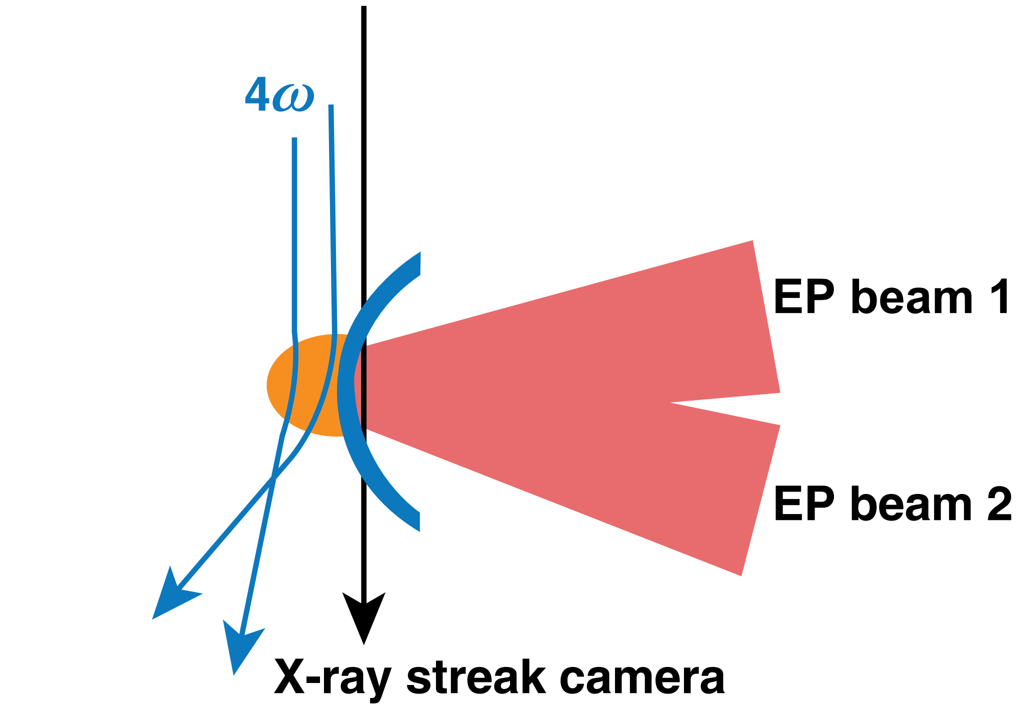
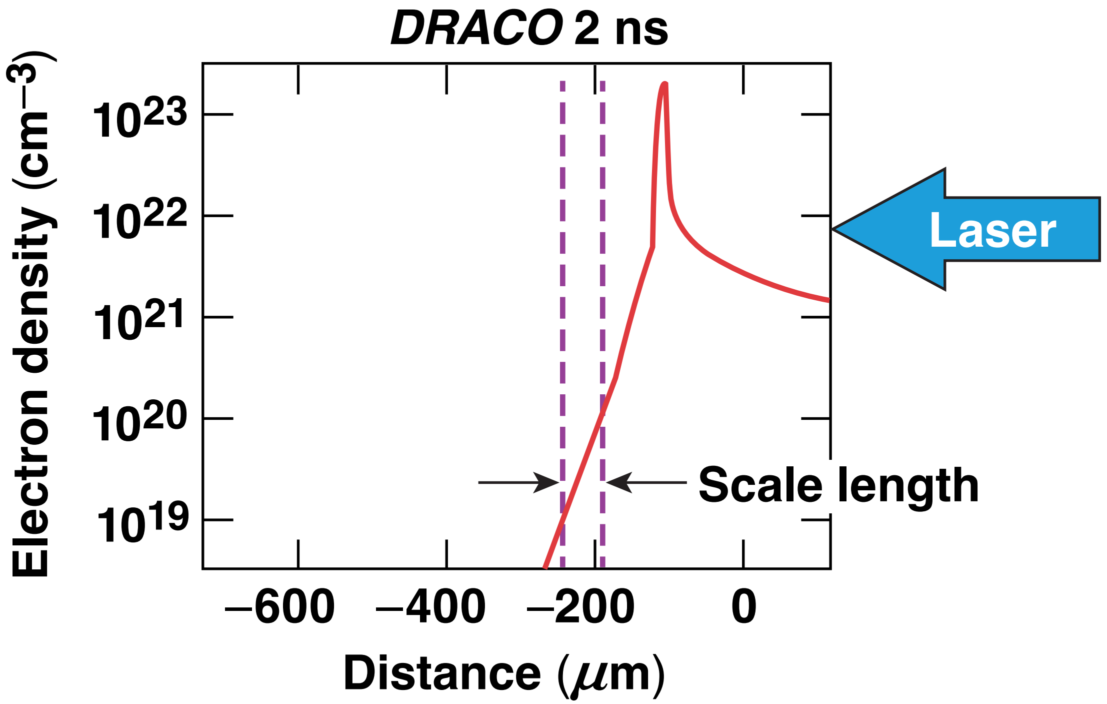
Numerical Simulations of Shock-Release OMEGA EP Experiments





