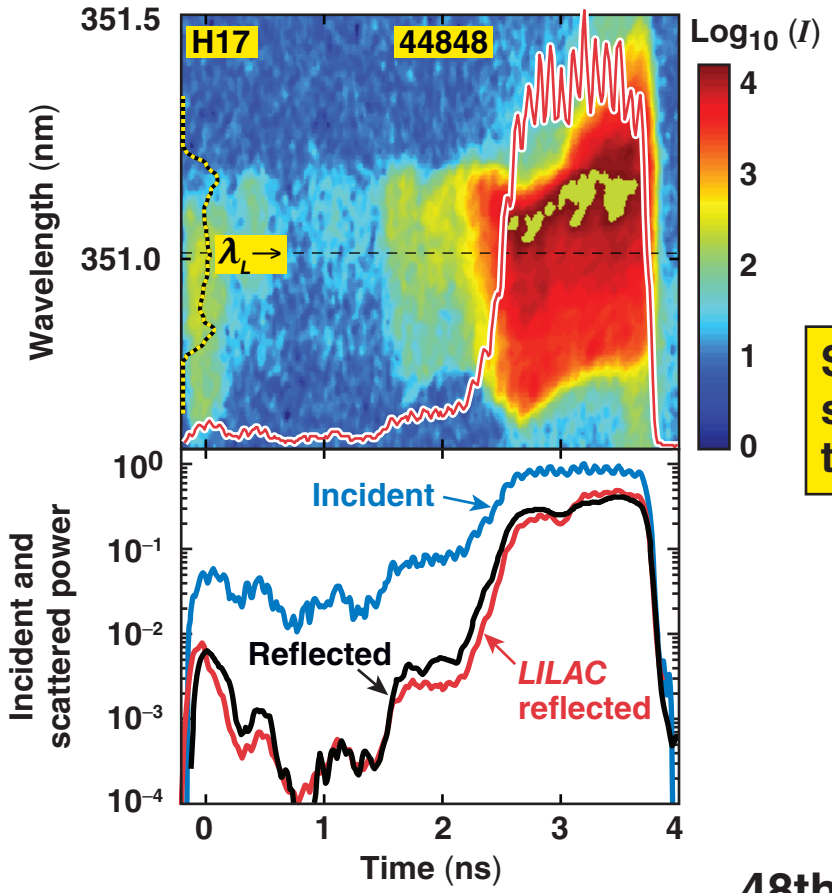
Time-Dependent Absorption Measurements in Direct-Drive Spherical Implosions



Scattered light spectrum of cryogenic target implosion

W. Seka
University of Rochester
Laboratory for Laser Energetics

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Summary

Time-integrated absorption measurements agree well with predictions but time-resolved scattered light spectra show small differences

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- Measured time-integrated absorption agrees well with hydrodynamic predictions across all targets and pulse shapes including cryogenic implosions.
- Time-resolved absorption measurements show higher absorption during the first 200 ps, that may be due to resonance absorption.
- At high intensities subtle differences between experiments and predictions may be due to nonlinear interaction processes not included in hydrodynamic simulations.

Collaborators

UR LLE

R. S. Craxton

J. A. Delettrez

D. H. Edgell

V. N. Goncharov

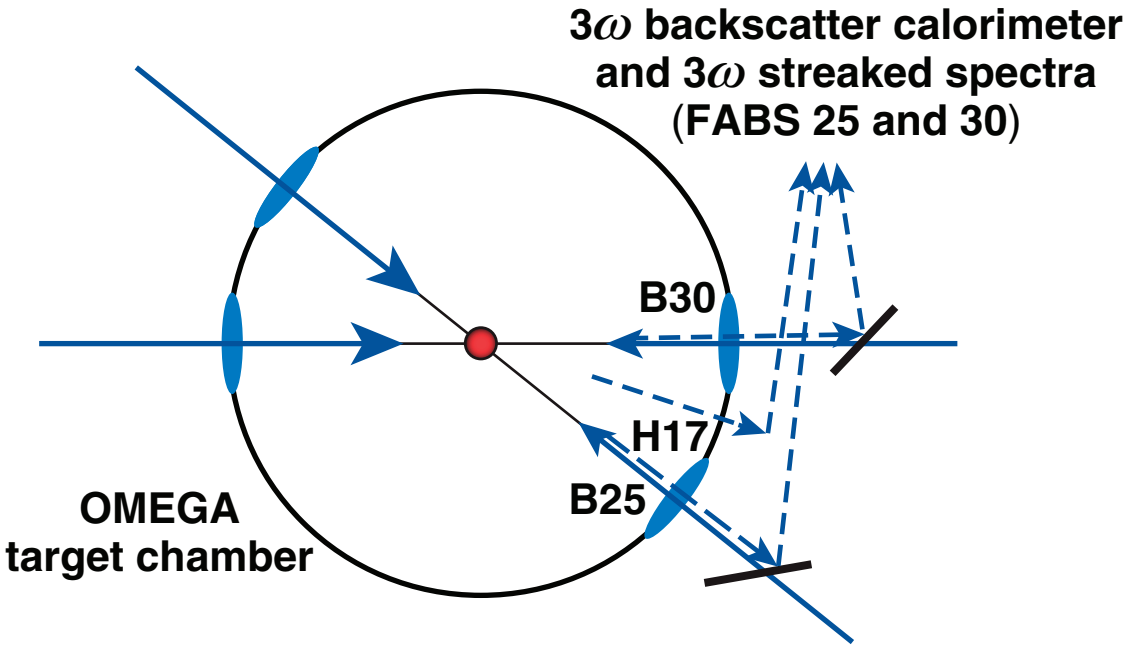
I. V. Igumenshchev

A. V. Maximov

J. Myatt

R. W. Short

Scattered light is detected behind two focusing lenses (FABS 25 and 30) and in between focusing lenses (H17)



- FABS measurements have contributions from opposing beams that miss the target (required corrections can be significant).
- Measurement: scattered light extrapolated to 4π (E_{scatt})
  - → absorption = $(E_{tot} - E_{scatt})/E_{tot}$
  - calculated deviations from isotropy are in percentage range.

