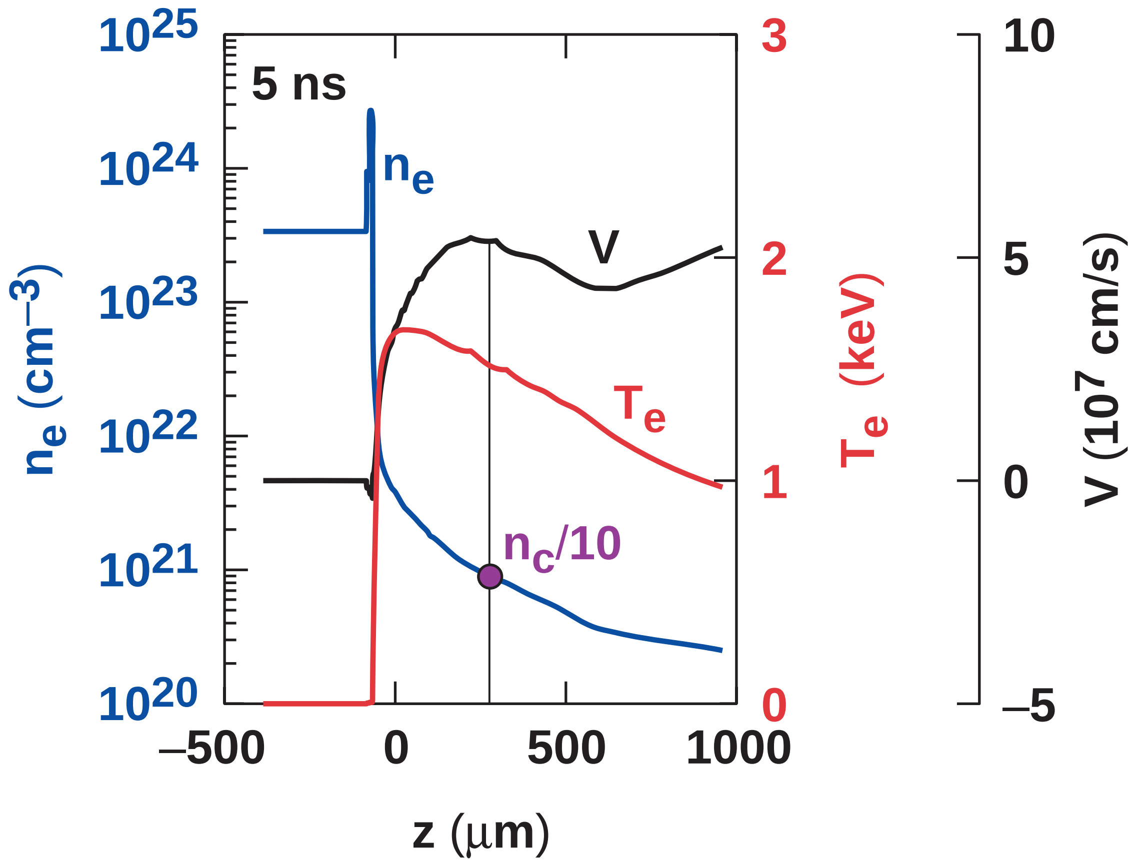
Design of Long-Scale-Length Plasmas for Interaction Physics Experiments on OMEGA

UR LLE



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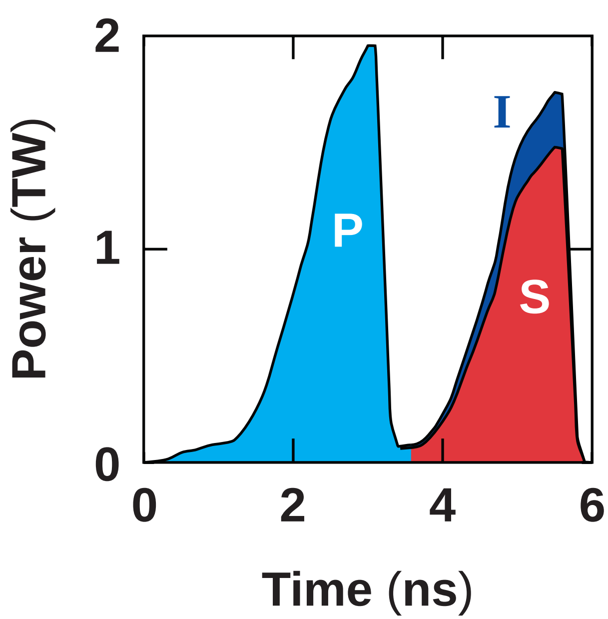
31st Annual Anomalous
Absorption Conference
Sedona, AZ
3–8 June 2001

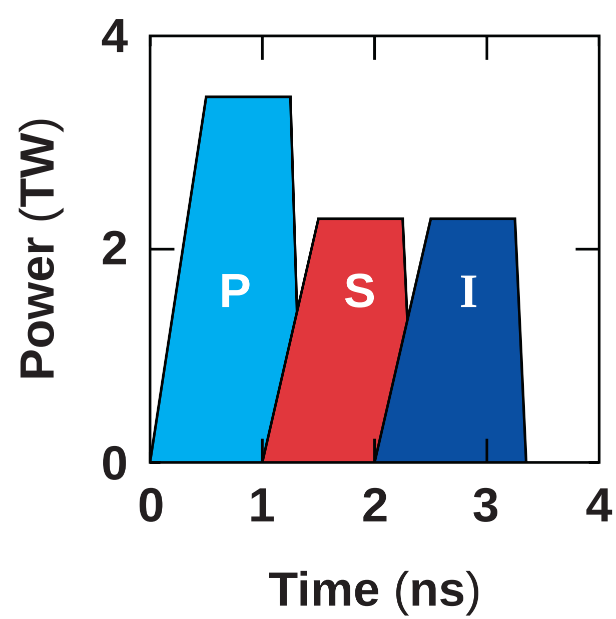
Summary

Two long-scale-length plasmas have been designed for NIF-relevant experiments

- Design A (see R. Short paper)
  - Double-pulse design leads to low velocity gradient for SBS.

- Design B (see W. Seka paper)
  - Test bed for multibeam effects allows up to six interaction beams.



