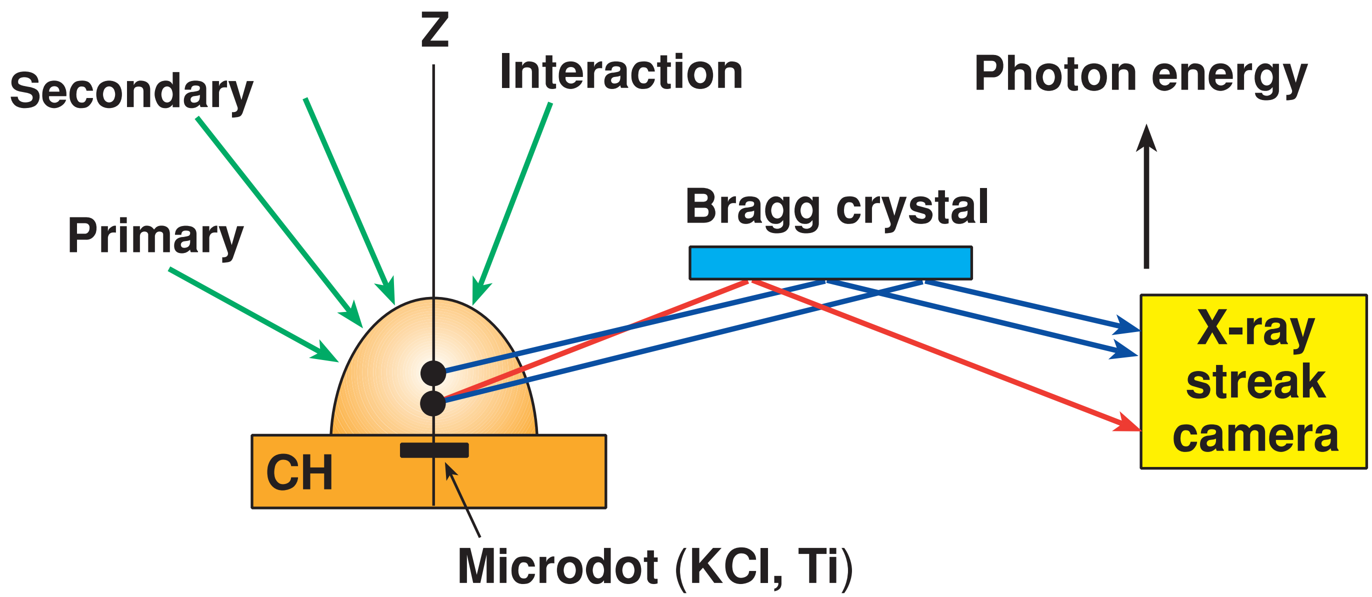
Microdot Expansion Trajectories in Long-Scale-Length Plasmas on OMEGA



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Collaborators

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Summary

A novel spectroscopic diagnostic is used to characterize long-scale-length plasmas on OMEGA

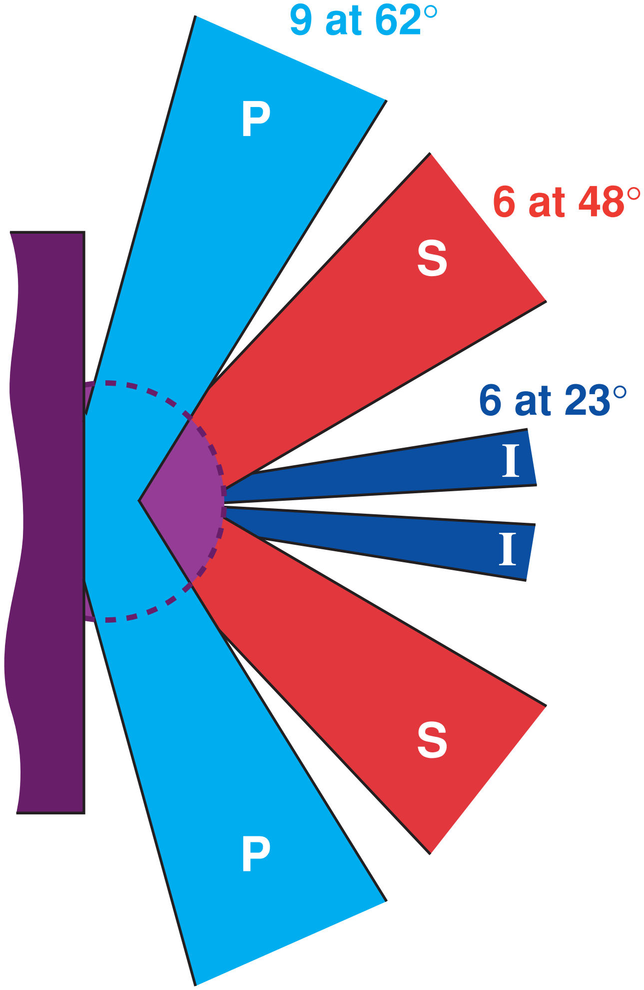
- The diagnostic provides trajectories and time-resolved line ratios of ablated microdots in the blowoff plasma.
- Spectroscopic results are mostly in agreement with *SAGE* modeling.
- There is some indication that the ablation of microdot tracer materials is delayed relative to simulations.

