

SBS Measurements for Sandia's MagLIF Program

Matthias Geissel

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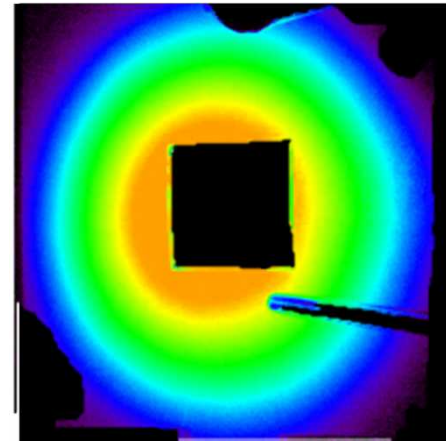
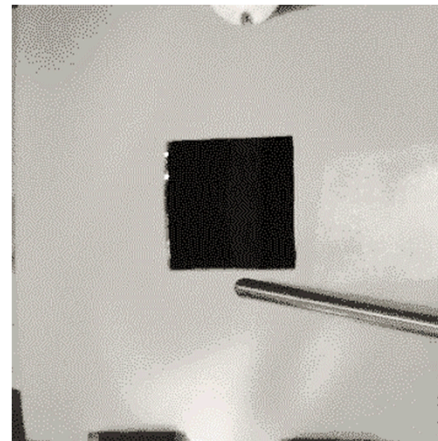