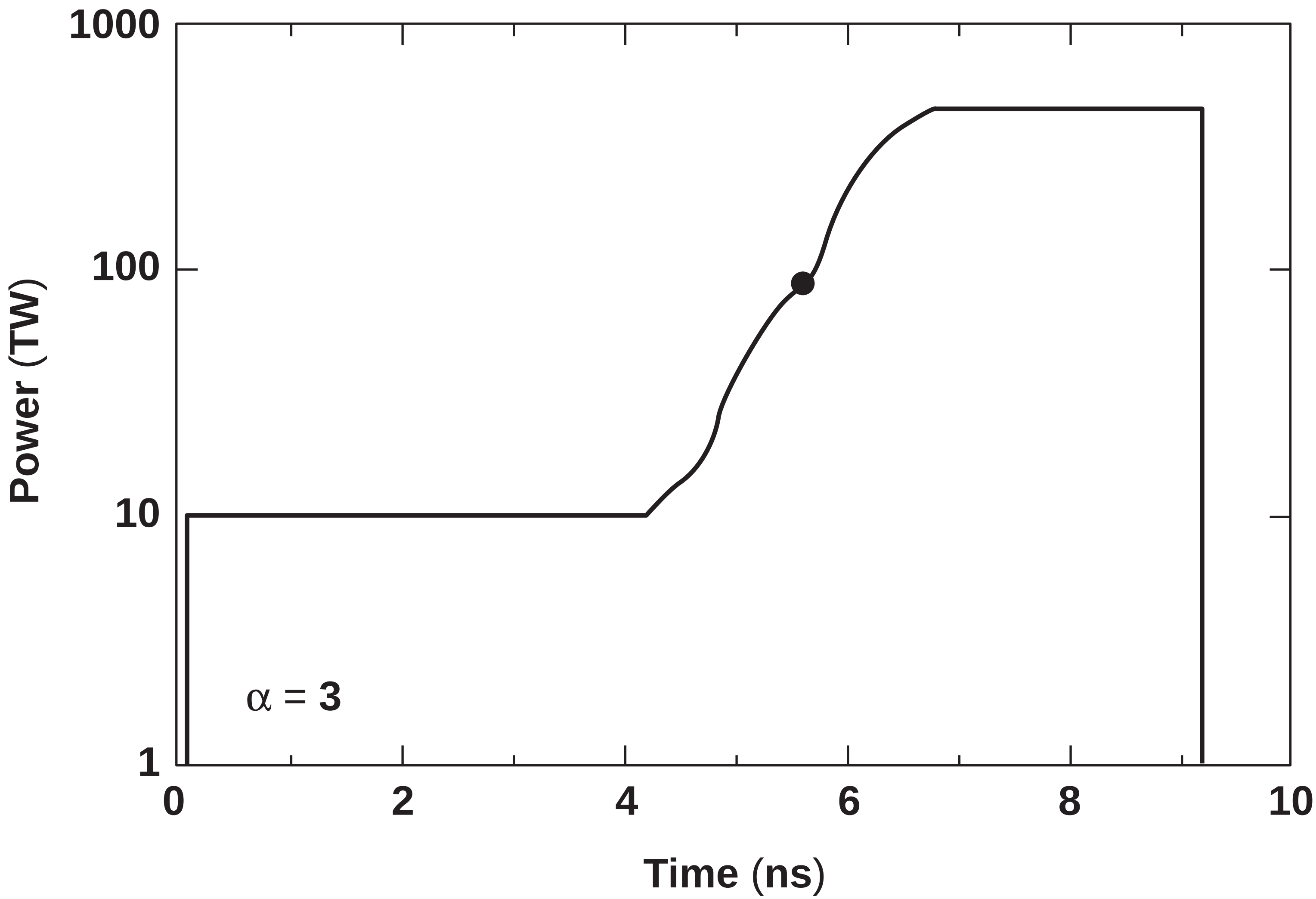


Runs 3261, 3268
TC5638

Outline

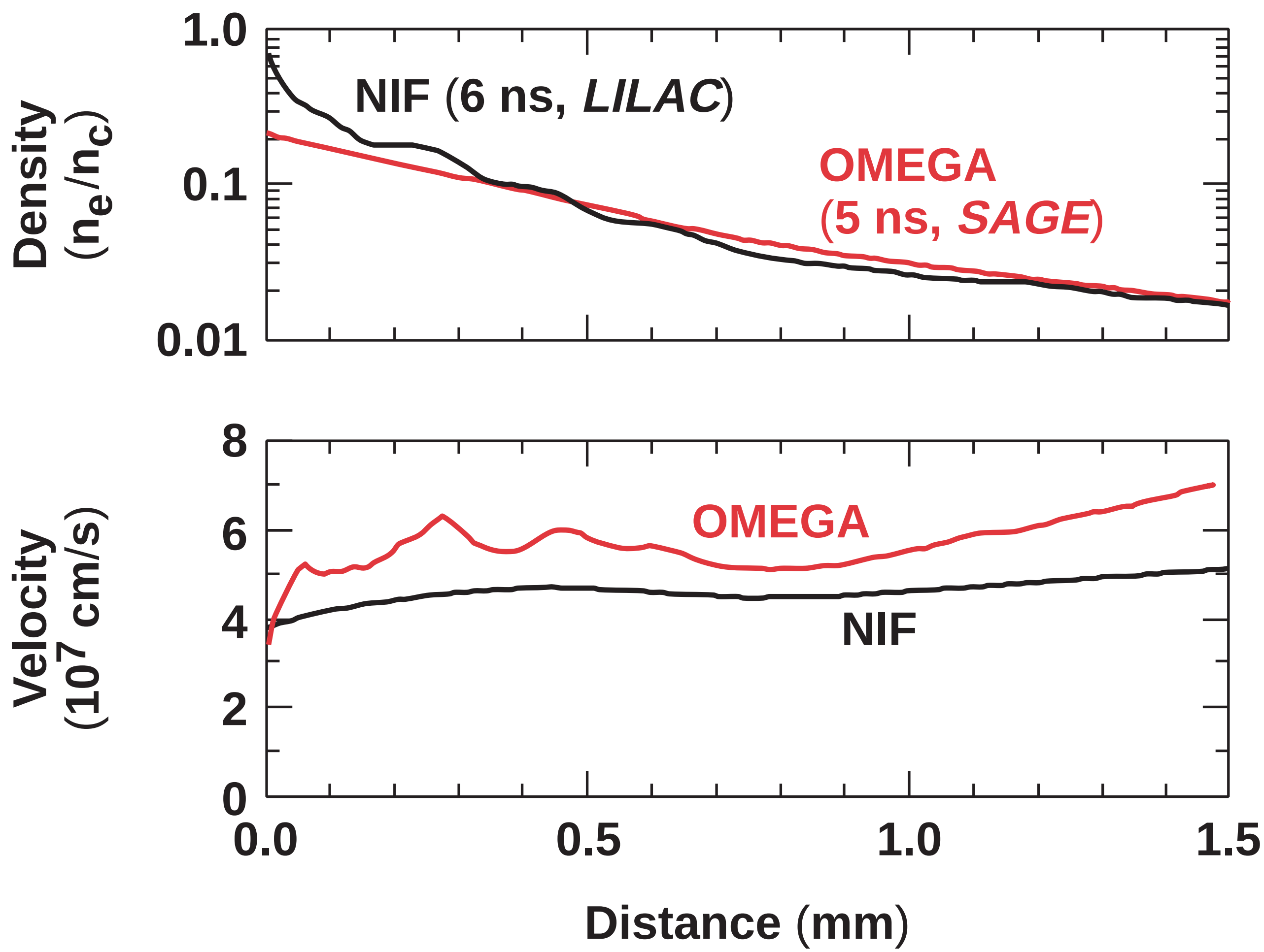
- NIF direct-drive pulse
- Double-pulse design A
- Multiple-beam design B
- Results for
  - plasma evolution
  - profiles of (n_e, T_e, V)