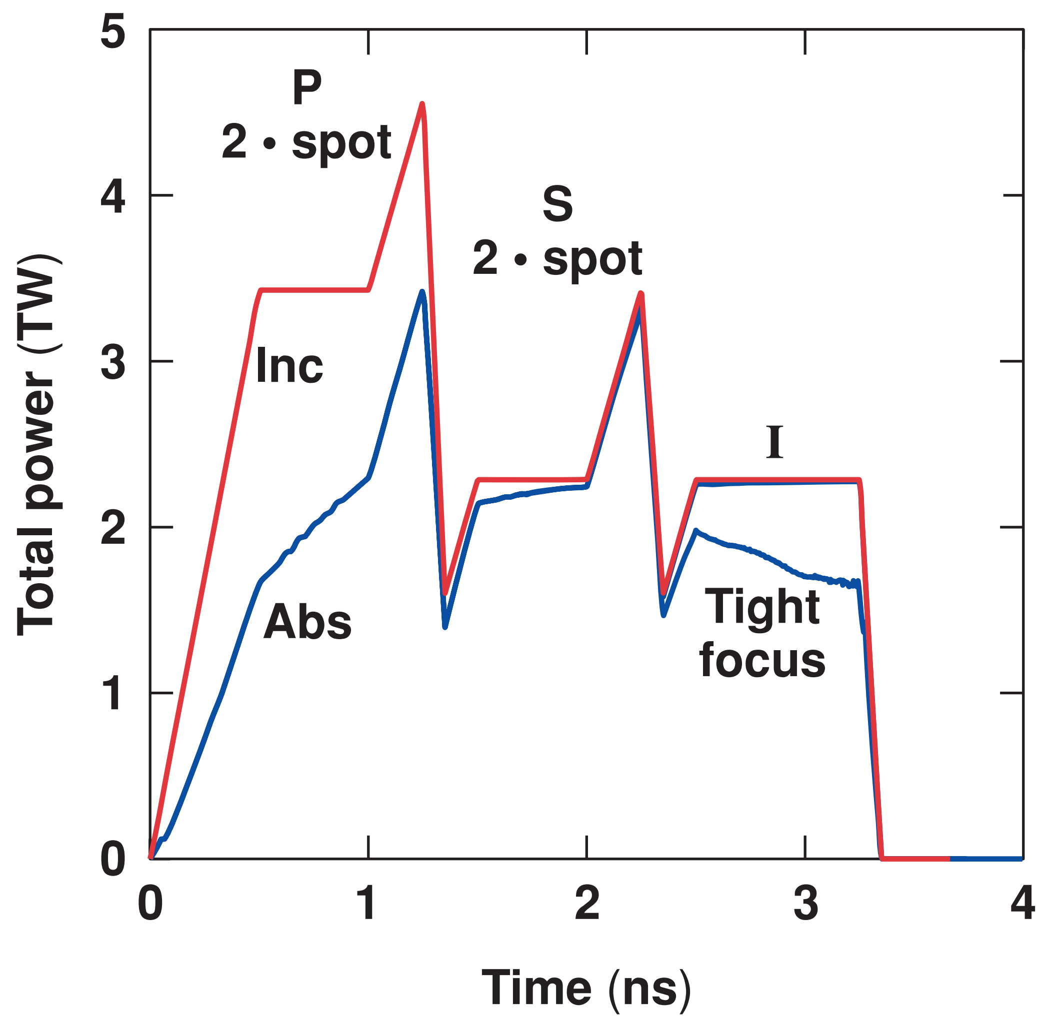
Subsequent papers describe the use of these plasmas to study NIF-relevant plasma instabilities.