E14626

Time-resolved scattered light measurements clearly show onset of absorption in DT, in agreement with predictions

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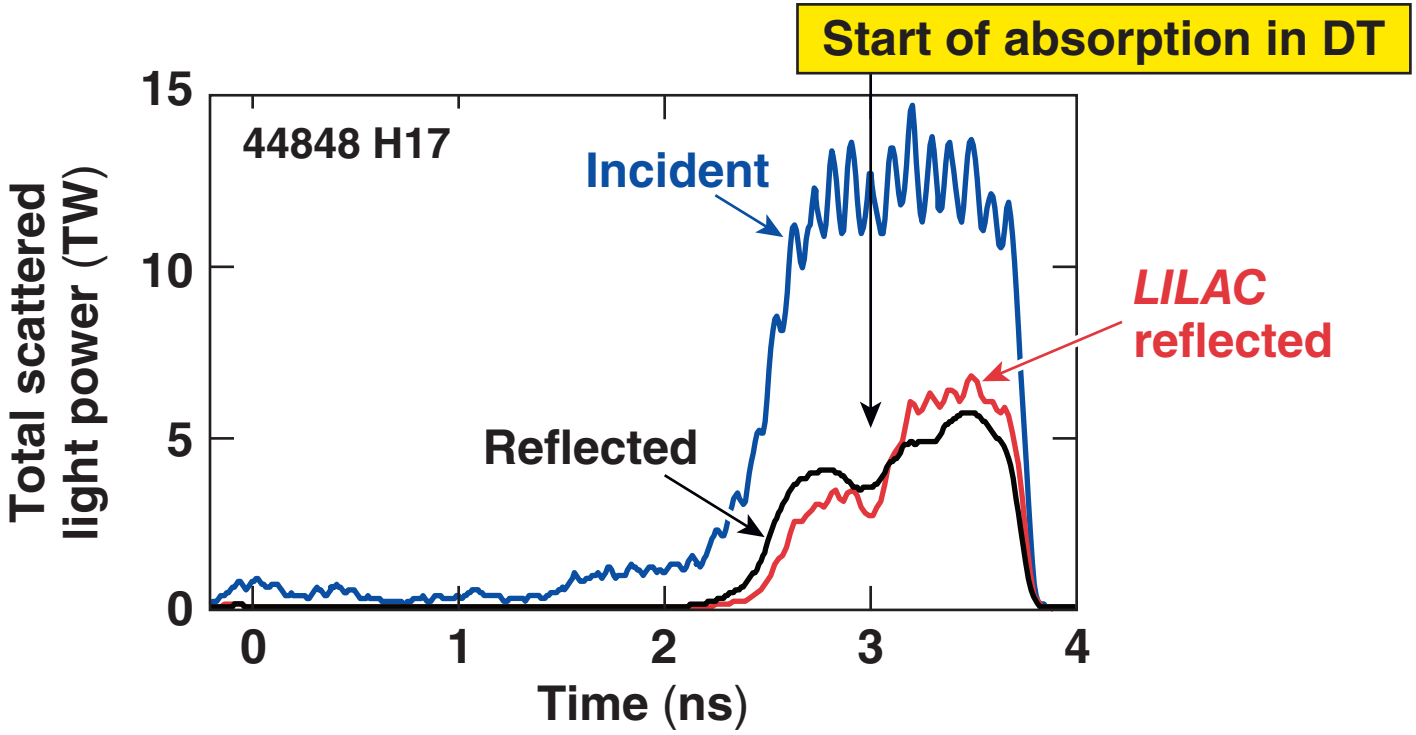
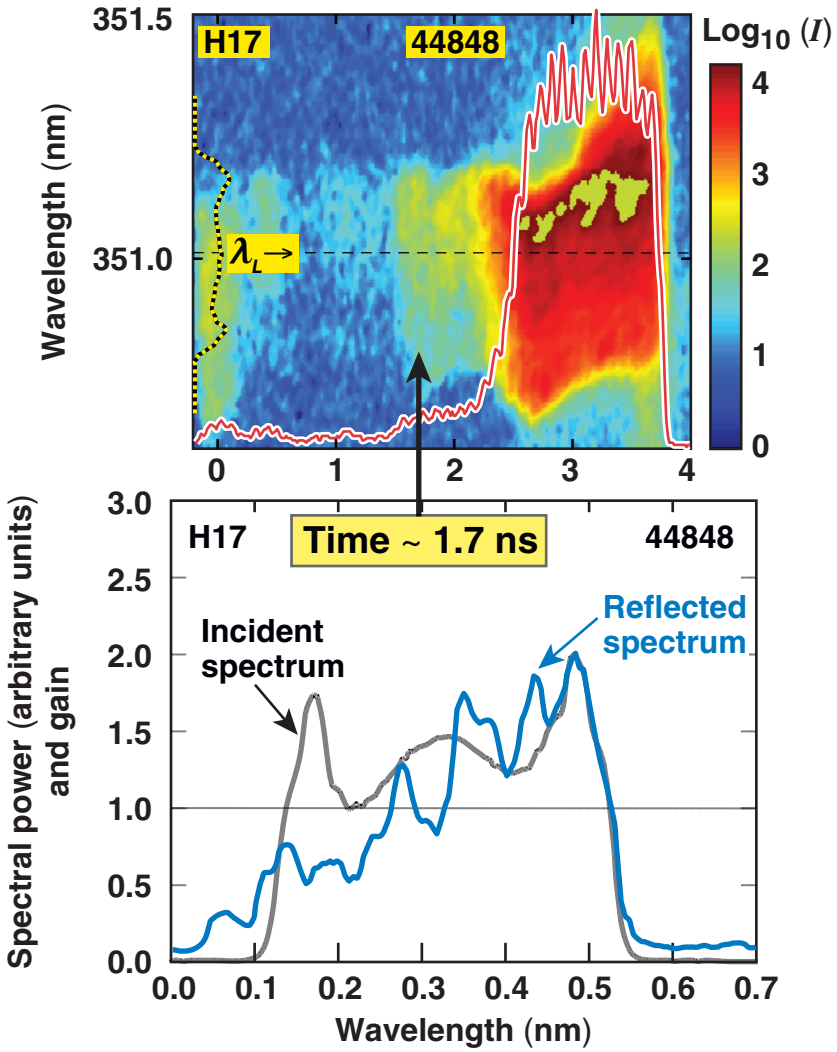
Target: cryogenic DT (95 μm), 5.4-μm CD shell



