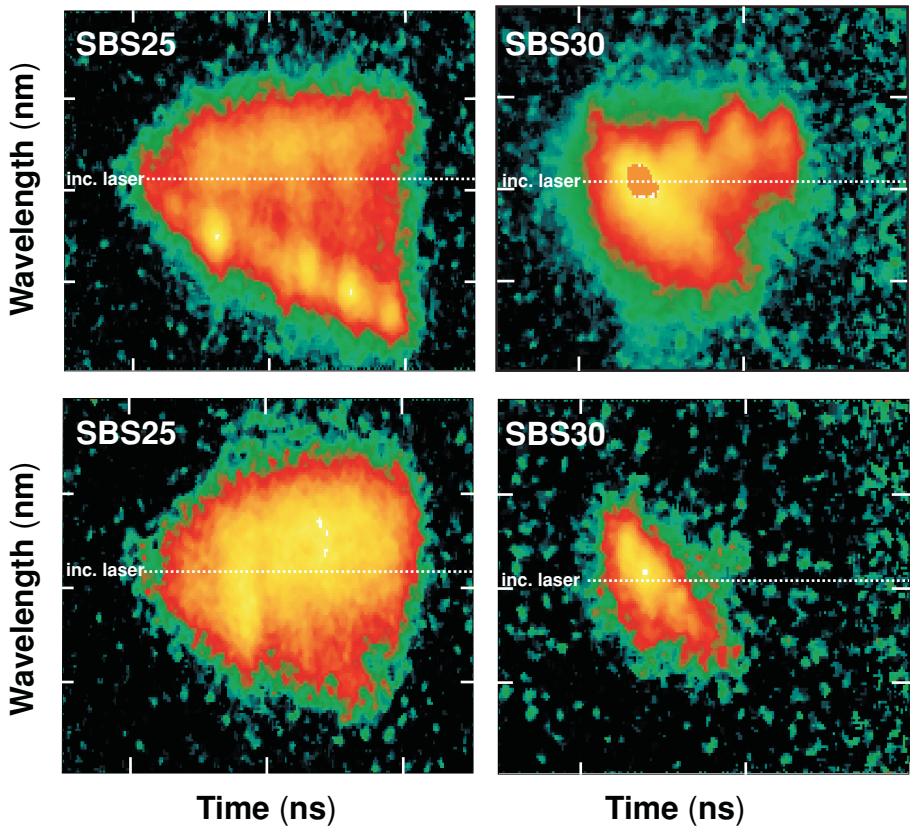
SBS in Long-Scale-Length Plasmas for Direct-Drive ICF: Comparing Experiments with Simulations

UR LLE



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Summary

Seemingly contradictory SBS backscatter and sidescatter results find resolution in simulations

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- SBS backscatter and sidescatter data show red- and blue-shifted components.
  - Simulations show the same feature provided EM seeding is included.
- Some data show early quenching of SBS while others do not
  - Hydro and LPI simulations show that plasma dynamics is the primary reason for these observations.
- Hot-spot origin of SBS is seen experimentally via polarization smoothing.

Outline

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- Motivation
- LPI experiments
  - Experimental observations
  - 2-D hydrocode predictions
  - LPI simulations
- Discussion of results
- Summary

Multiple-beam experiments are a special case of single-beam experiments

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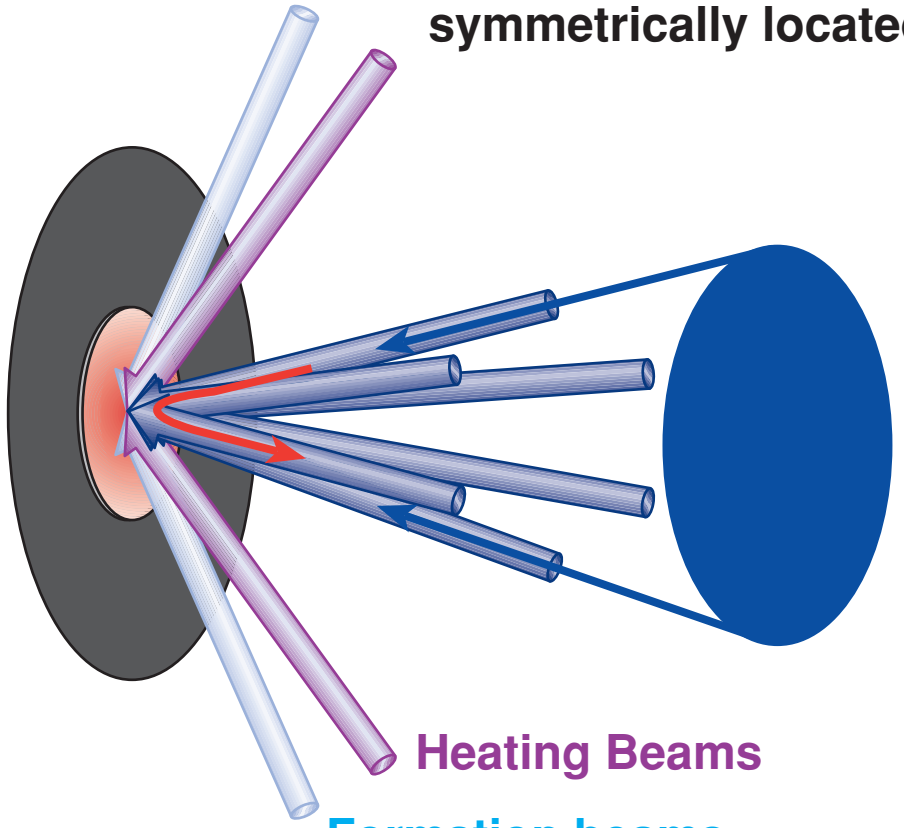
- Multiple obliquely incident, high-*f*-number beams display some of the same features as single lower-*f*-number beams
  - Multiple beams allow separation of EM seeding from symmetrically located beams via reflections from n_c.