Plasma conditions have been generated representative of the transition portion of a NIF direct-drive pulse

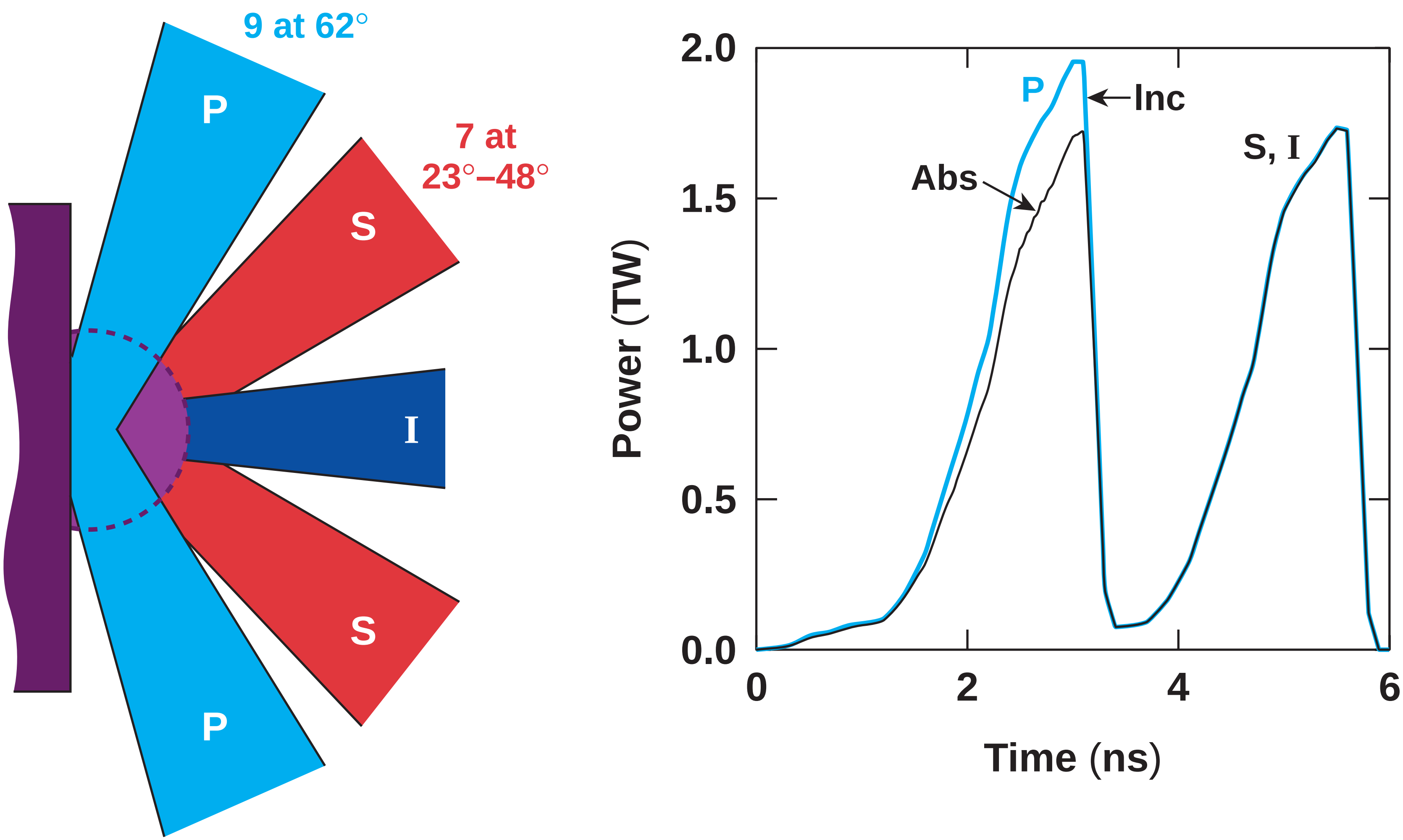


TC5045a

Plasma conditions on OMEGA closely resemble those at the start of the main NIF pulse

