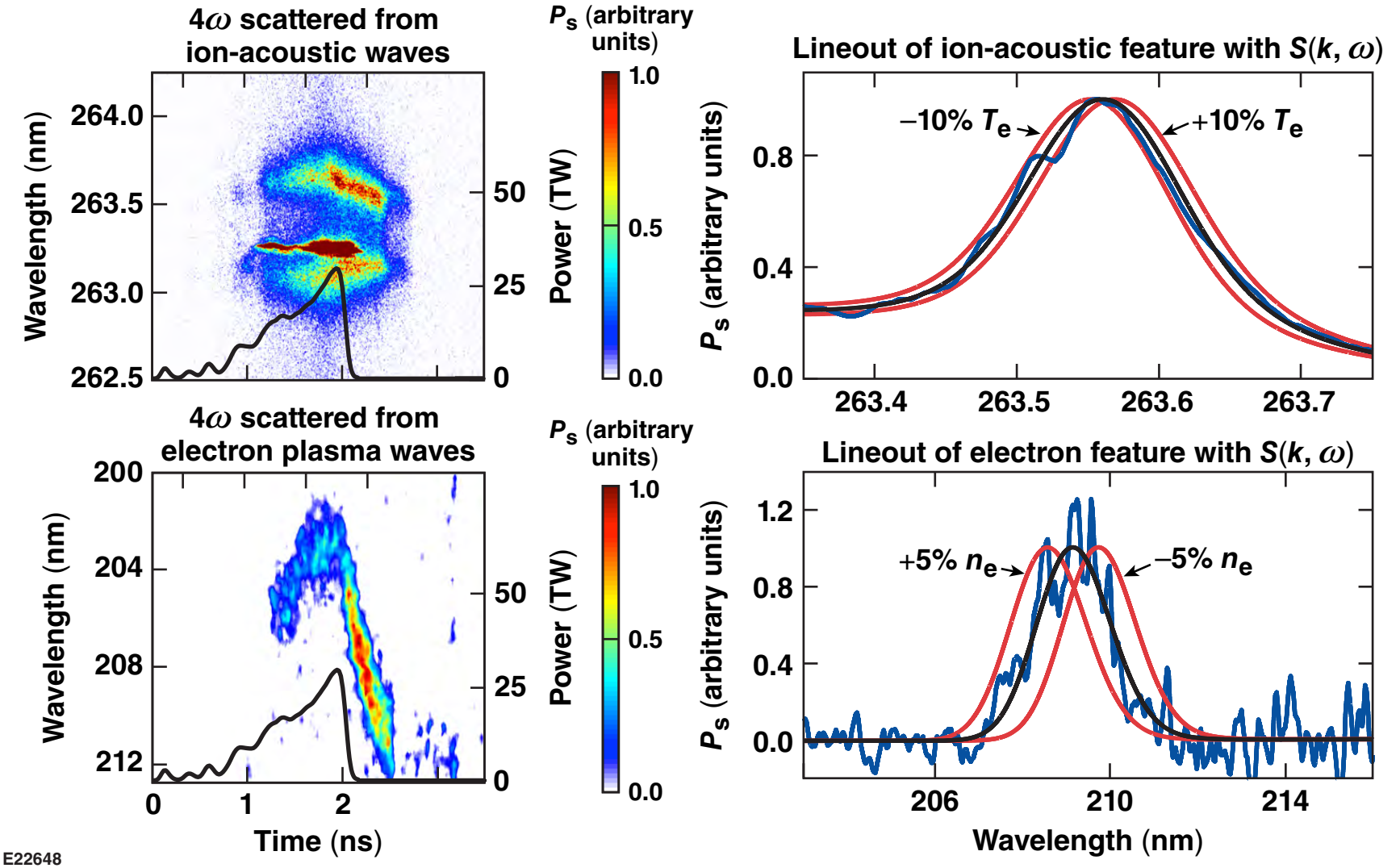
Simultaneous measurements of collective Thomson scattering from ion-accoustic waves (IAW's) and electron plasma waves (EPW's) provide local plasma coditions