E11941

SBS at normal incidence with slowly evolving velocity "bump" exhibits blue-shifted SBS over the entire pulse that is sensitive to beam smoothing

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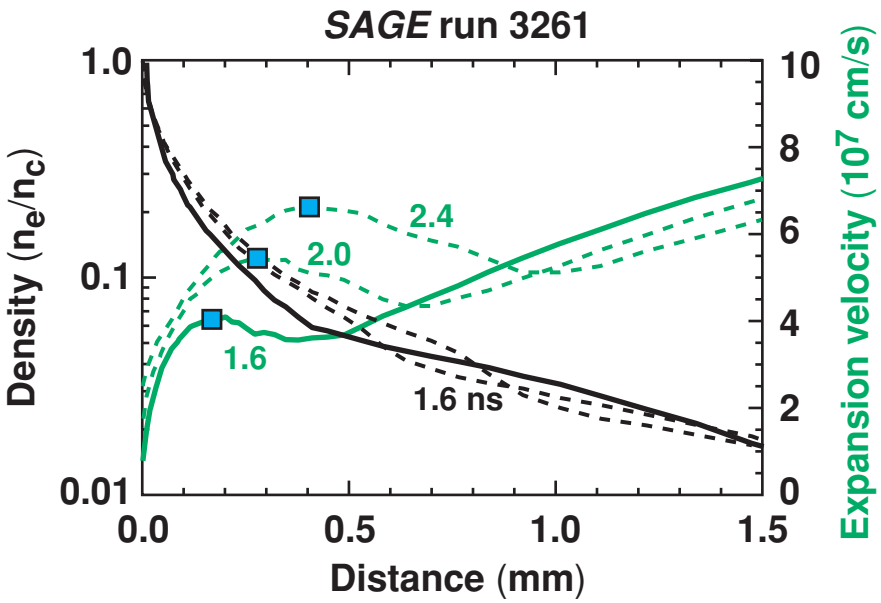
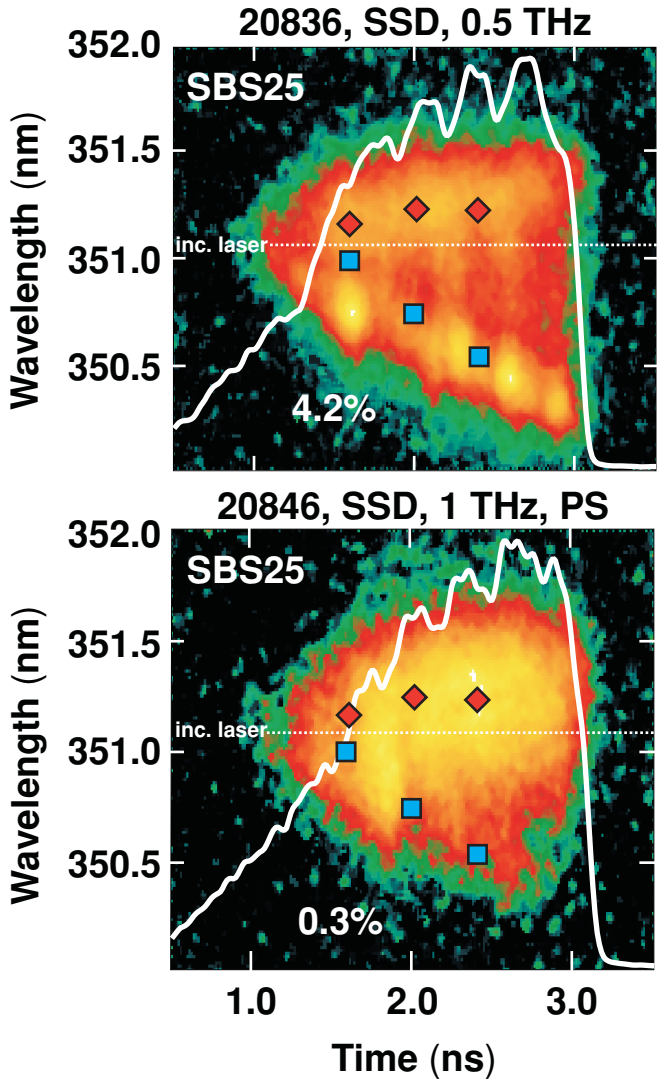
$I \approx 5 \times 10^{14}$ W/cm^2