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Summary

The measured electron density scale length in the released shock is significantly longer than that predicted by hydro simulations

- Material release from the inner shell of an implosion determines the mass of the hot spot and the onset of deceleration
- 4ω probe diagnostics were used on OMEGA EP to measure the electron density profile in the released shock*
- *DRACO*-simulated shell trajectories depend on the thermal transport models and agree with those measured using side-on x-ray radiography**

*D. J. Haberberger *et al.*, CO4.00010, this conference.
**PJXI: Paul Jaanimagi x-ray imager

Collaborators

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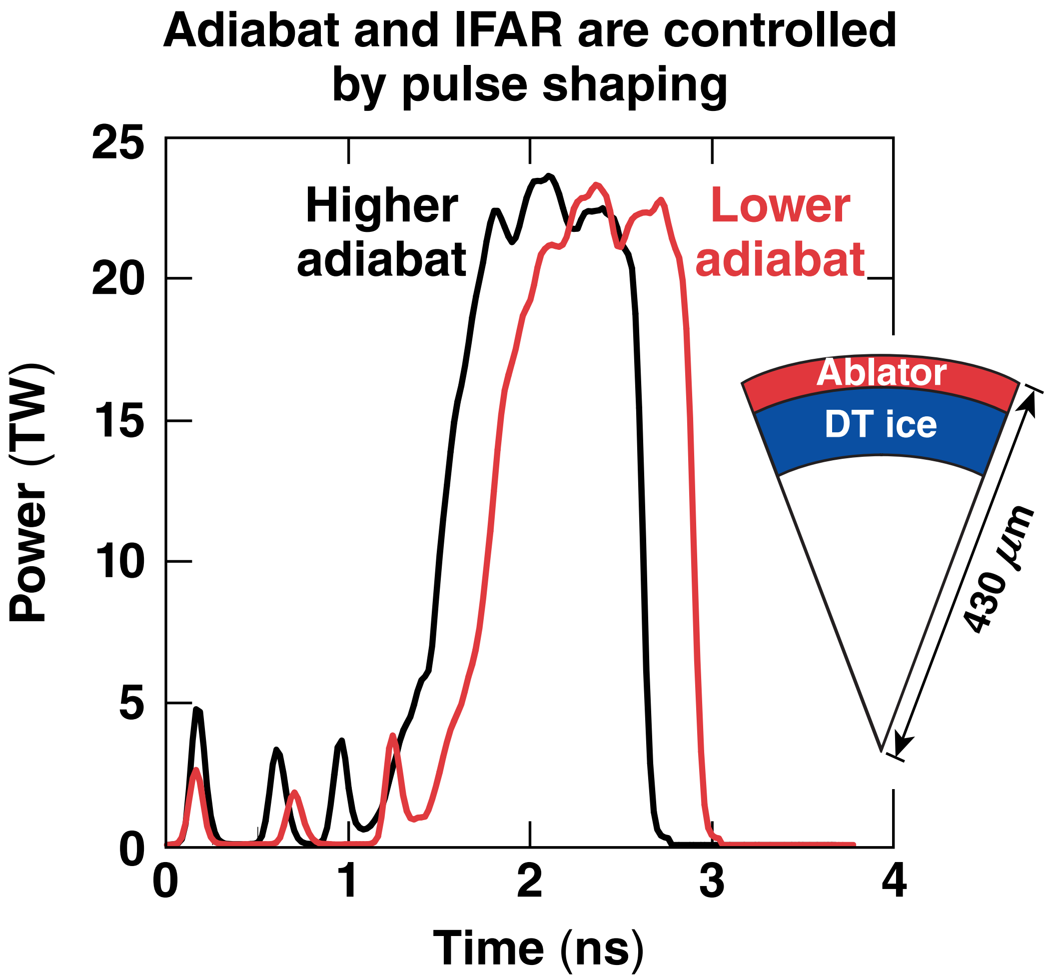
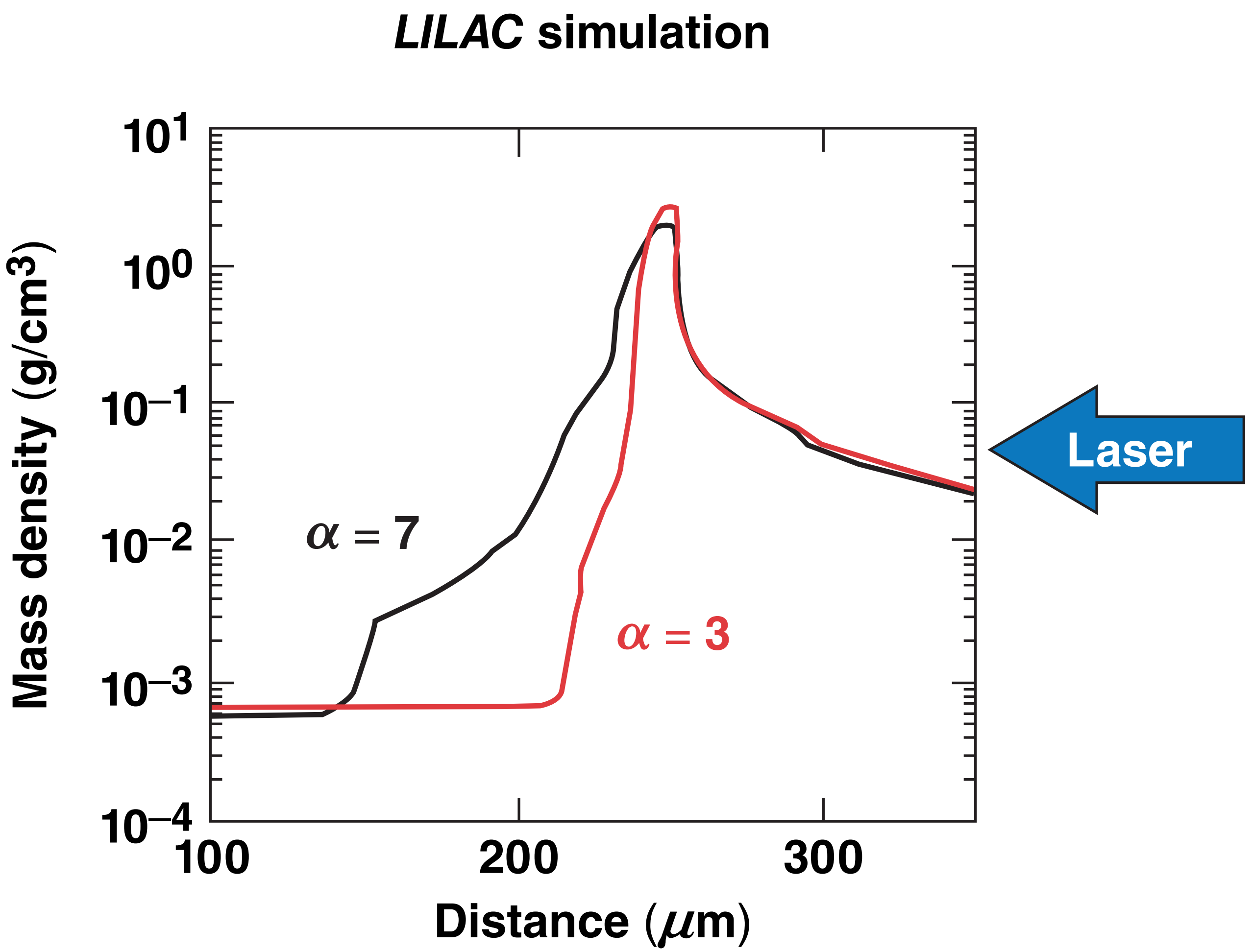
The density profile in the rarefaction wave affects the hot-spot formation and depends on the shell adiabat and the shock-release physics