- Measured time-integrated absorption = 67% = *LILAC* predicted absorption.
- Details of time-resolved absorption differ from predictions around peak irradiation intensity.

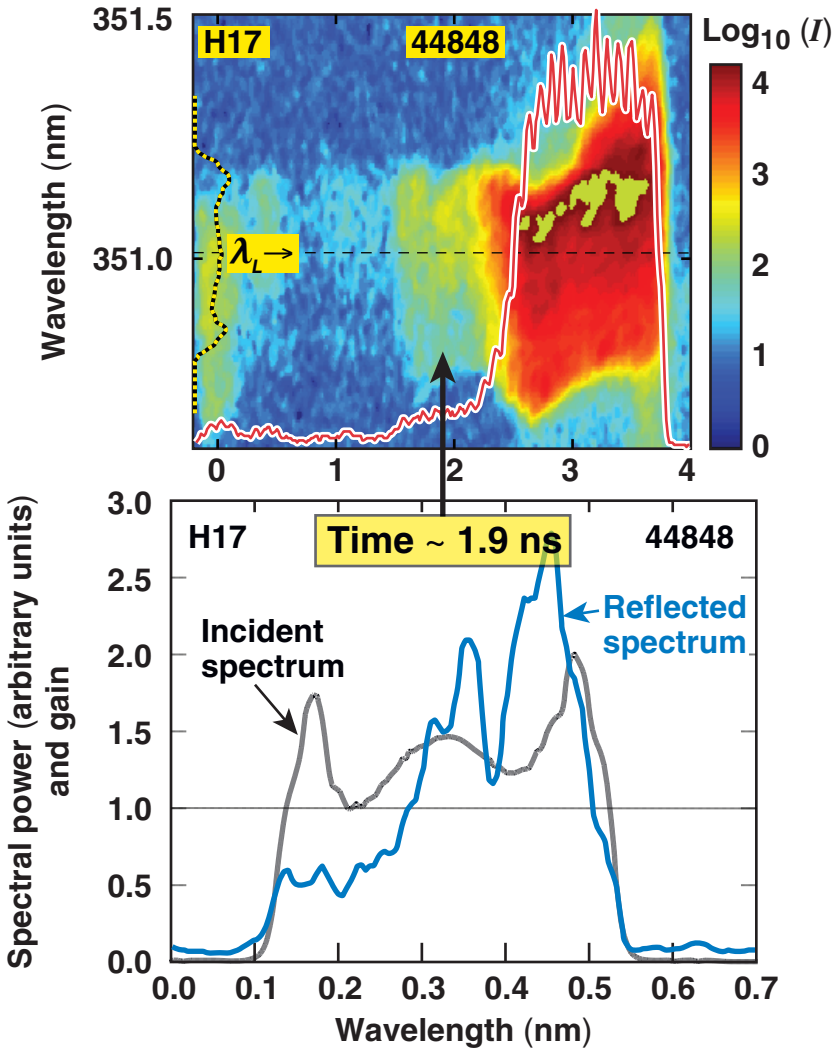
E15204

Time-resolved scattered light spectra show spectral changes indicative of either SBS side scattering or intrabeam energy transfer