E11942

The fast-evolving velocity bump leads to early quenching of the blue SBS feature while the EM-seeded red feature disappears without seed

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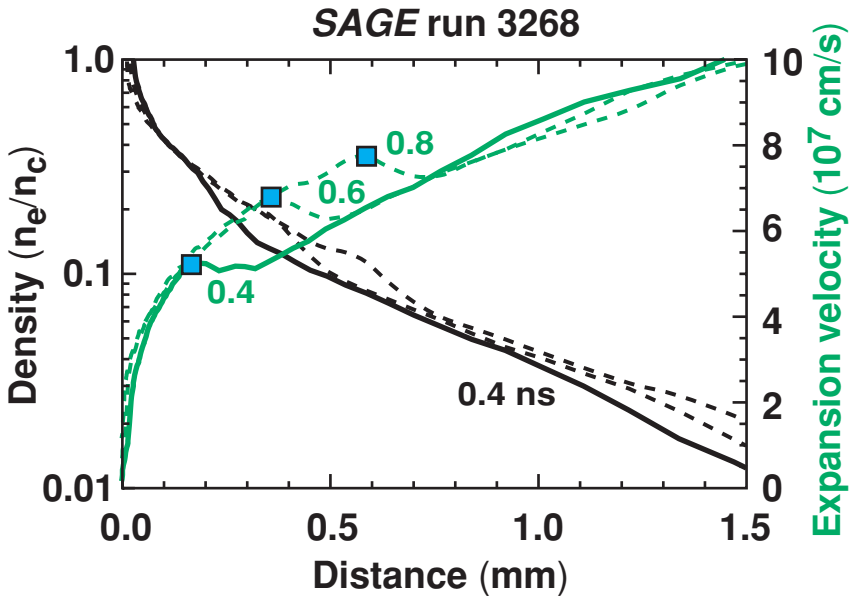
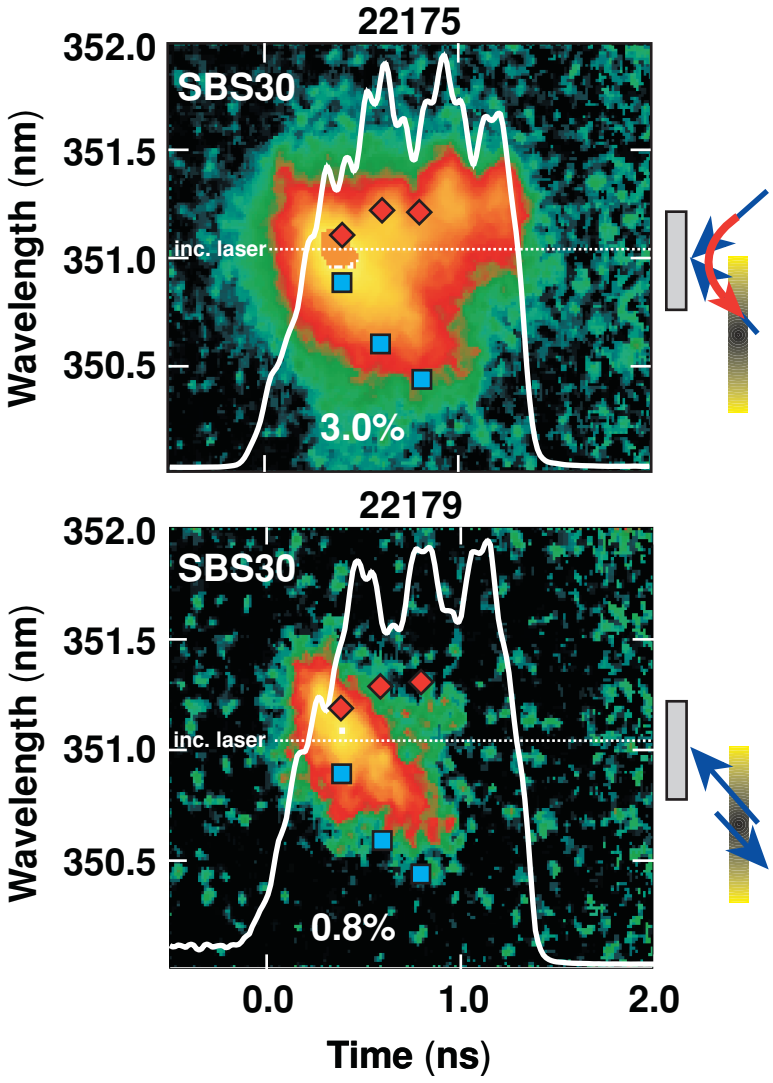
$I \approx 1.5 \times 10^{15}$ W/cm^2
SSD, 1 THz, PS