Outline

- *SAGE* simulations of long-scale-length plasmas on OMEGA
- Spectroscopic diagnostic
- Comparison between experiments and *SAGE*/*FLY* modeling
  - microdot trajectory
  - line ratios of *K*-shell emission

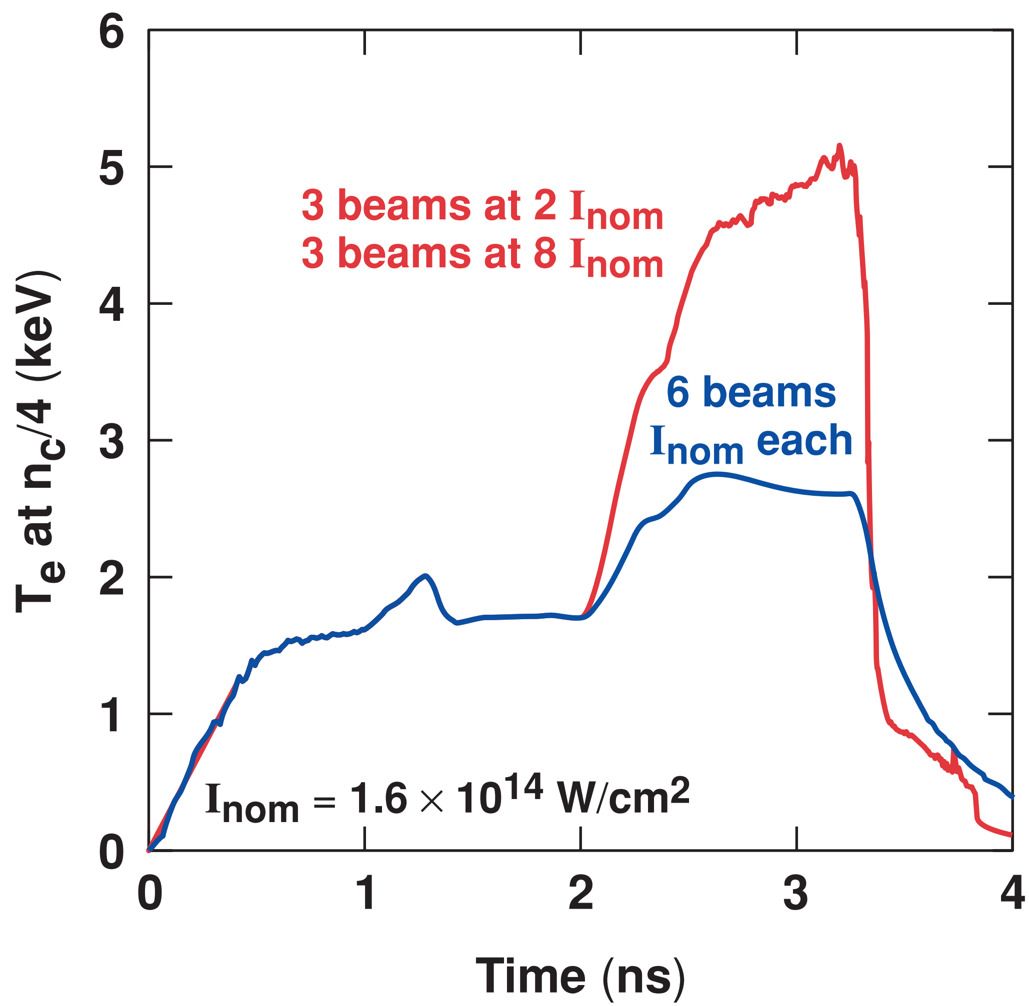
The long-scale-length plasma design uses six OMEGA beams as overlapped interaction beams