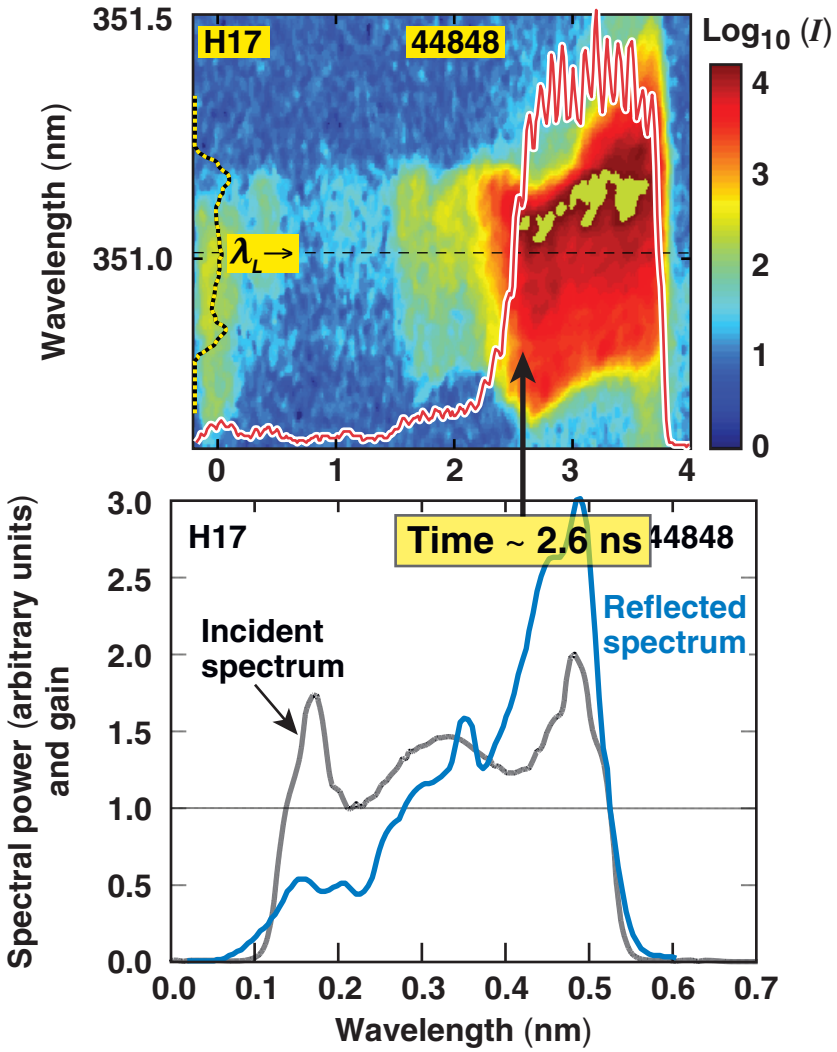
E15205

Time-resolved scattered light spectra show spectral changes indicative of either SBS side scattering or intrabeam energy transfer



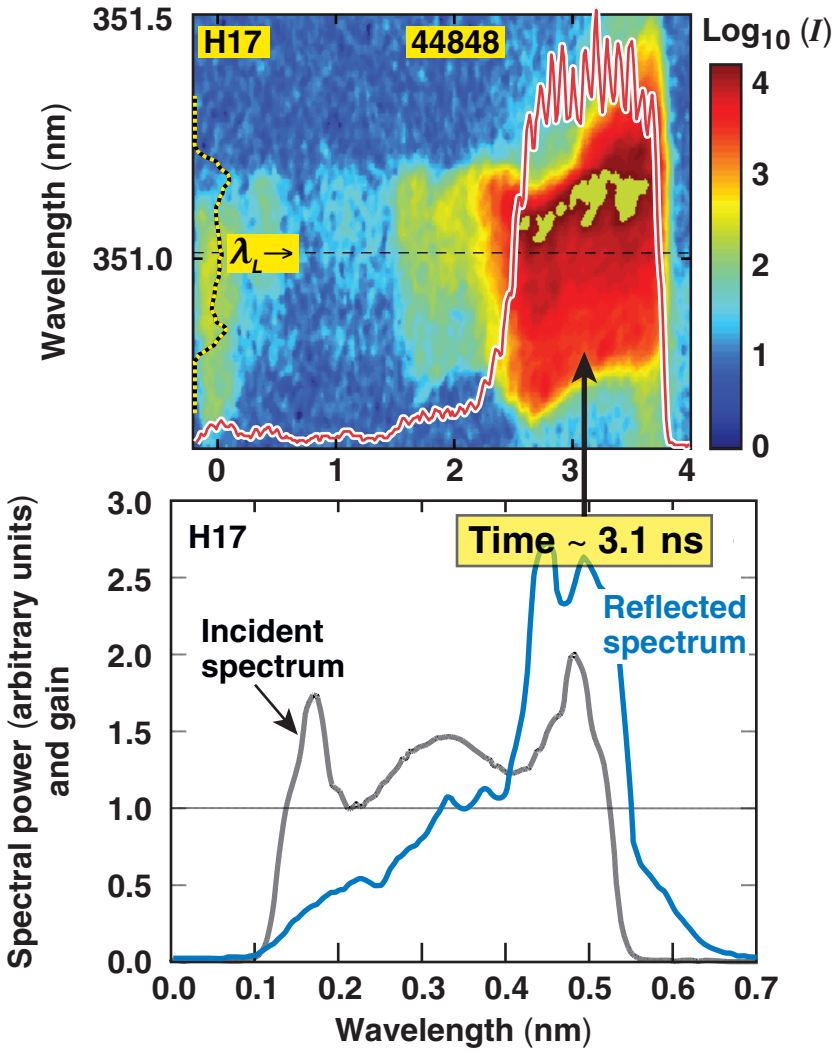
E15206

Time-resolved scattered light spectra show spectral changes indicative of either SBS side scattering or intrabeam energy transfer