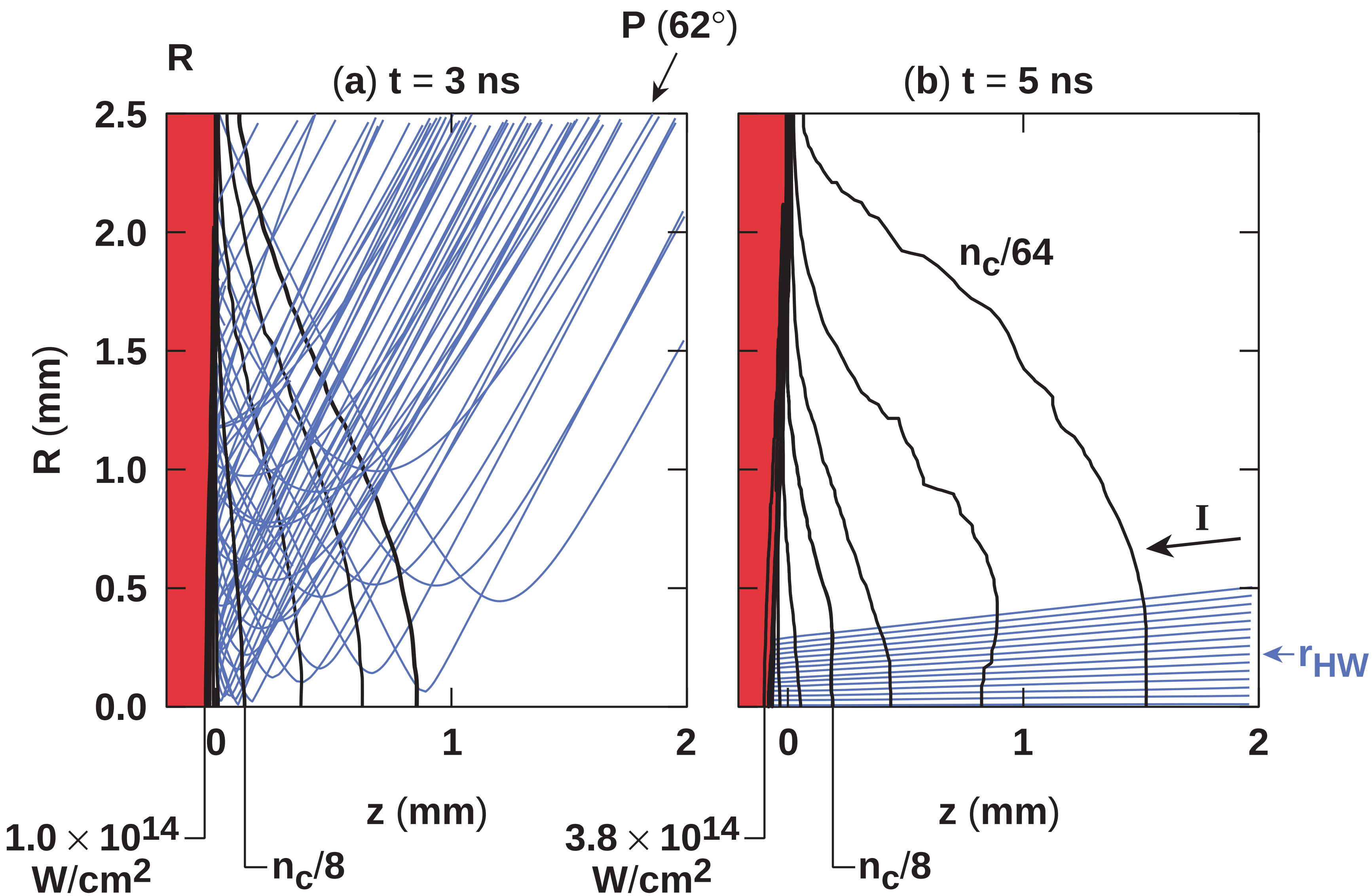


Solid-target plasmas have been created and heated using various groups of OMEGA beams