E22577

Adjusting plasma parameters within the noise of the data determines the accuracy of the fit



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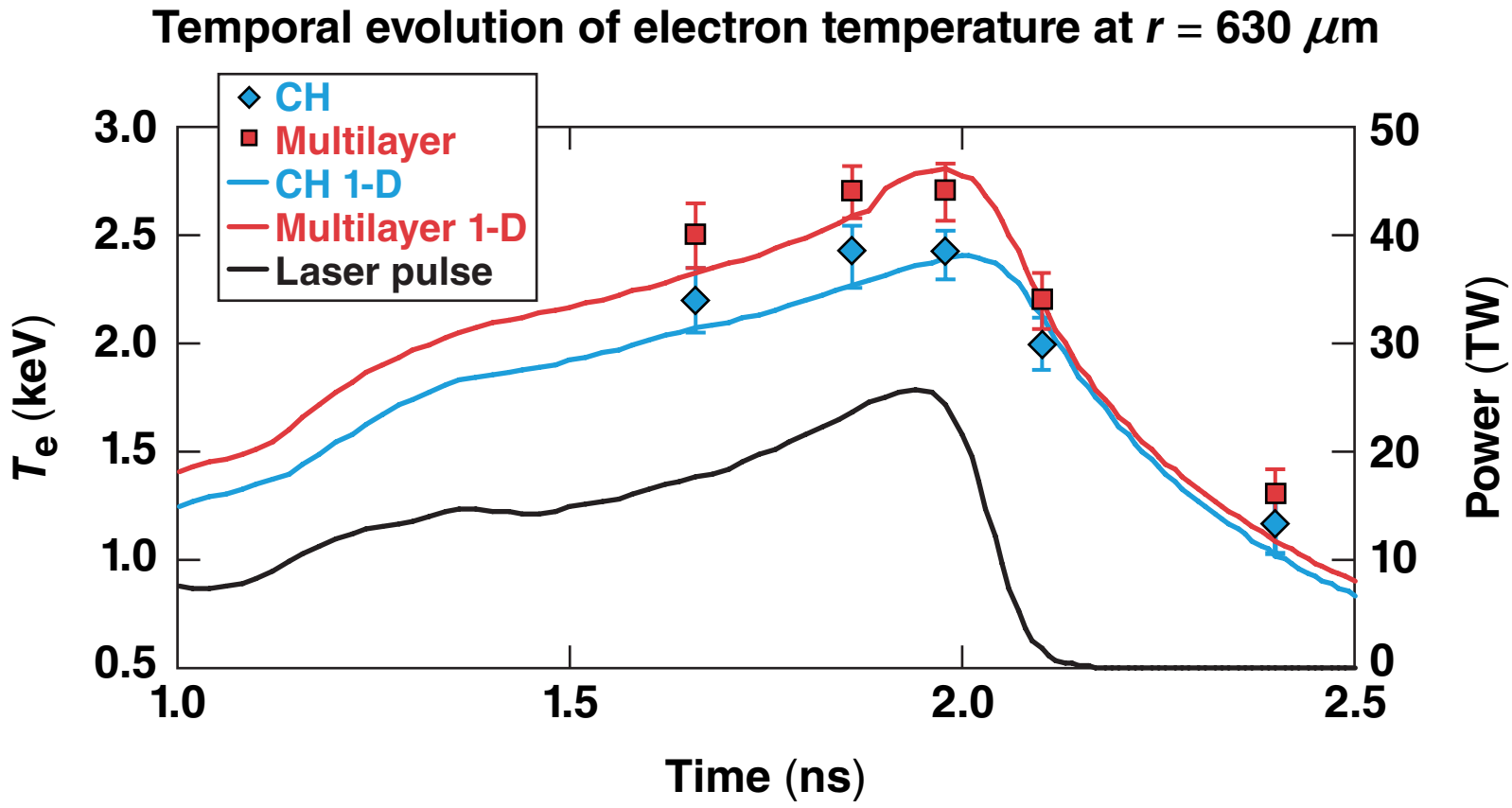