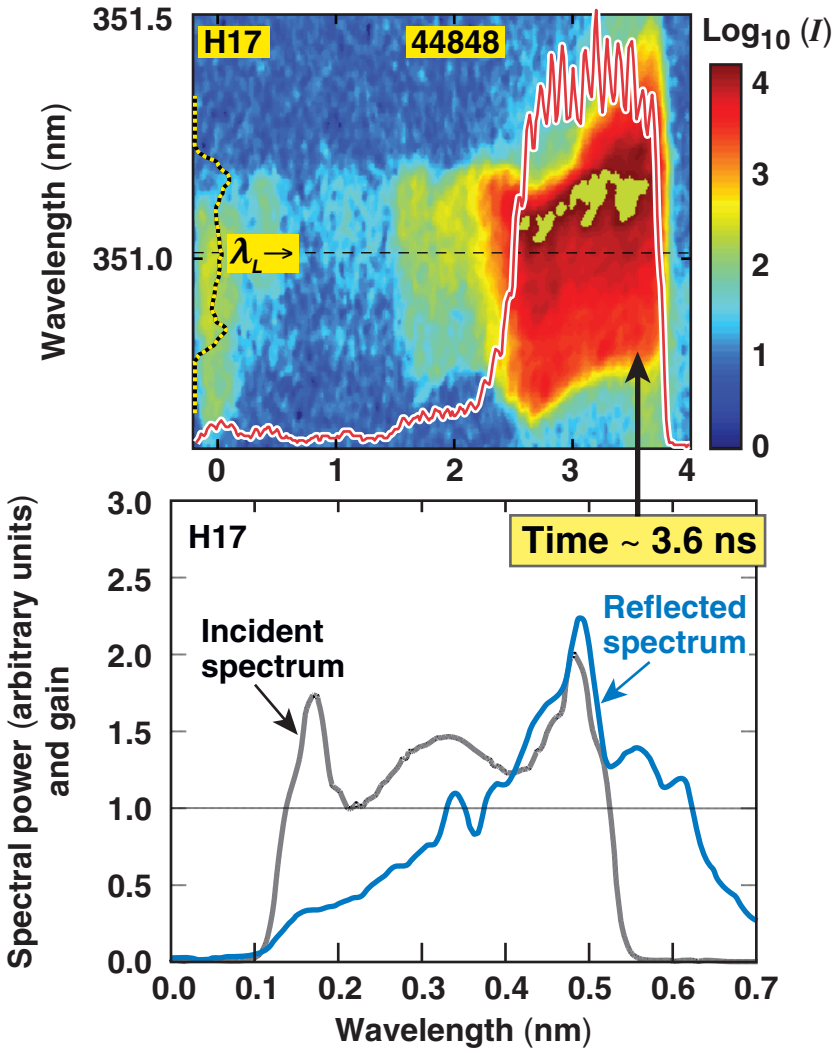
E15207

Time-resolved scattered light spectra show spectral changes indicative of either SBS side scattering or intrabeam energy transfer



E15208

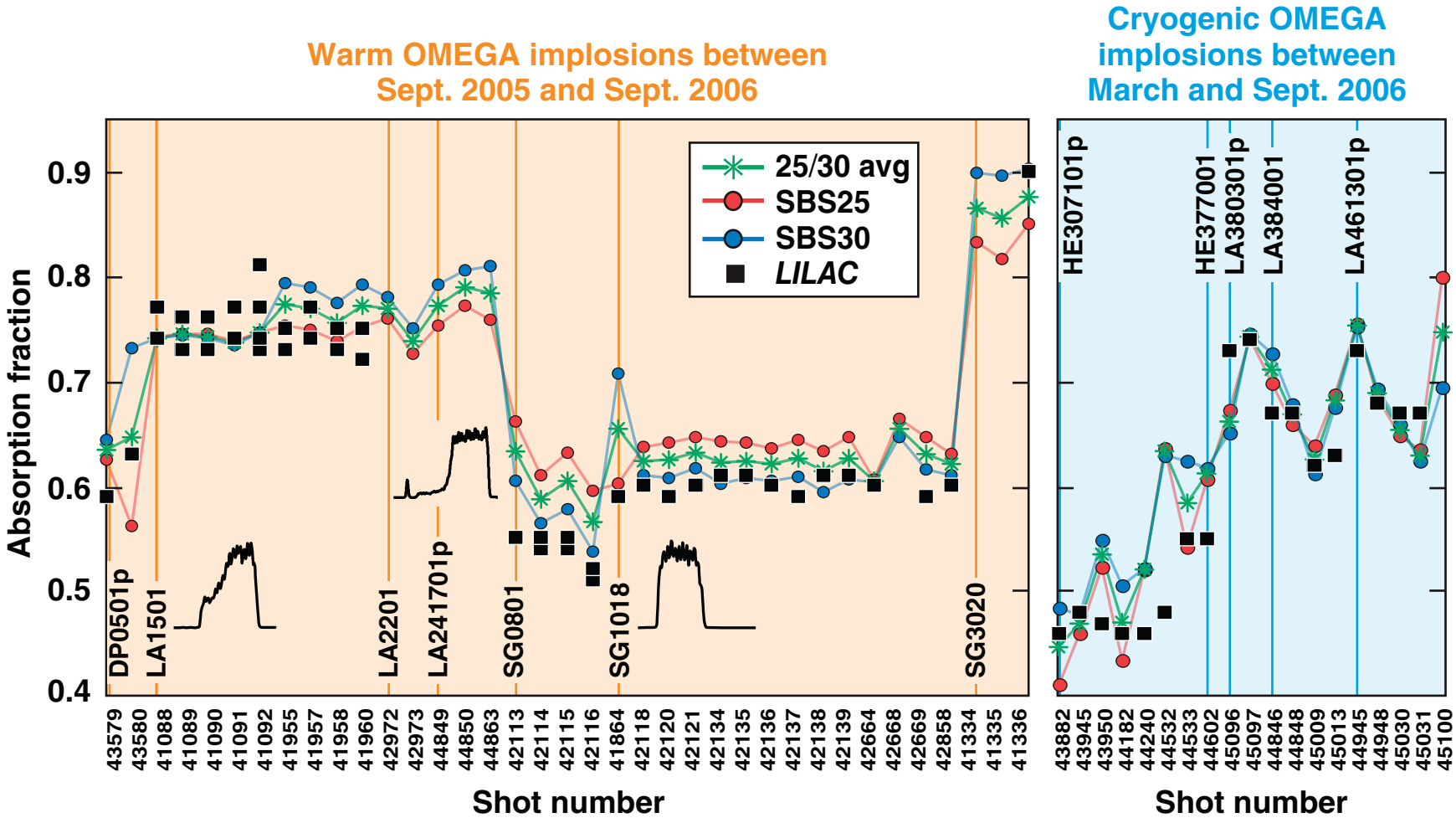
Time-resolved scattered light spectra show spectral changes indicative of either SBS side scattering or intrabeam energy transfer



The scattering process is complex since all 60 beams contribute to a varying degree during the irradiation, and SBS gains are low but clearly observable.