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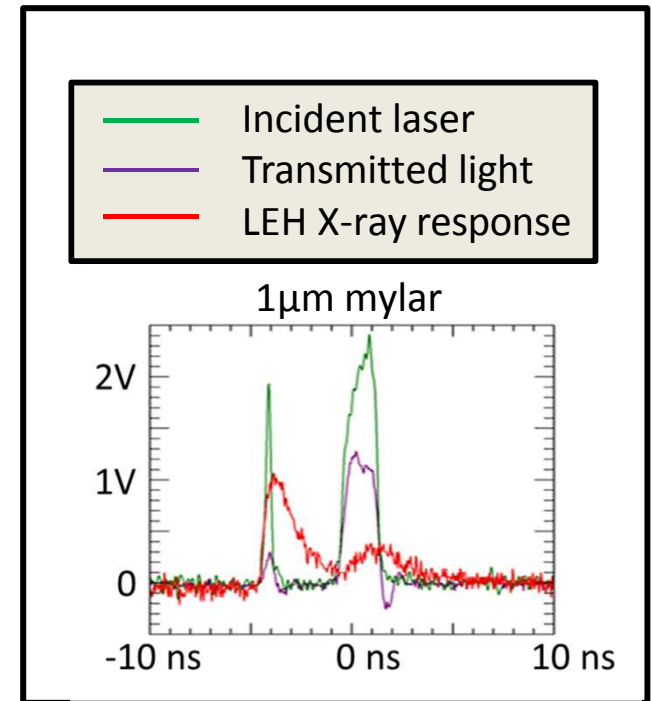
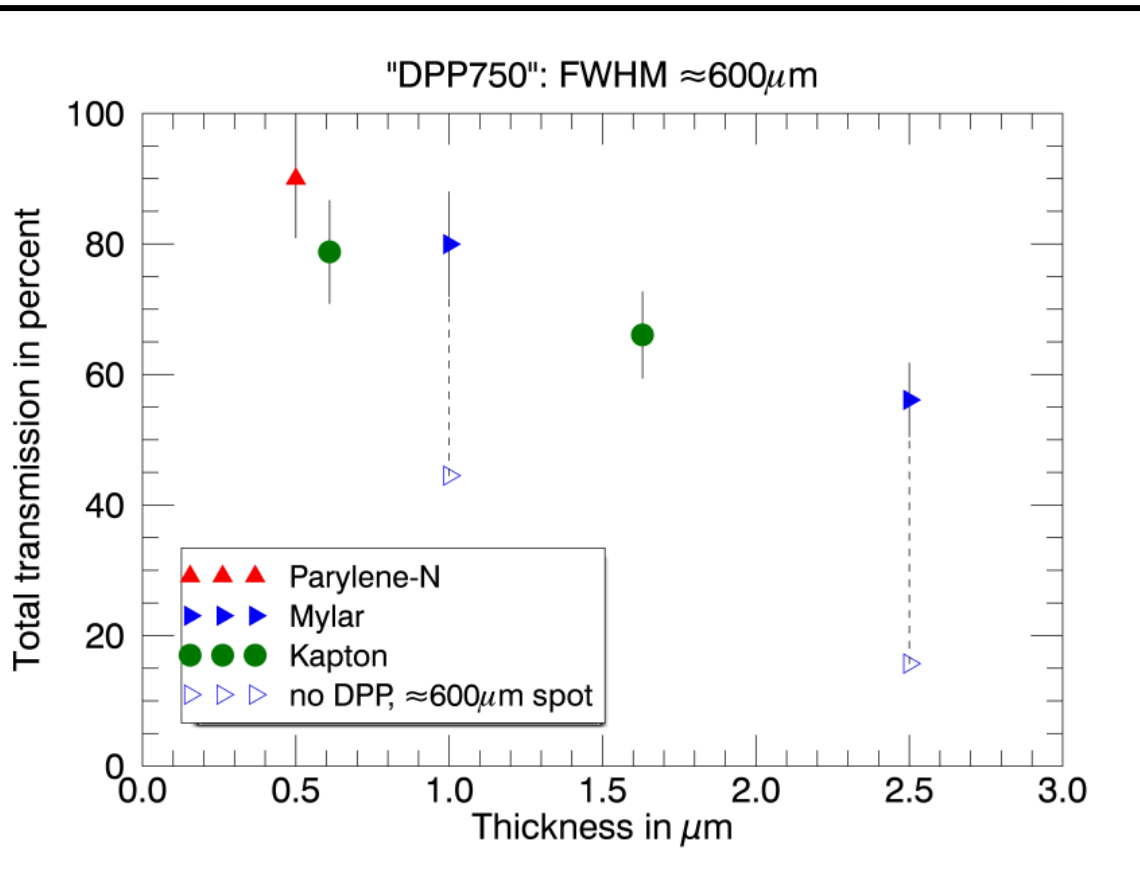
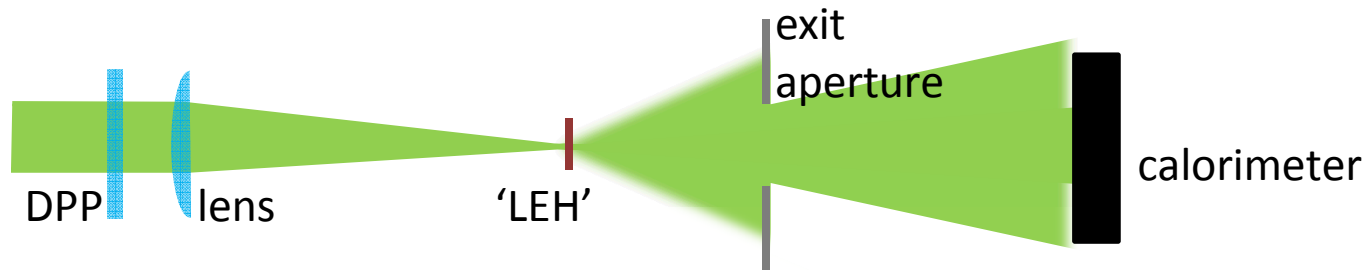