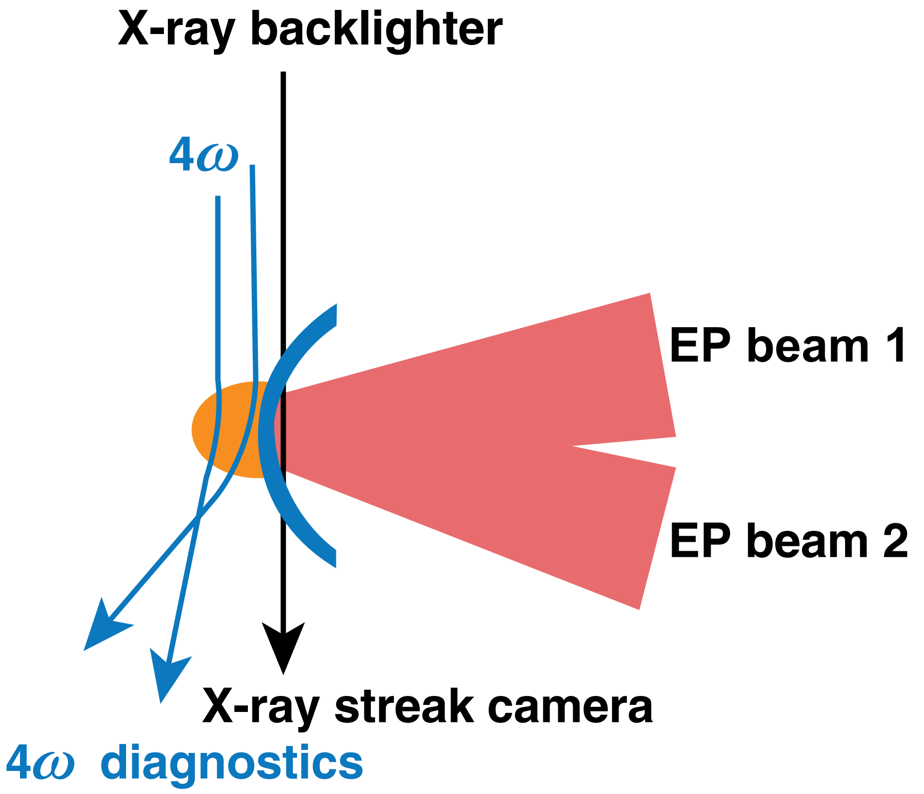


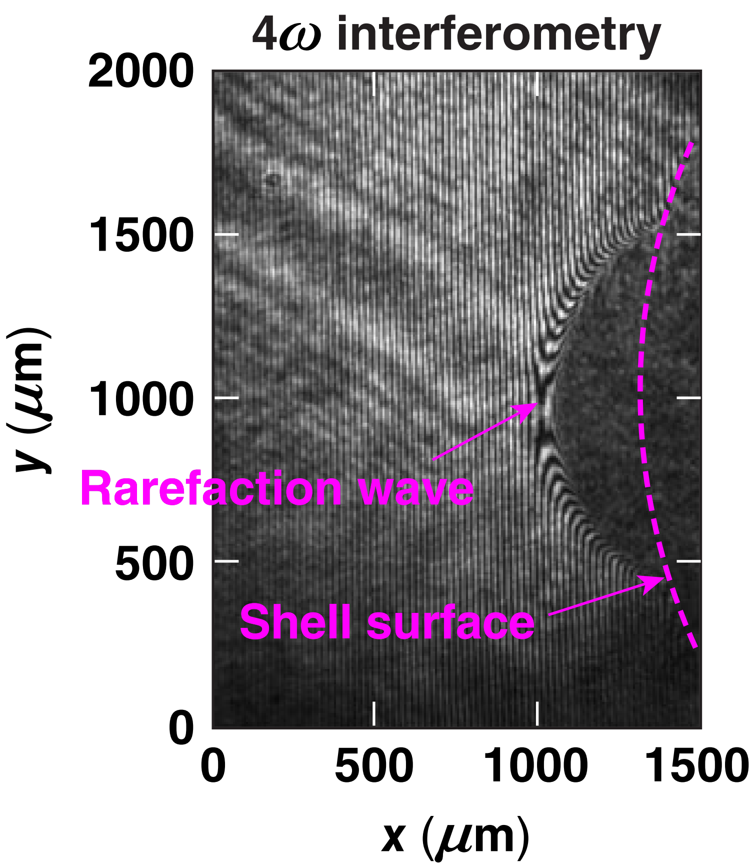


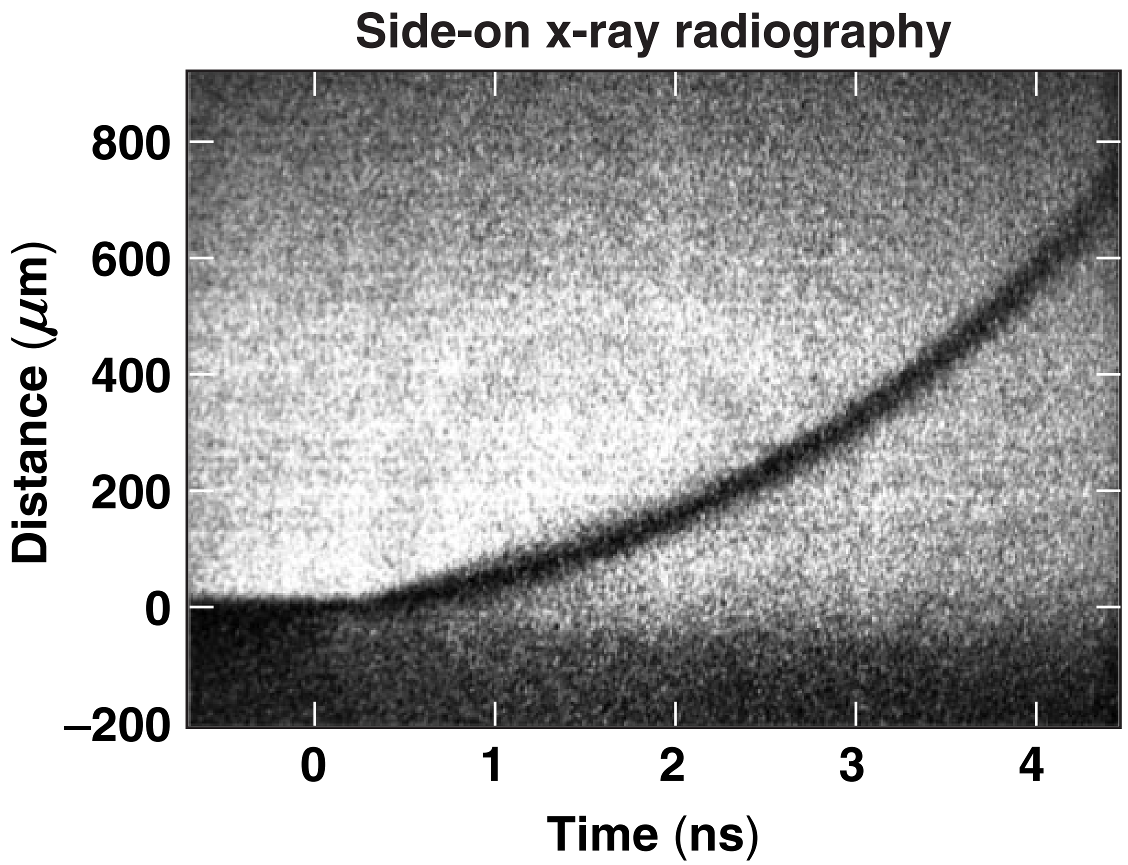
TC14639

IFAR: in-flight aspect ratio

The shock-release experiment uses a 4ω probe to measure the low-density plasma profile and side-on x-ray radiography to measure the shell trajectory