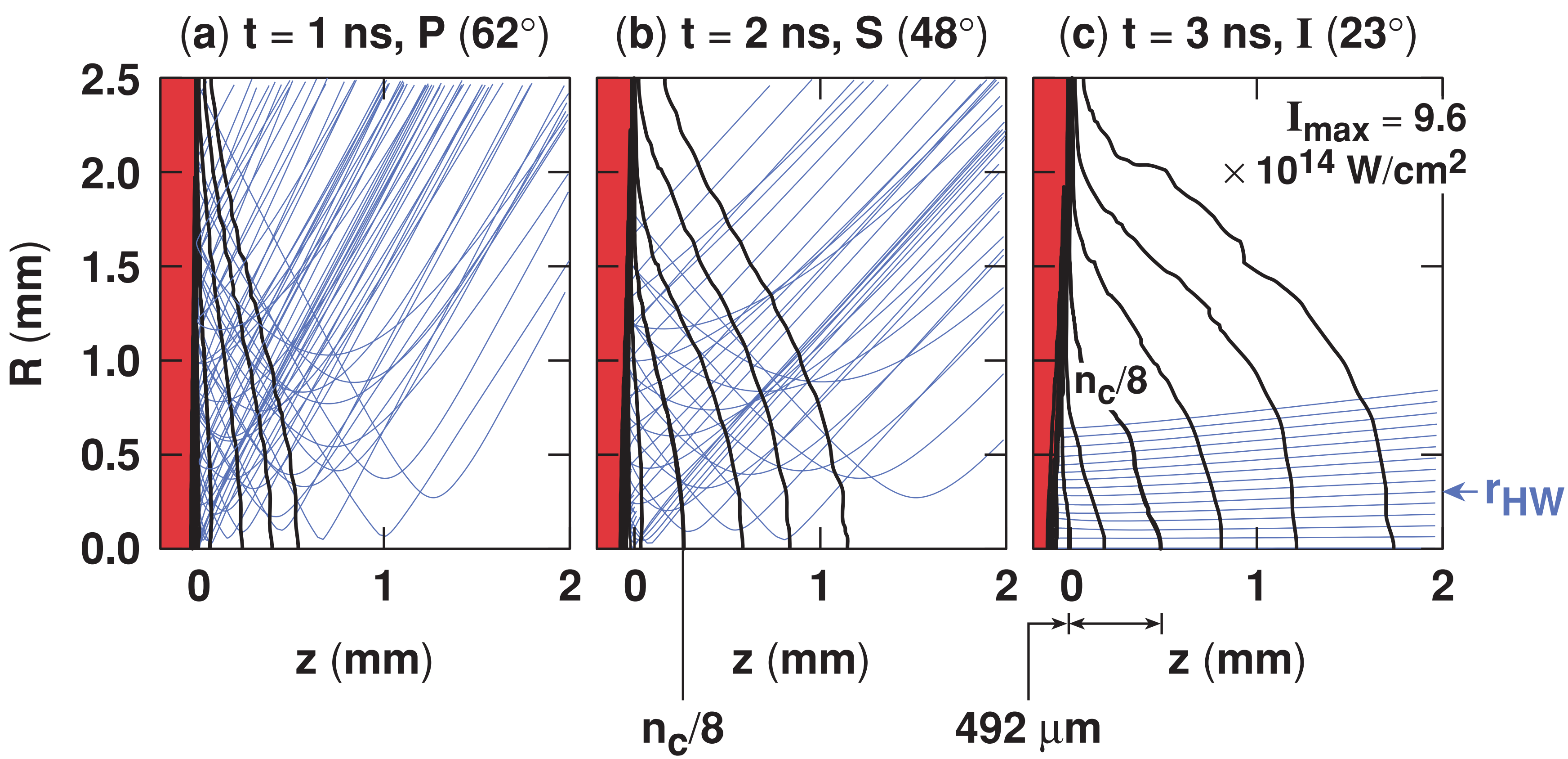
Runs 3268, 3271
TC6001

The corona temperature depends strongly on the interaction-beam focusing conditions