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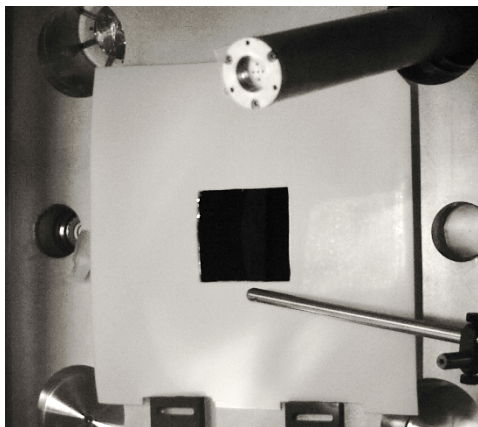
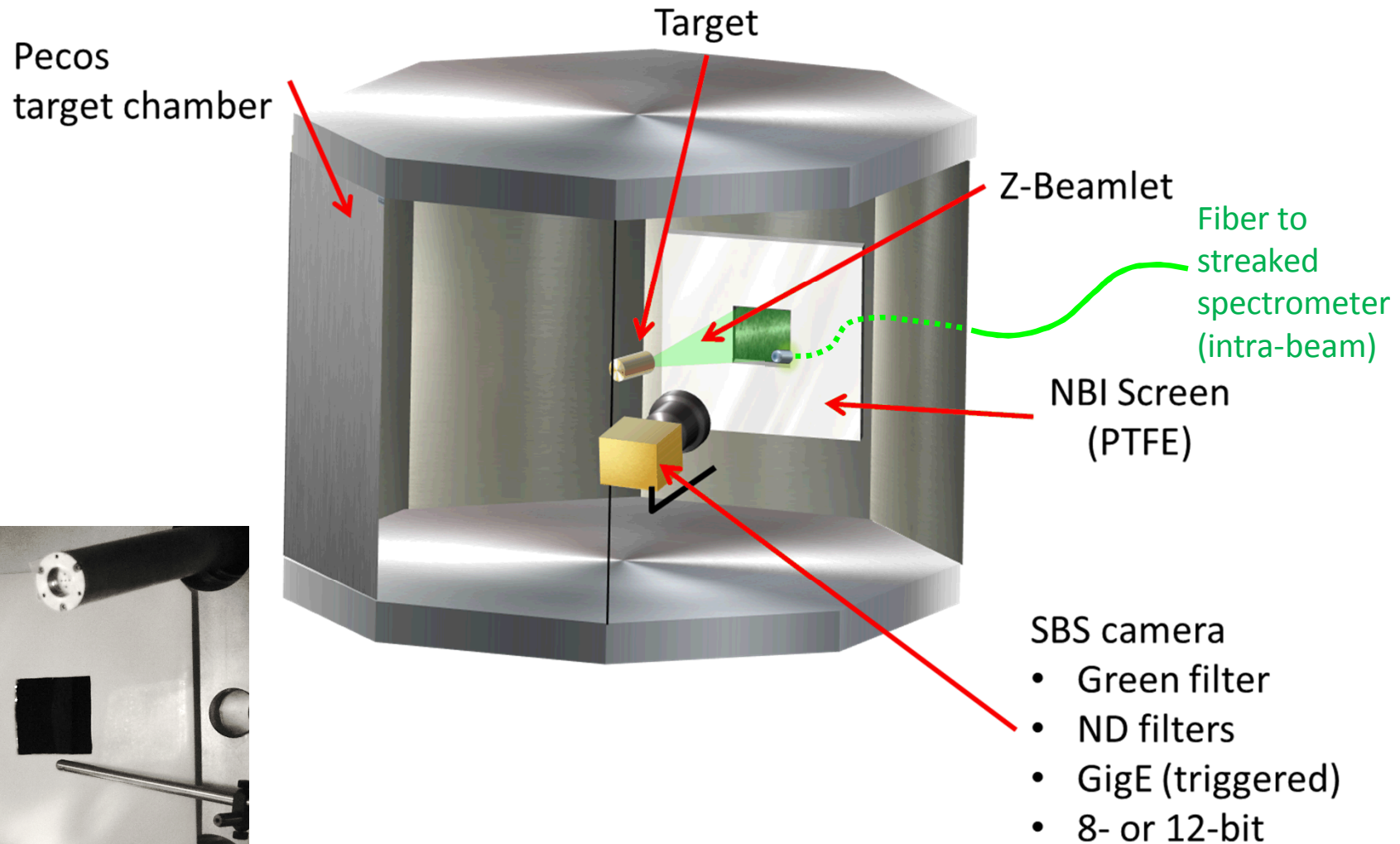
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LEH Transmission with Phase Plate