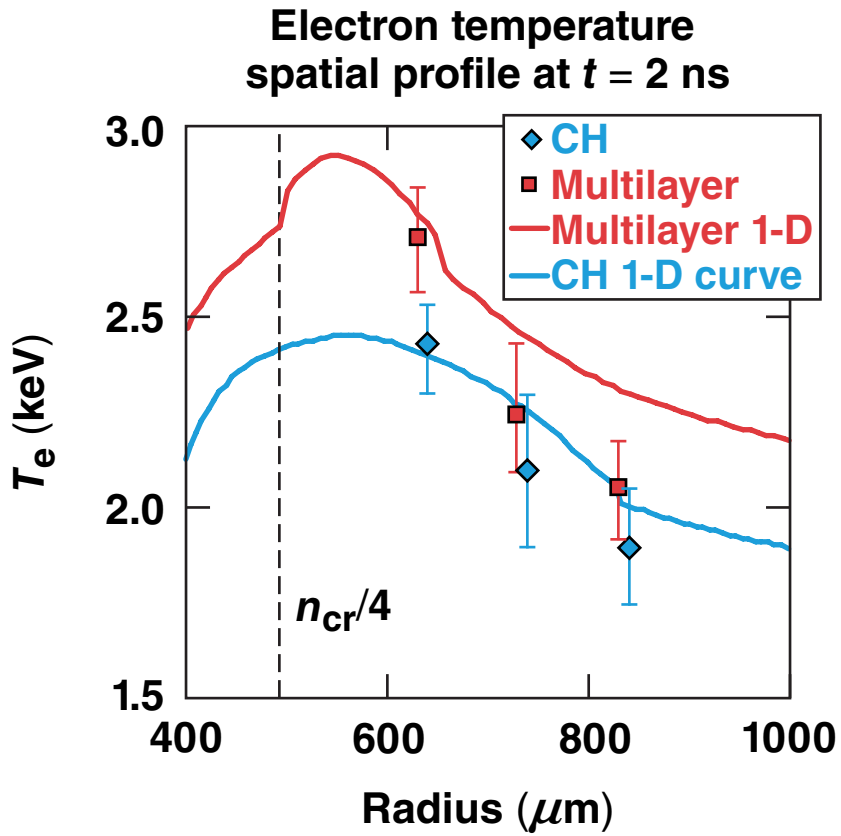
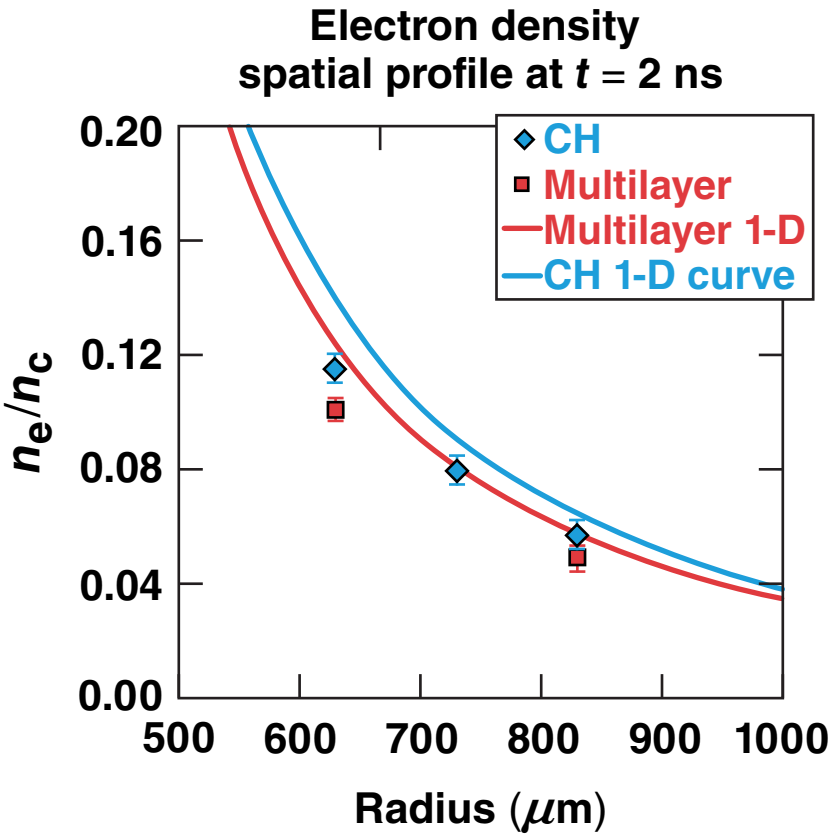
Electron temperature is higher in the coronal plasma of multilayer targets than in CH targets at the end of the drive