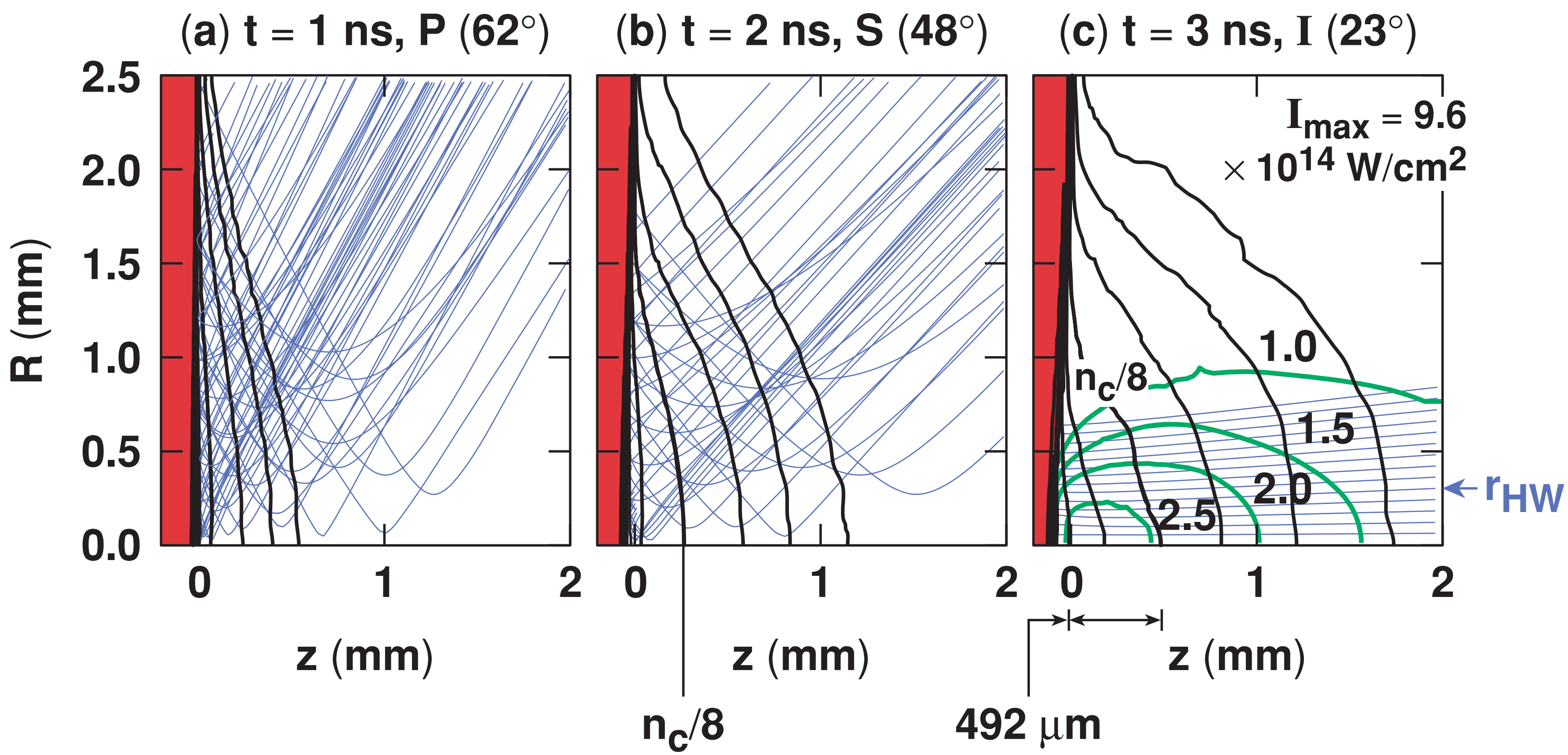
Runs 3268, 3271
TC5649a

The overlapped interaction beams see a large plasma that they heat



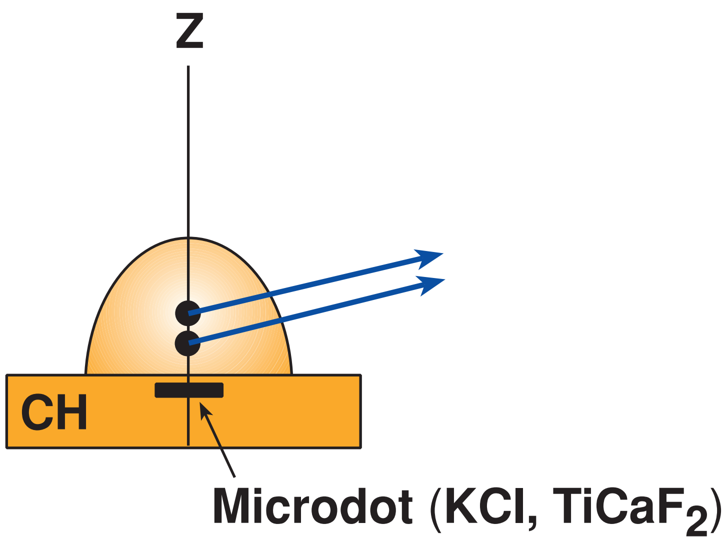
Run 3268
TC5647

The overlapped interaction beams see a large plasma that they heat

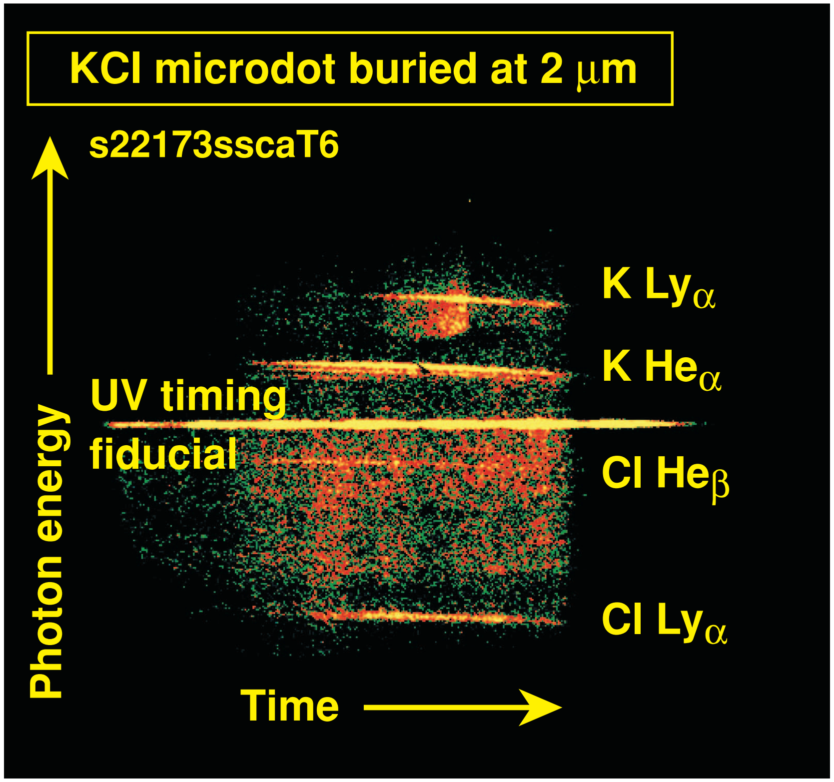


Run 3268
TC5647a

Plasma conditions are diagnosed with time-resolved *K*-shell spectroscopy of a microdot tracer layer



Diameter = 200 μm
Thickness = 0.1 μm
Depth = 2 to 6 μm



Experimental trajectories are close to predicted but experience a delay for greater tracer material depths