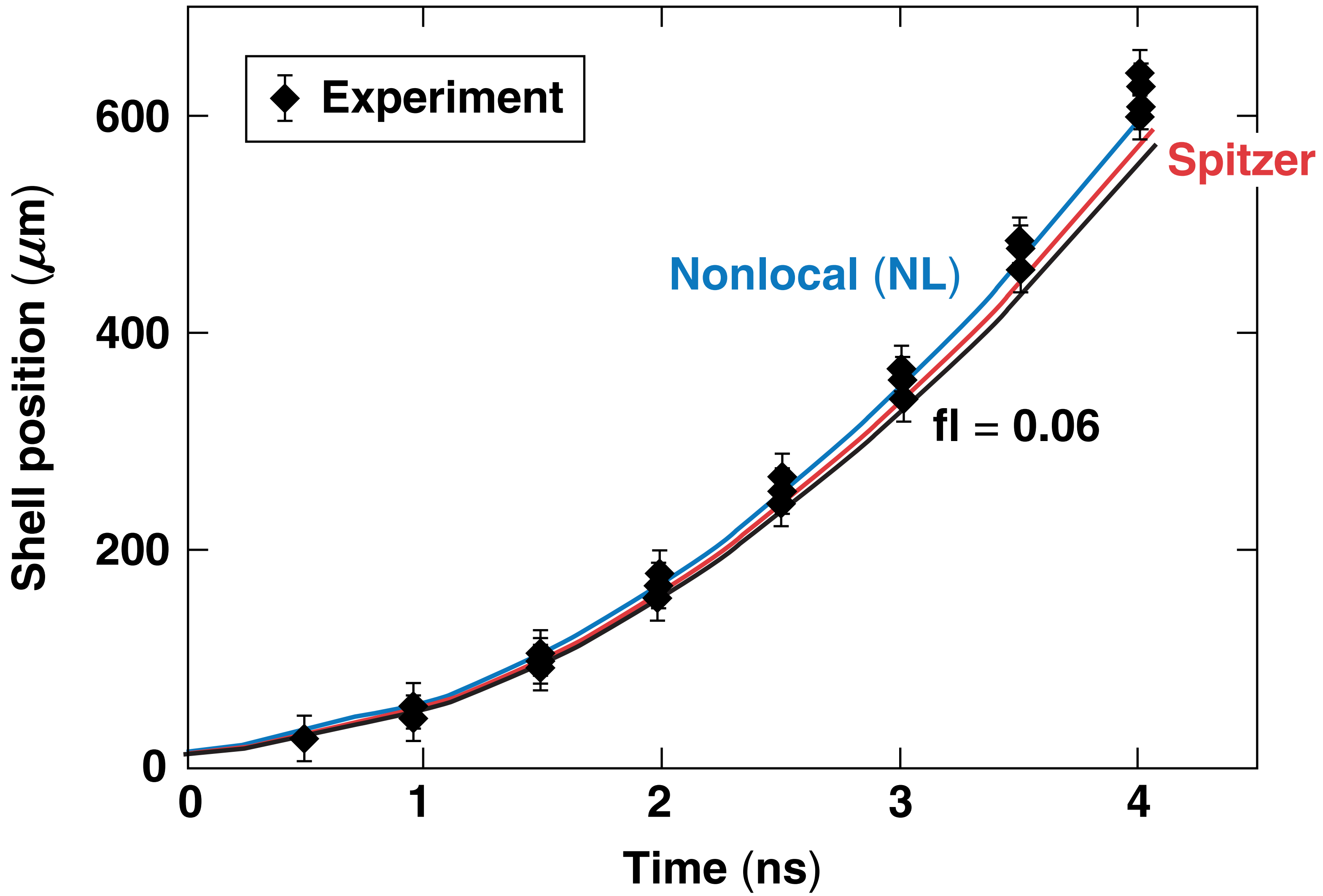




- 37 μm CH
- 4.1-mm-diam spherical cap
- 5-ns square pulse (two beams)
- 4×10^{14} W/cm^2

TC14640