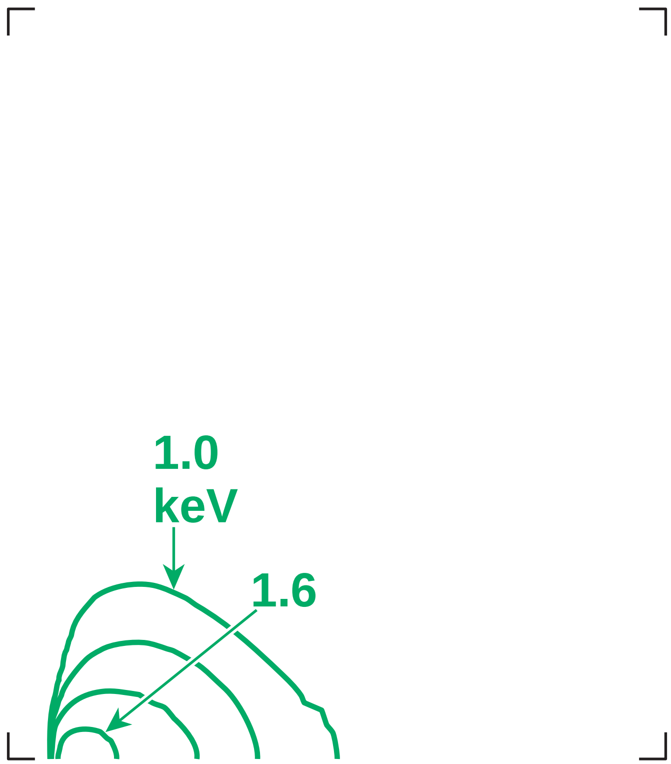


Run 3261
TC5641

Each of the two pulses creates ablating plasma

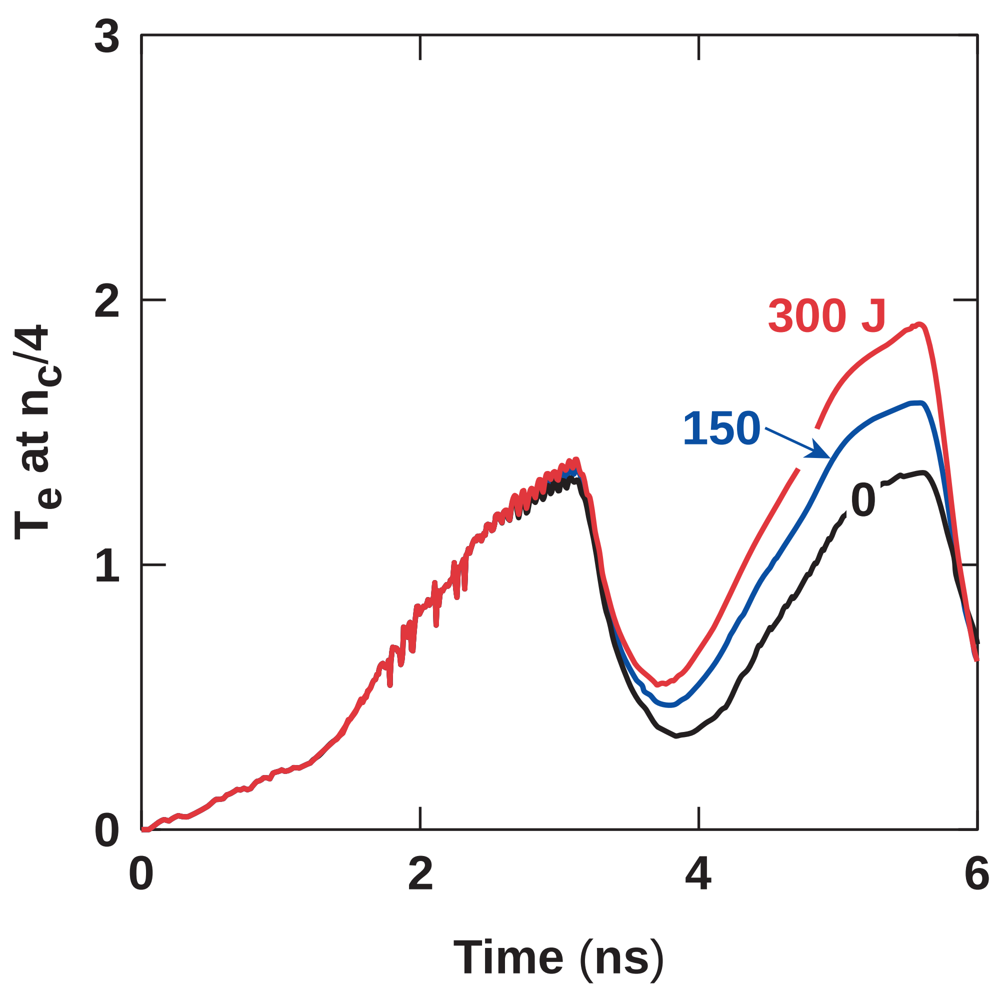


Run 3261
TC5642



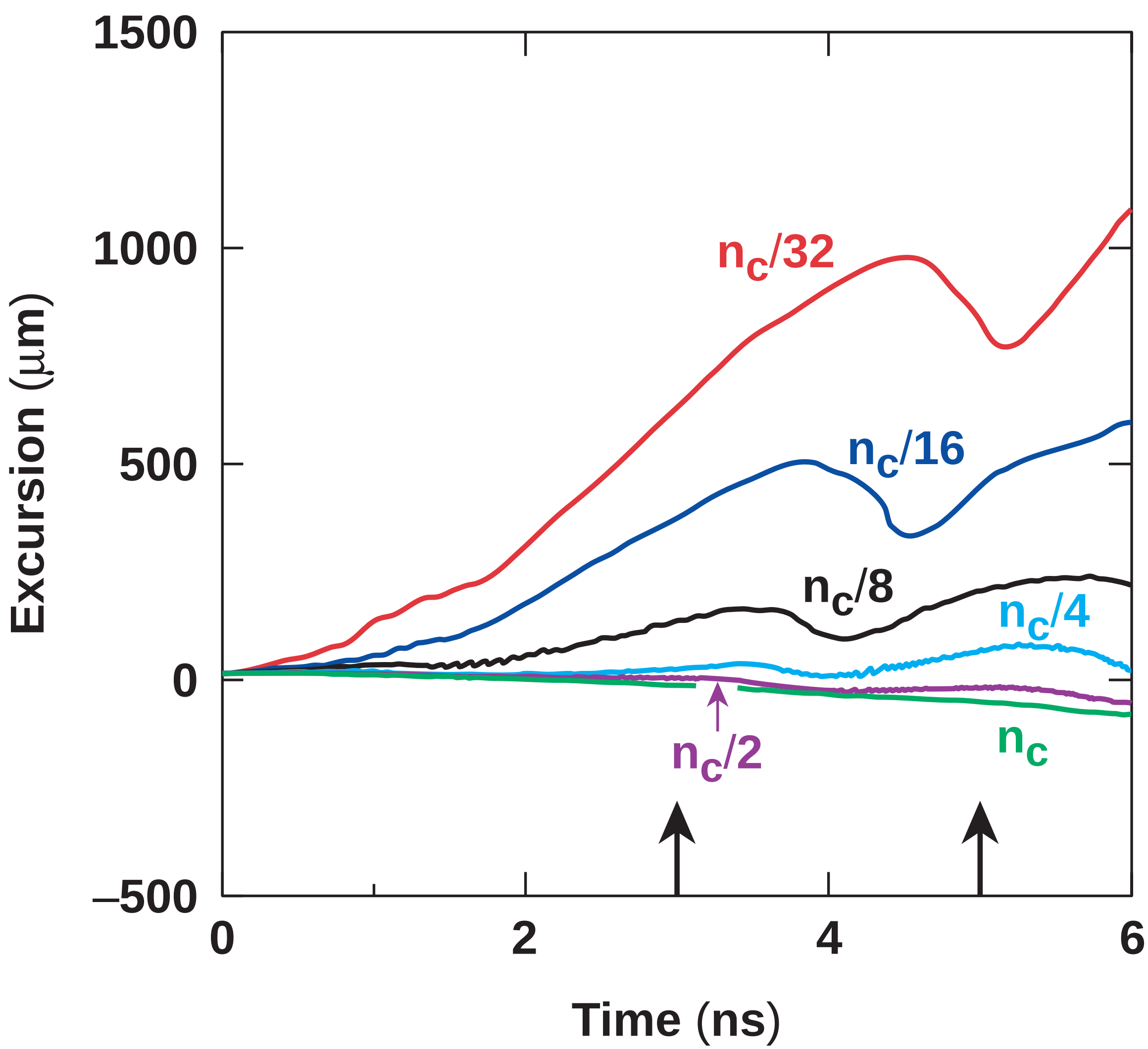
Run 3261
TC5642a

The quarter-critical temperature depends weakly on the interaction-beam energy