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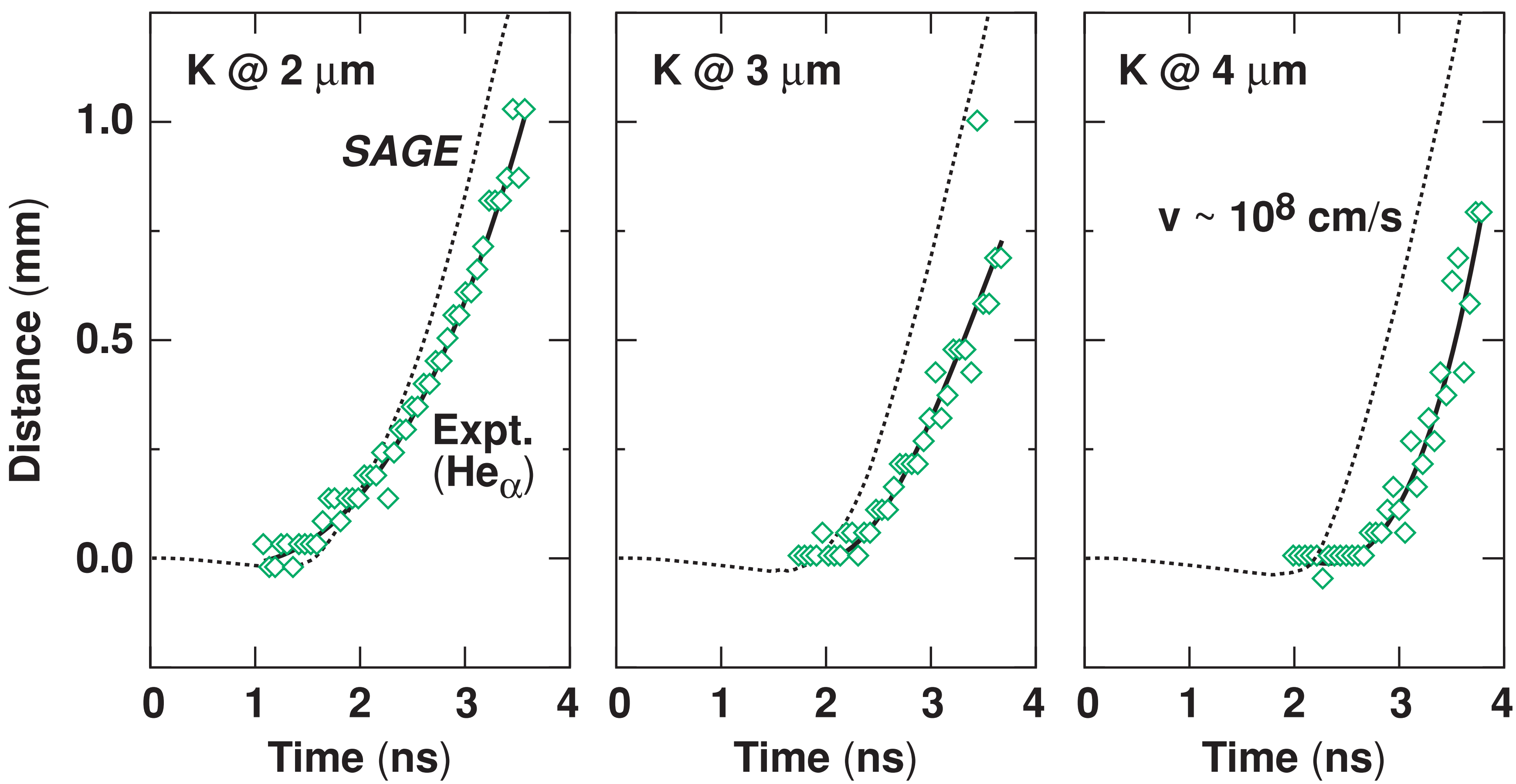
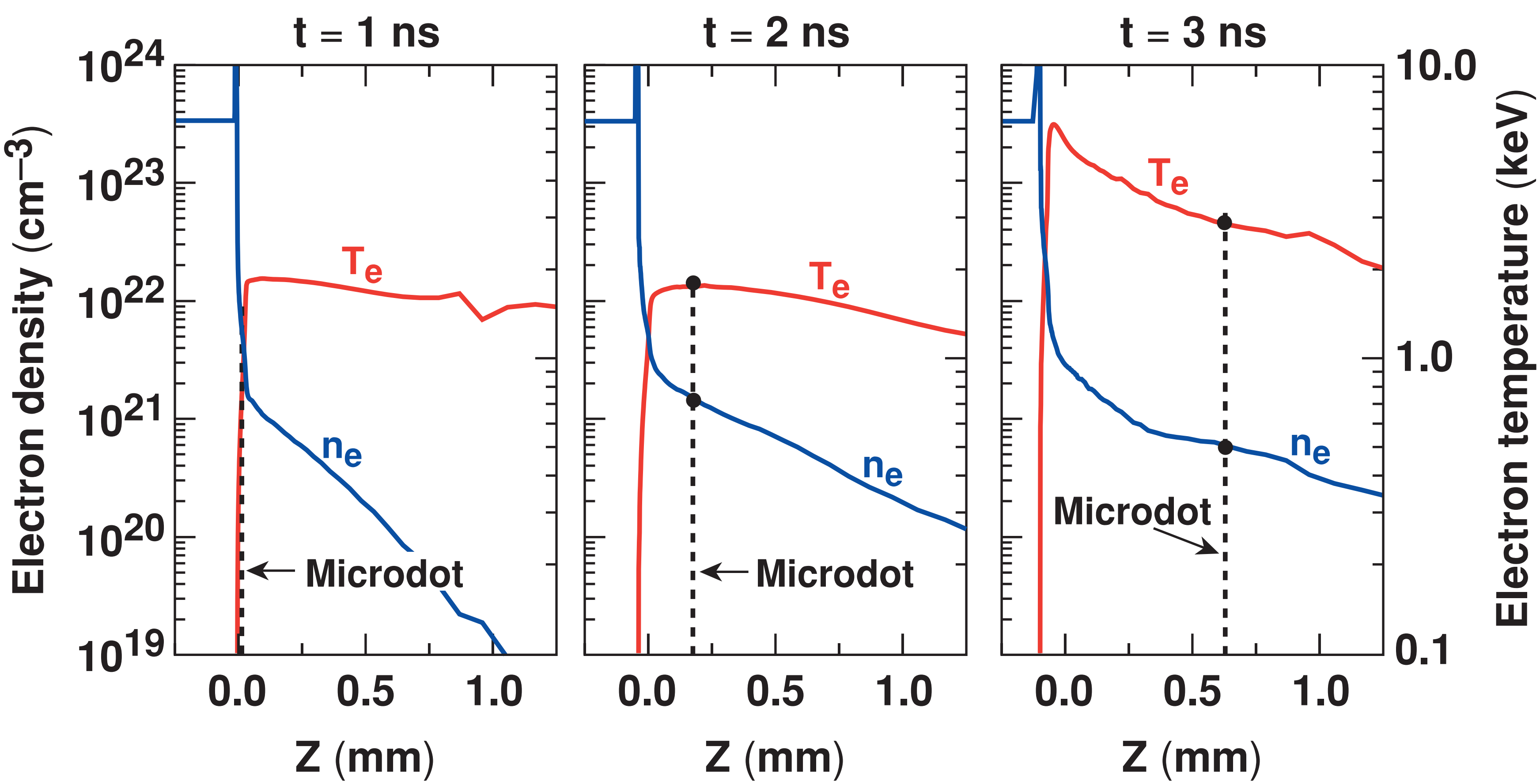