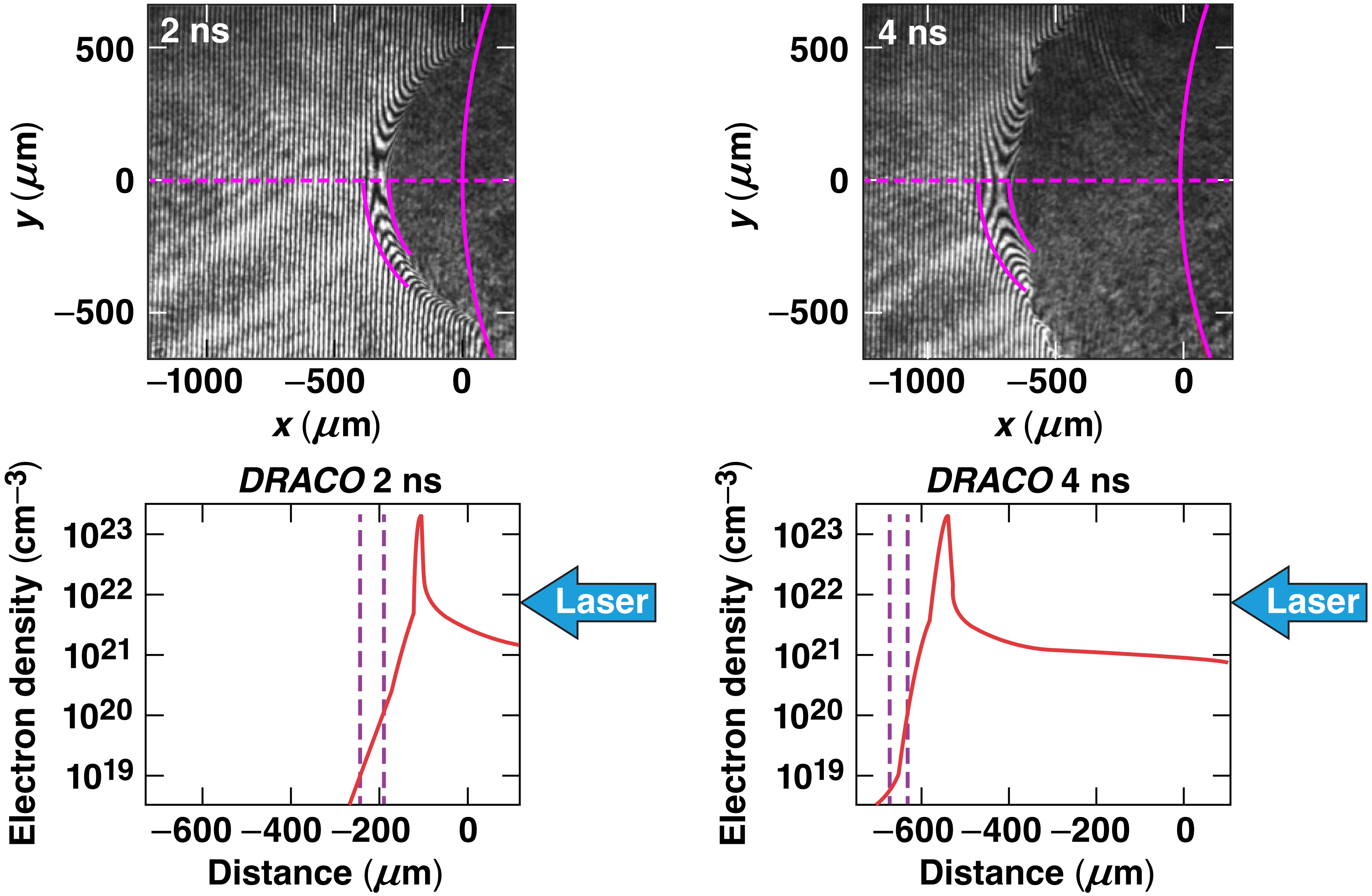
The shell trajectory from a *DRACO* simulation using the nonlocal transport model shows good agreement with the measured shell trajectory