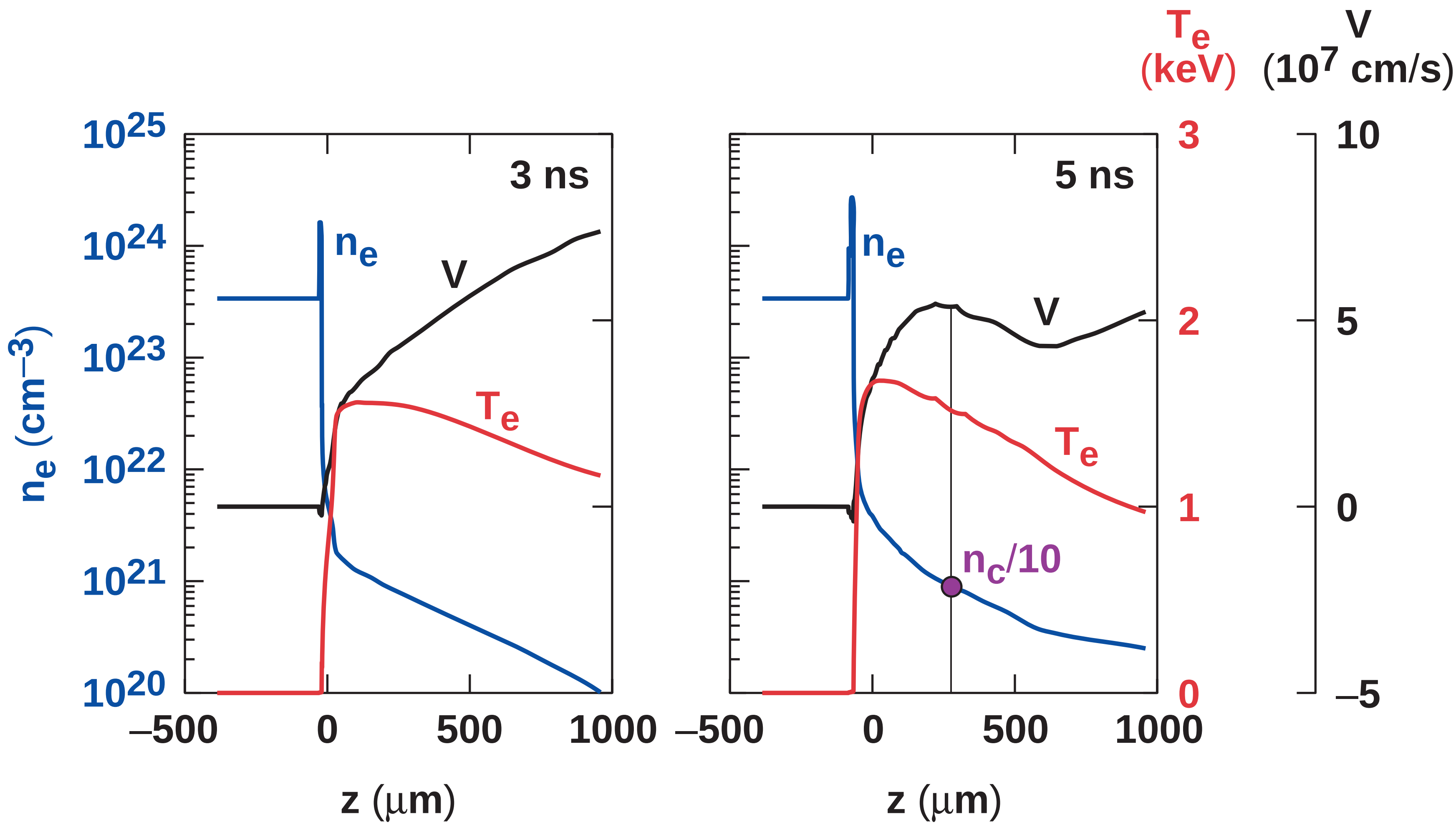
Runs 3261, 3272, 3273
TC5643

The coronal expansion occurs in two stages



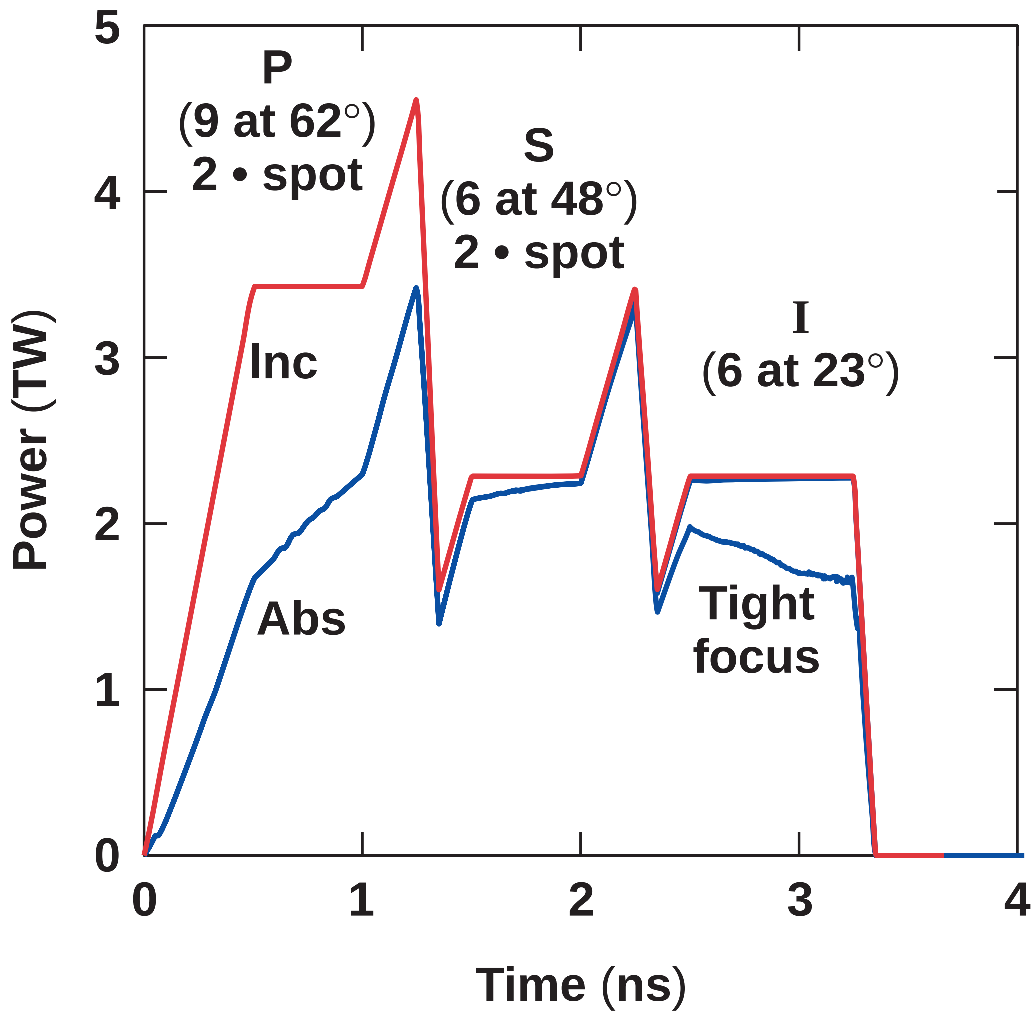
Run 3261
TC5644

At 5 ns, the velocity profile is flat around $n_c/10$



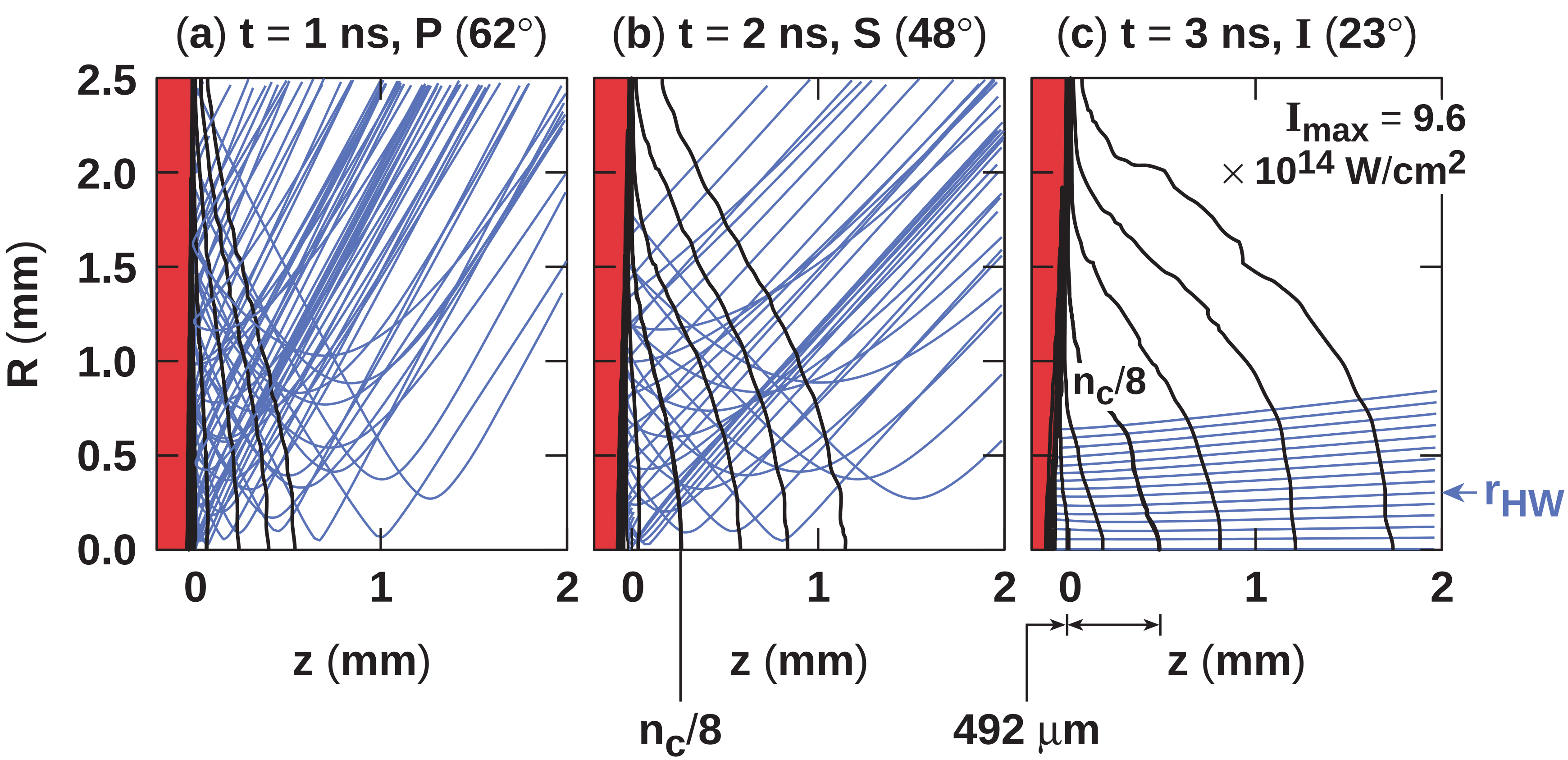
Run 3261
TC5645

The second long-scale-length plasma design uses six “normal” OMEGA beams as overlapped interaction beams

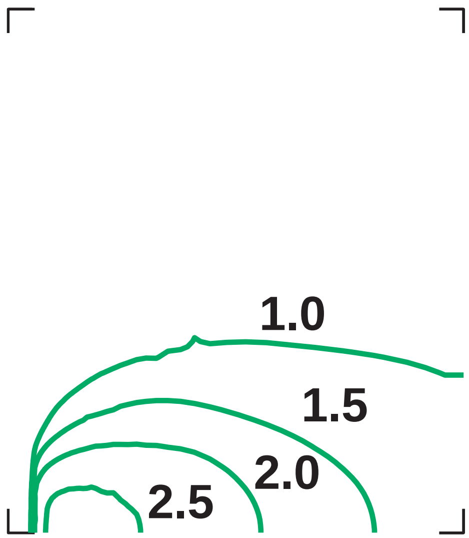


Runs 3268, 3271
TC5646

The overlapped interaction beams see a large plasma that they heat



Run 3268
TC5647



Run 3268
TC5647a

The scale length near $n_c/4$ is large and almost totally independent of the number of interaction beams