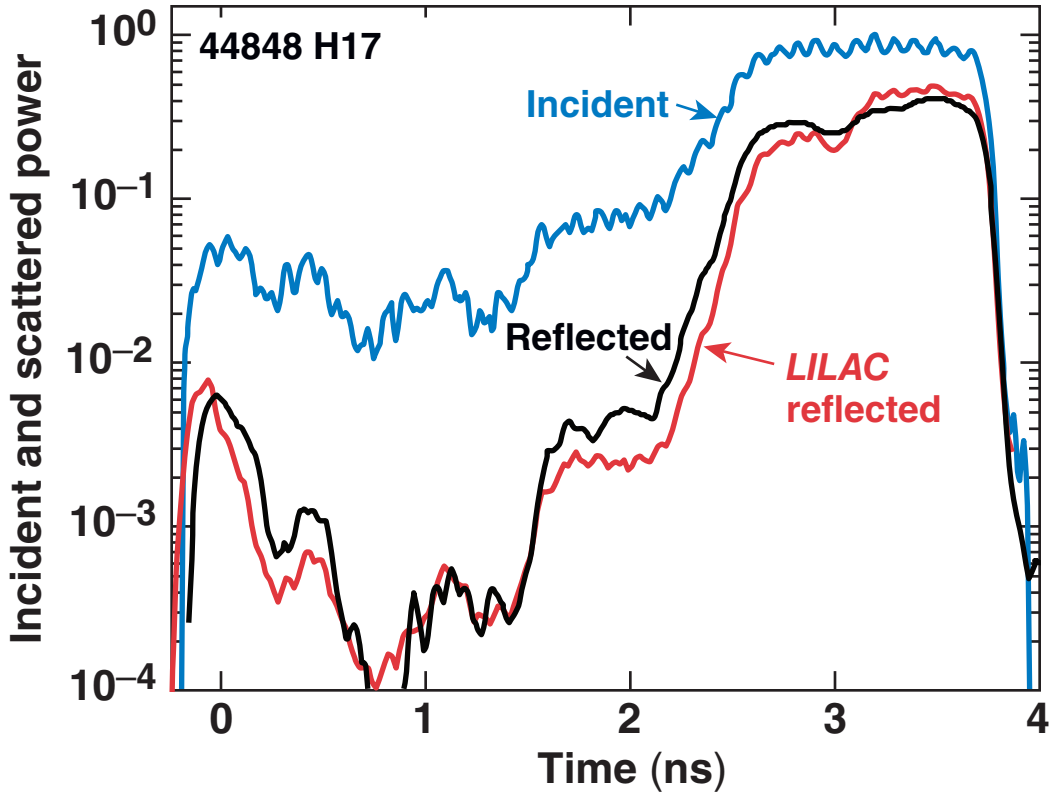
E15209

Time-integrated absorption data agree quite well with *LILAC* over a wide range of targets, pulse shapes, and irradiation energies



E14627a

Measured time-resolved scattered-light powers differ from hydrodynamic predictions in subtle ways



Measured time-integrated absorption = 67% = *LILAC*-predicted absorption

Target: cryogenic DT (95 μm), 5.4-μm CD shell

E15210

Measured time-resolved scattered-light powers differ from hydrodynamic predictions in subtle ways