TC14641

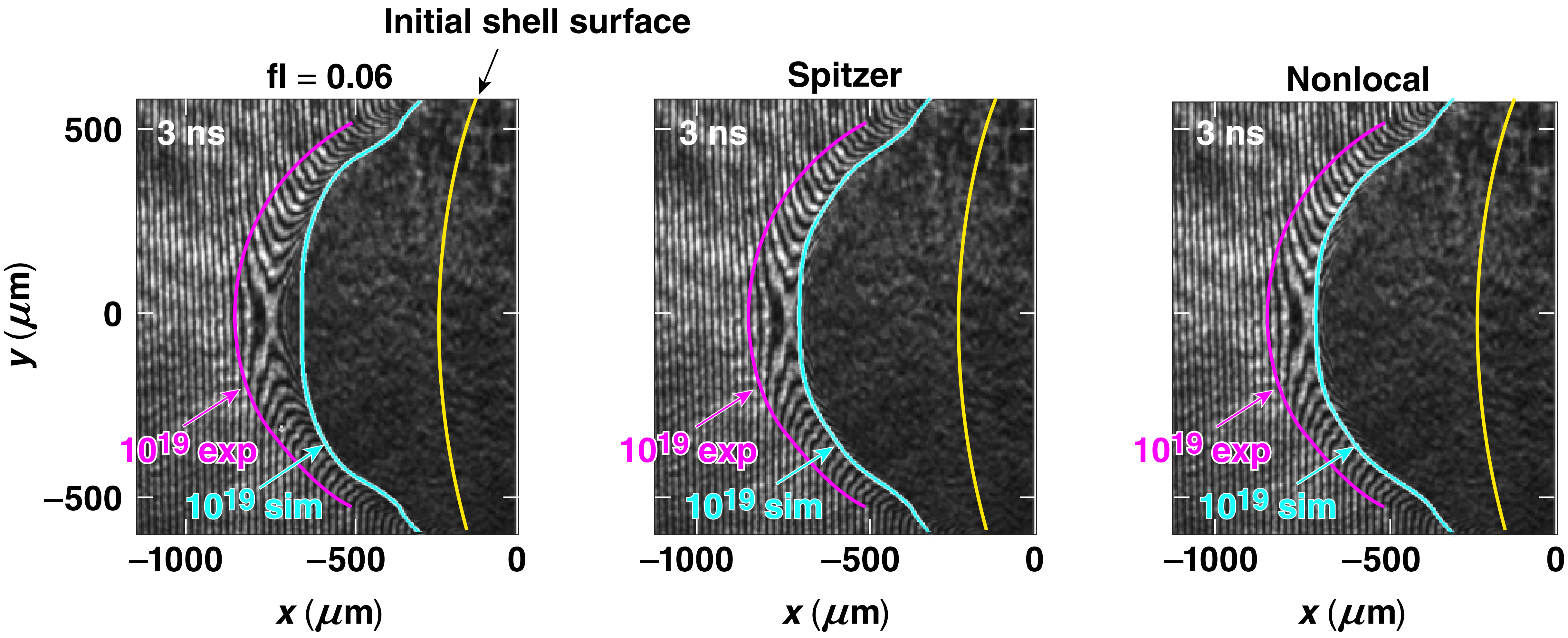
fl: flux limiter

A time series of 4ω data delivers detailed temporal and spatial information about the plasma density in the rarefaction wave