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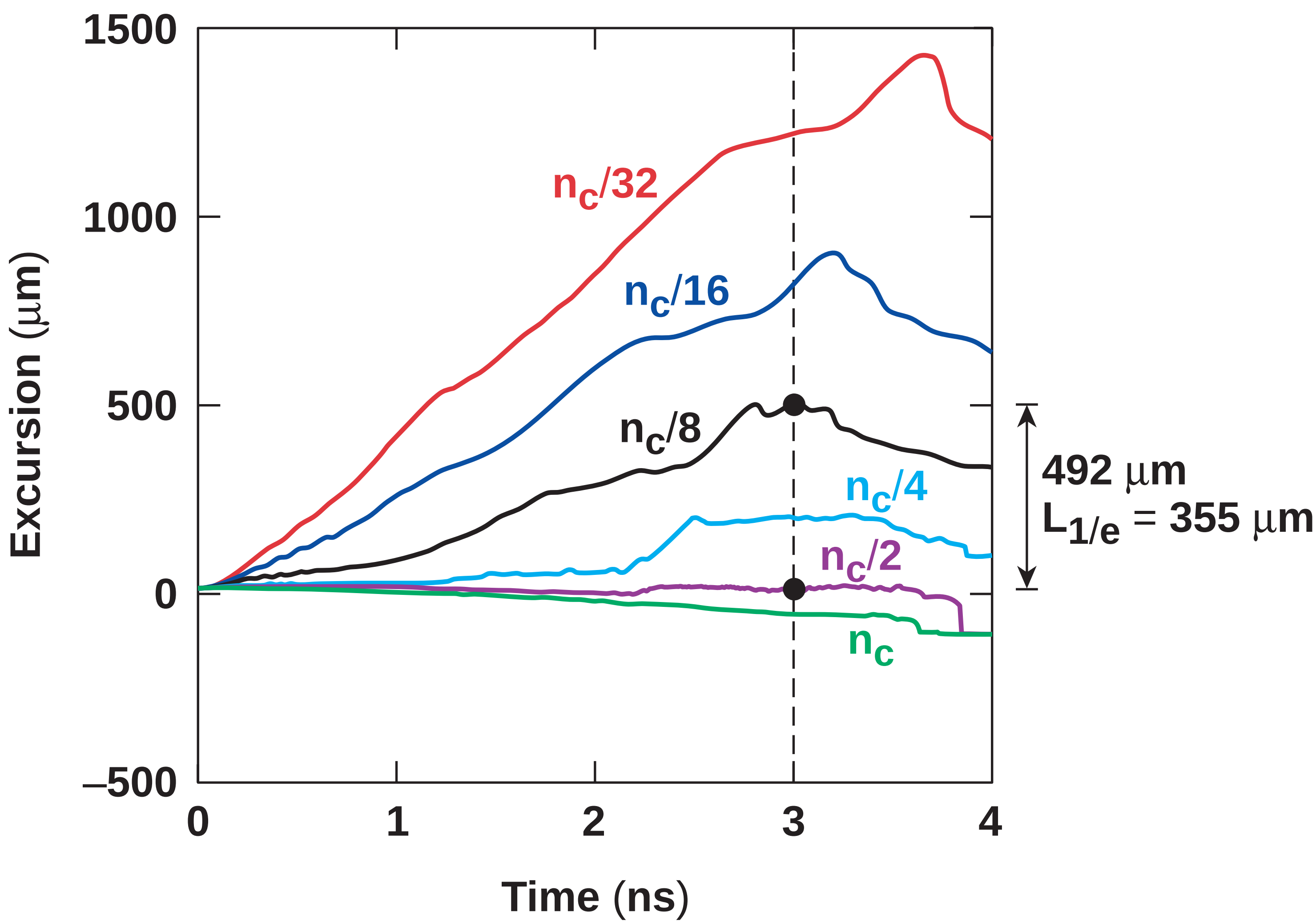
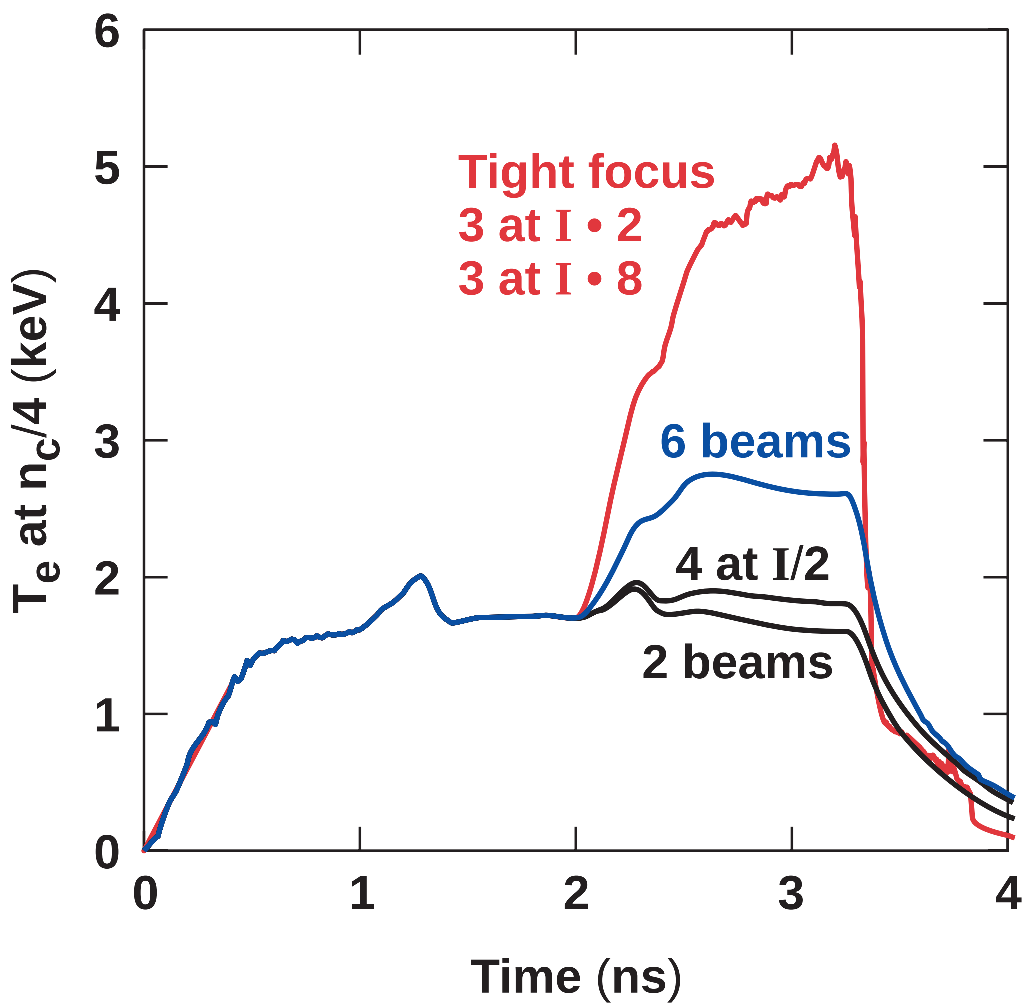


Run 3268
TC5648

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



Runs 3268–3271
TC5649

Summary/Conclusion

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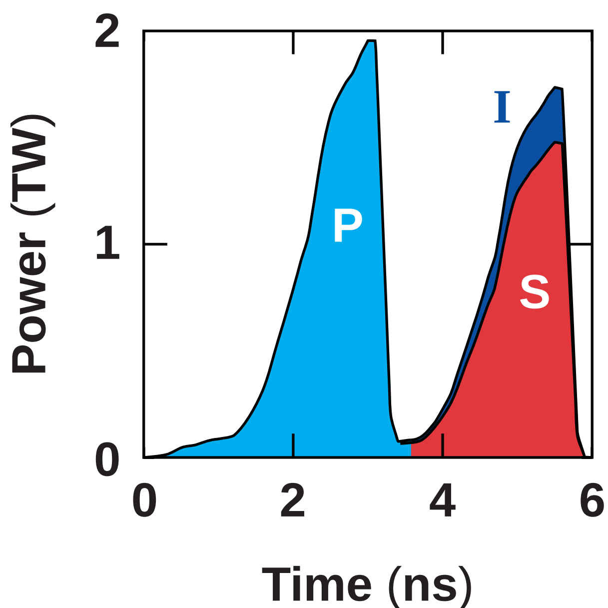

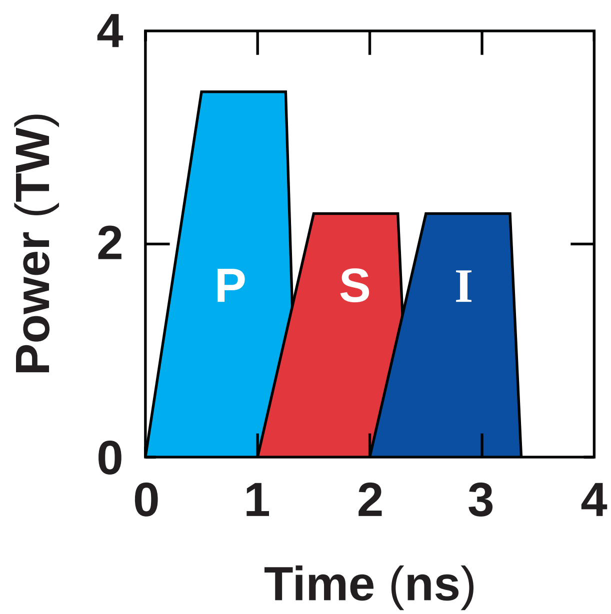

Runs 3261, 3268
TC5638