E22578

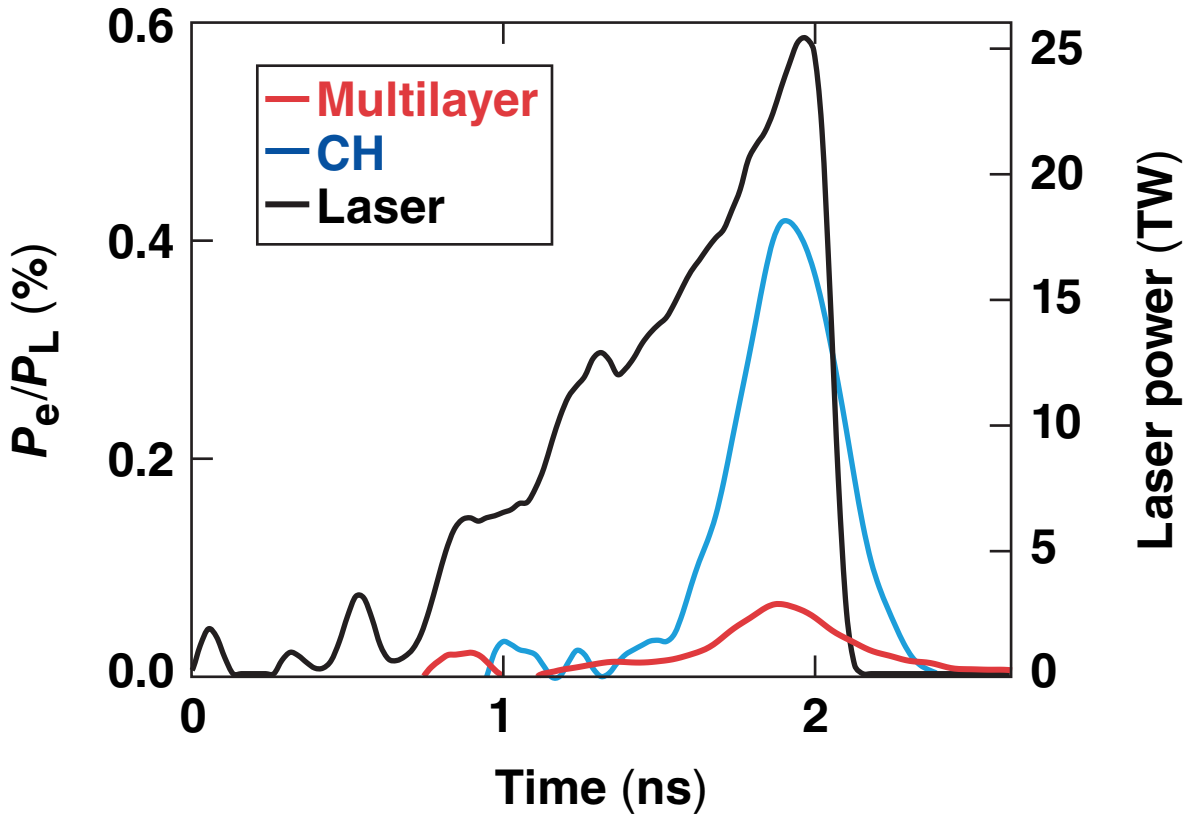
The difference in electron temperature between the two types of targets is more evident closer to the target





E22579

The higher coronal temperatures reduce two-plasmon–decay produced hot electrons



Multilayer targets produce 8× fewer hot electrons than CH targets.

E22649

Summary/Conclusions

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