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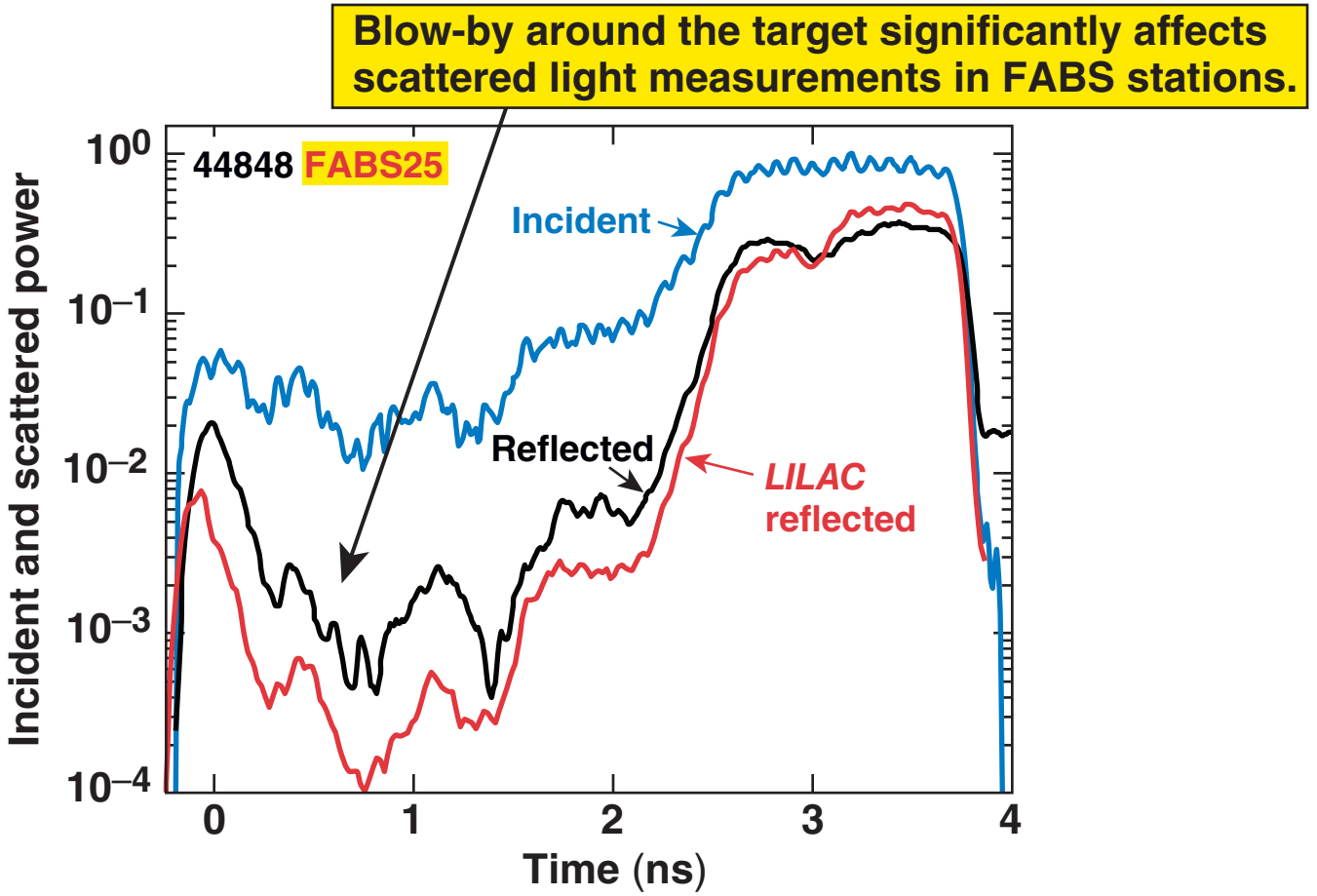
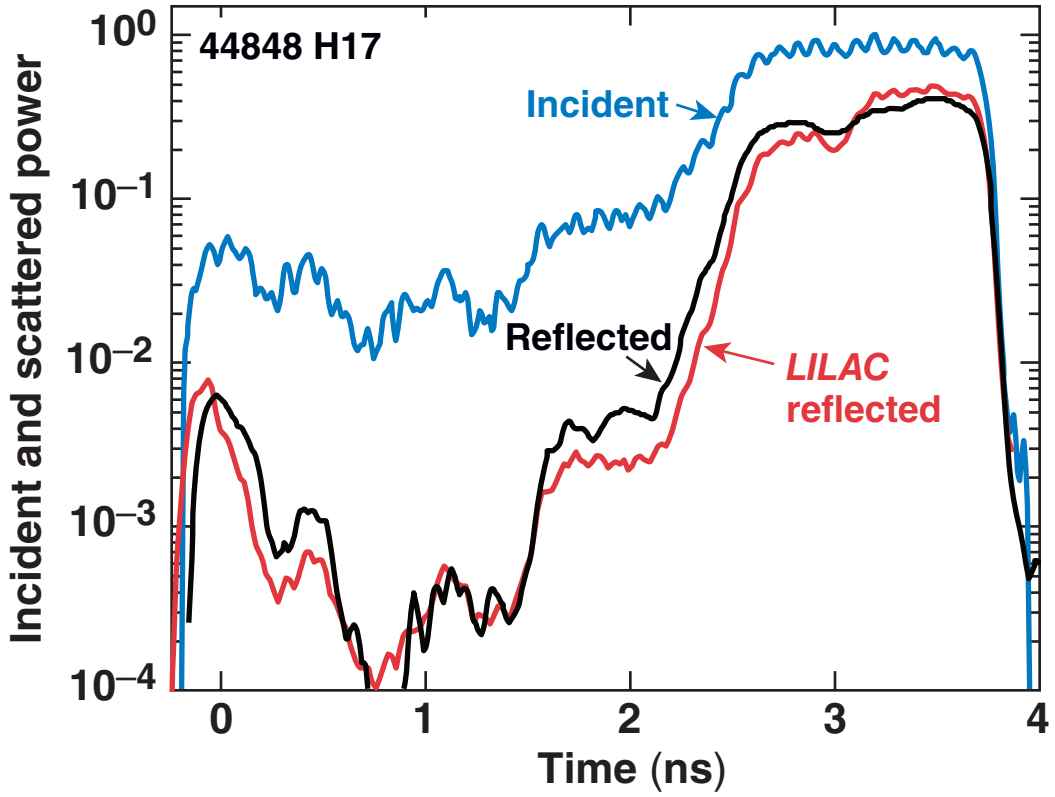


Measured time-integrated absorption = 67% = *LILAC*-predicted absorption

Target: cryogenic DT (95 μm), 5.4-μm CD shell

E15211

Measured time-resolved scattered-light powers differ from hydrodynamic predictions in subtle ways