TC14642

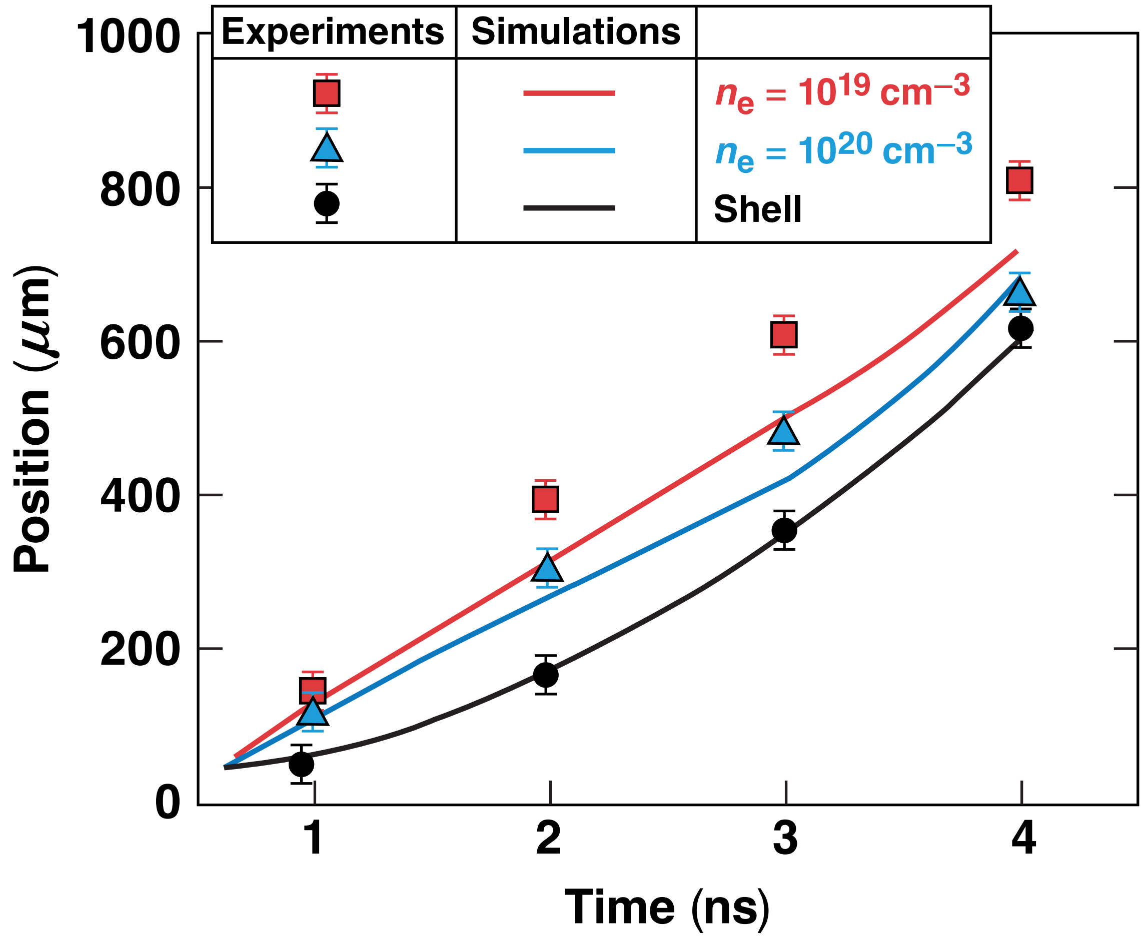
DRACO-simulated 2-D shapes of the rarefaction wave depend on the thermal transport model



TC14643

Experimentally measured scale lengths of the electron density profiles in the rarefaction wave are significantly longer than those predicted by *DRACO*

UR LLE



Possible reasons for discrepancy

- **Shell adiabat and sound speed are not accurately modeled**
- **EOS, plasma Z, and index of refraction are not accurate for the plasma conditions of the released shock**
- **Lack of important physics in the simulations such as ion viscosity and species separation**

TC14644

EOS: equation of state

Summary/Conclusions

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