Run 3368
E11769a

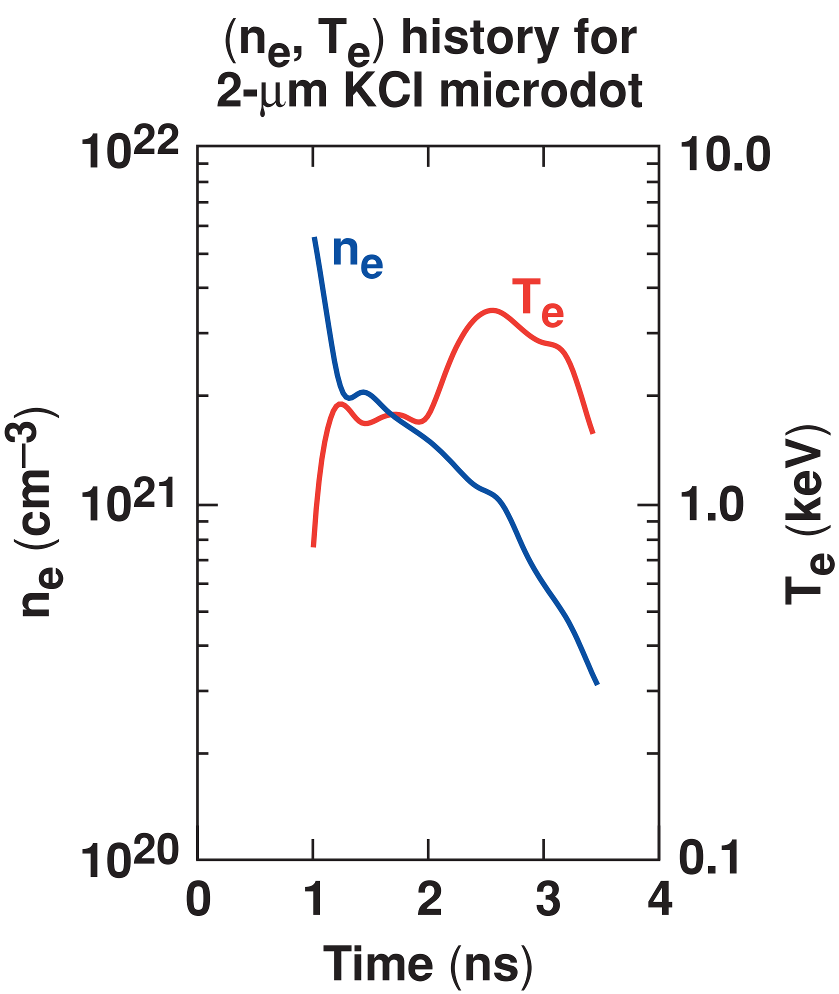
The time history of the microdot density and temperature can be obtained from the *SAGE* profiles

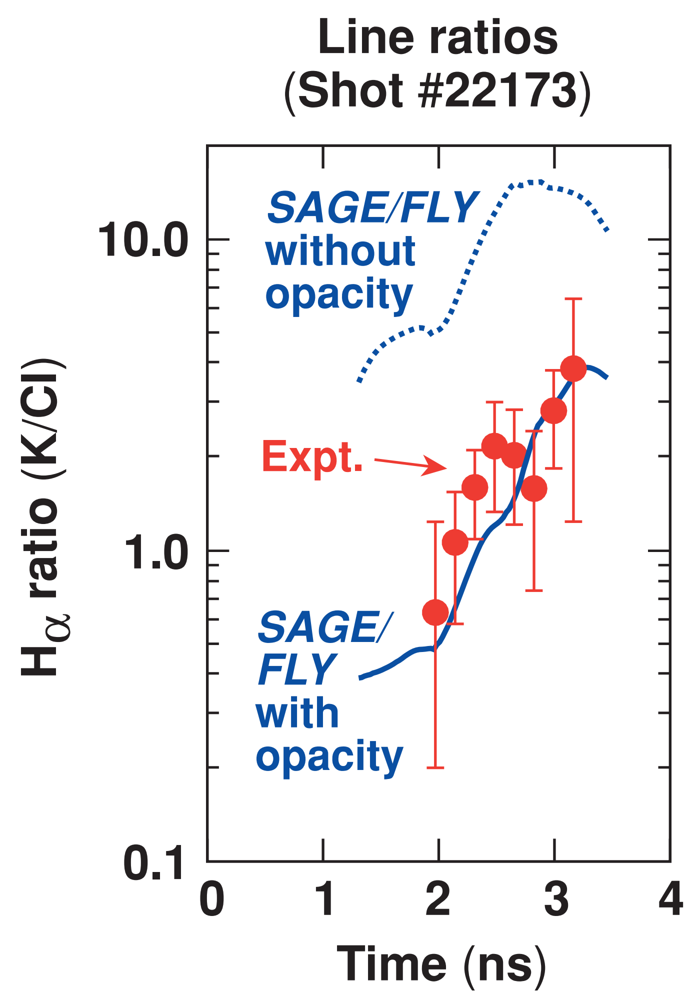
KCl microdot buried at 2 μm



Run 3368
S22173ssca T6
TC6003

SAGE/FLY predictions match measured line ratios when line opacities are included





- Normal-incidence view would avoid need for opacity correction.

Run 3368
TC6004

Summary/Conclusions

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TC5989