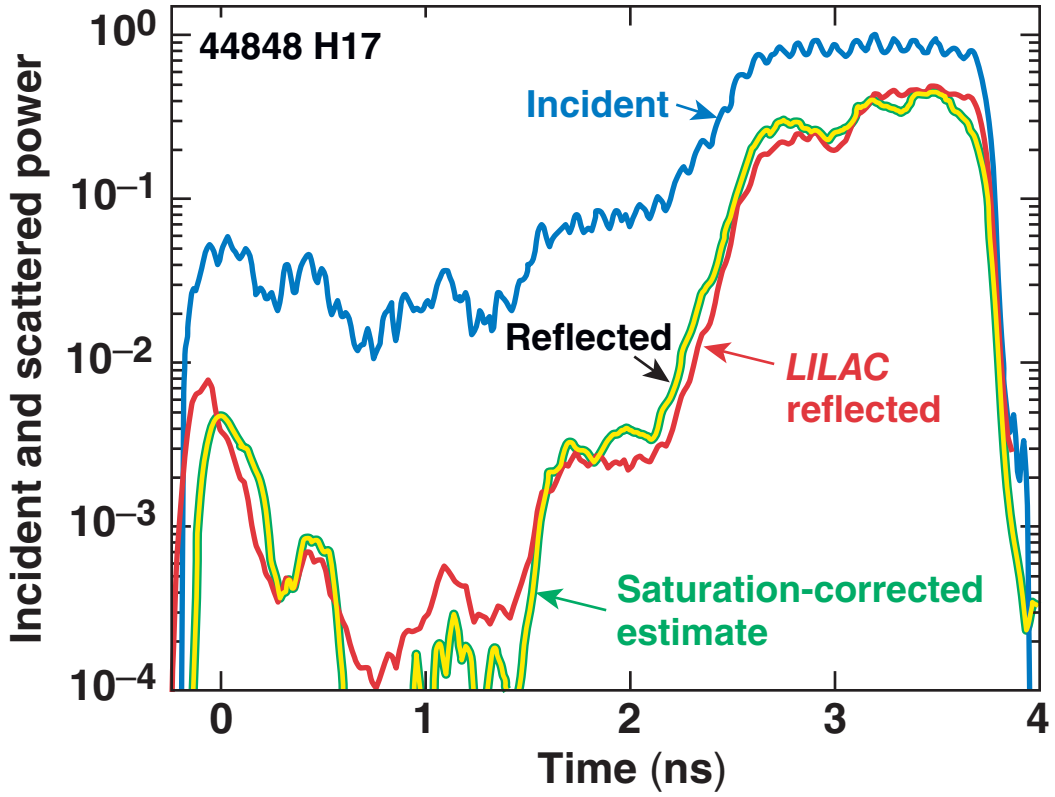


Measured time-integrated absorption = 67% = *LILAC*-predicted absorption

Target: cryogenic DT (95 μm), 5.4-μm CD shell

E15212

Measured time-resolved scattered-light powers differ from hydrodynamic predictions in subtle ways

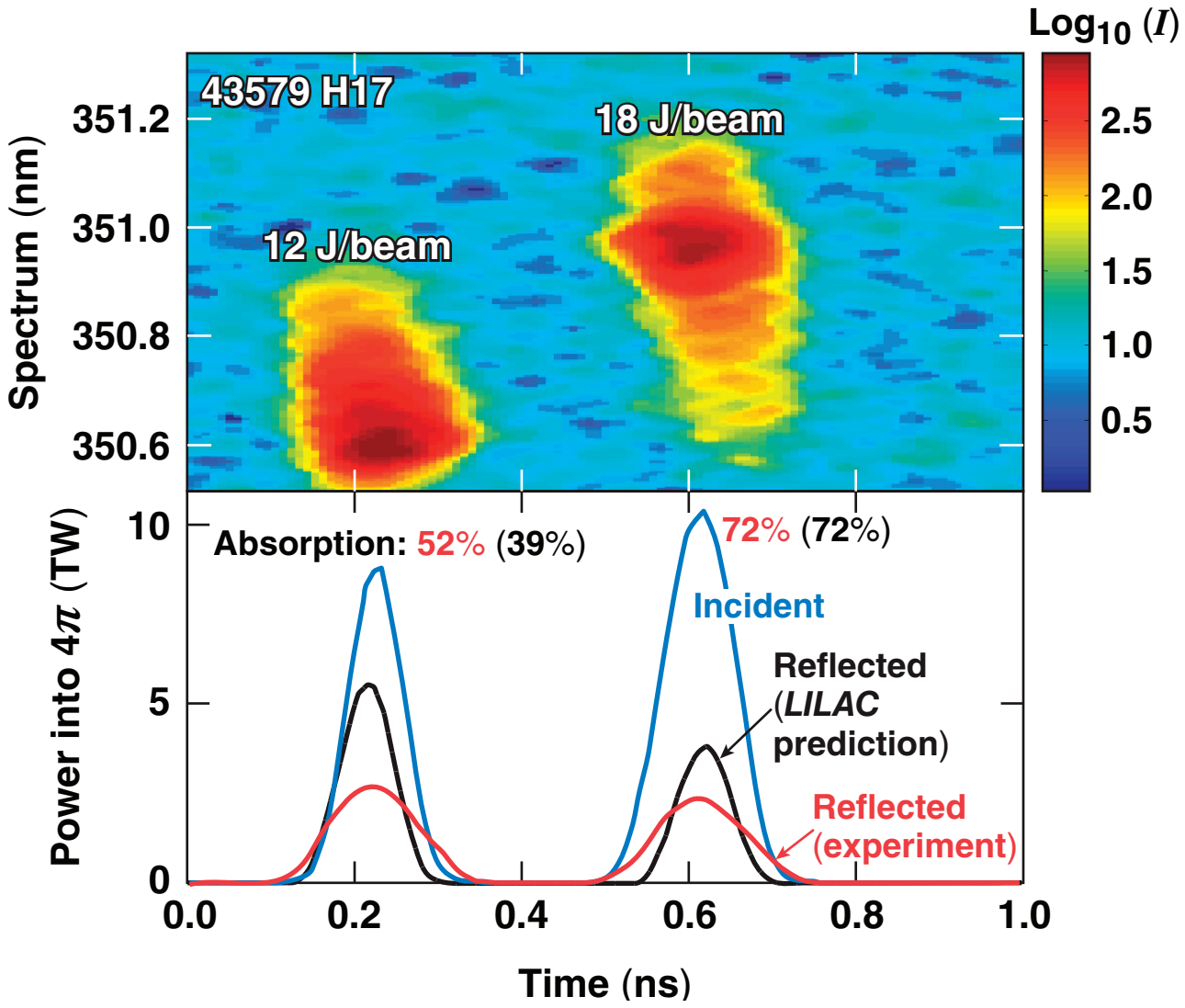


Measured time-integrated absorption = 67% = *LILAC*-predicted absorption

Target: cryogenic DT (95 μm), 5.4-μm CD shell

E15213

Double-picket pulses are well suited for investigating unexpectedly higher absorption at early times



E14630

Summary/Conclusions

Time-integrated absorption measurements agree well with predictions but time-resolved scattered light spectra show small differences

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