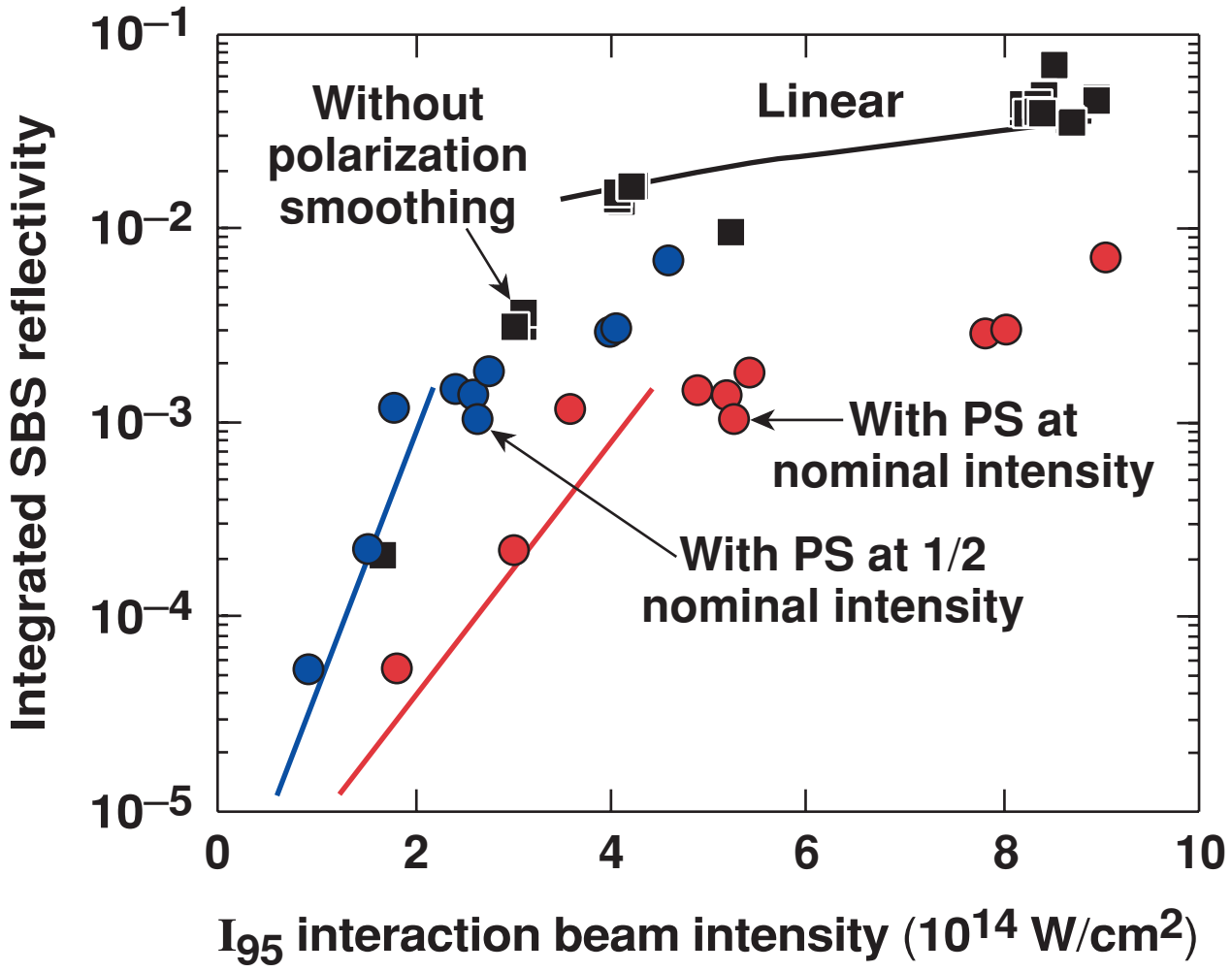




- Red component is suppressed due to lack of EM seed.
- Blue component – pure backscatter in SBS underdense region.

E11943

SBS reflectivities with and without polarization smoothing indicate that SBS occurs primarily in the hottest speckles



E11095

Summary/Conclusions

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