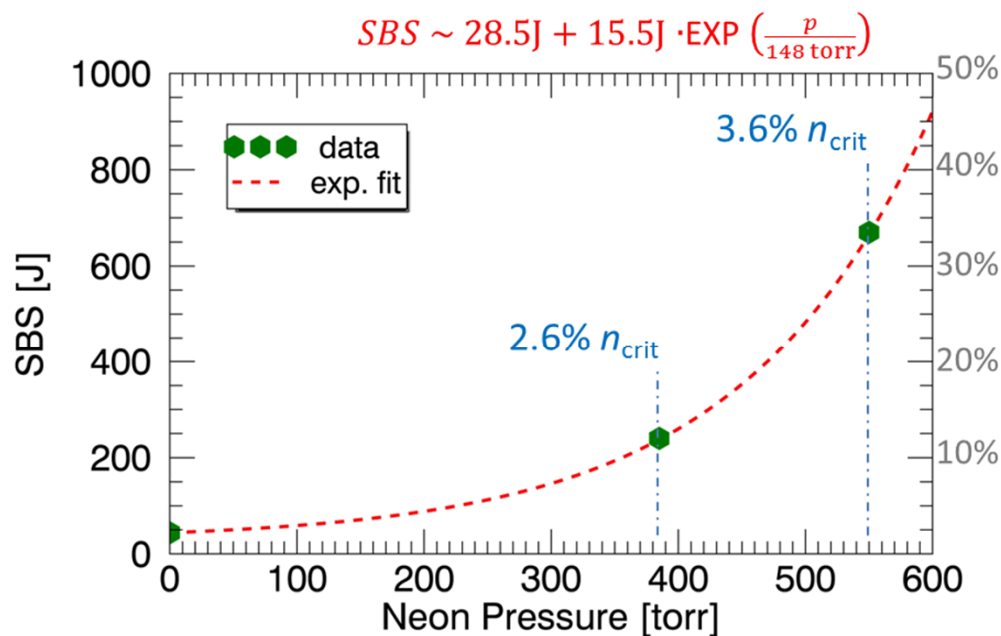
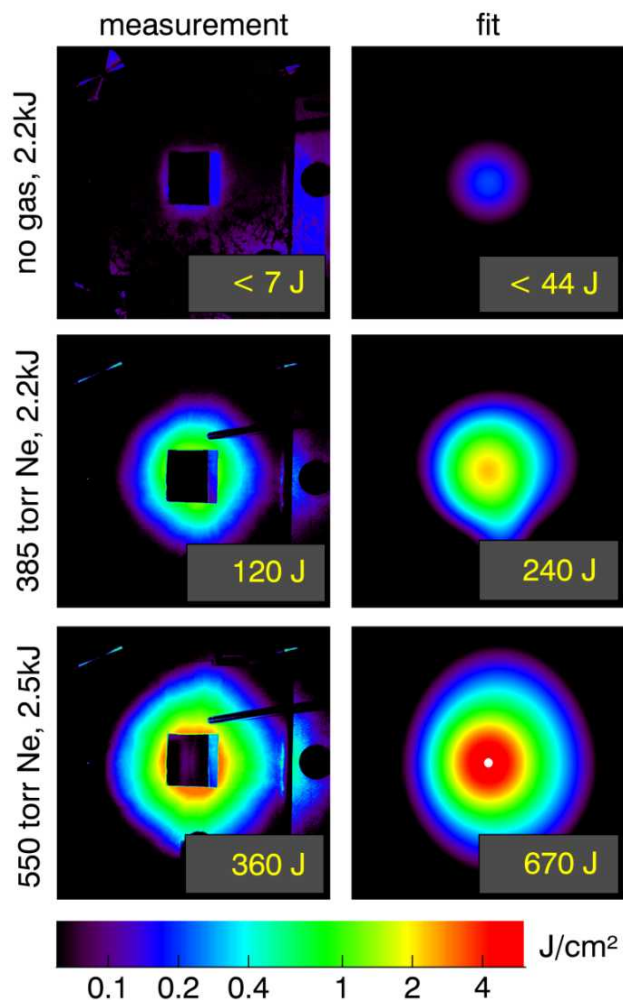
SBS Backscatter Measurements

Setup



SBS Backscatter Measurements

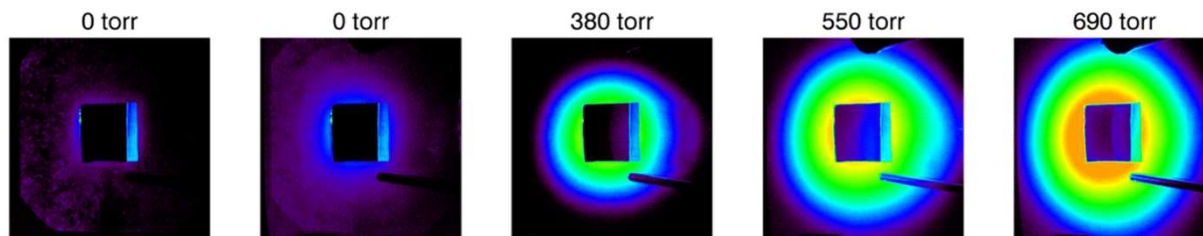
NEON GAS FILL, No Phase Plate



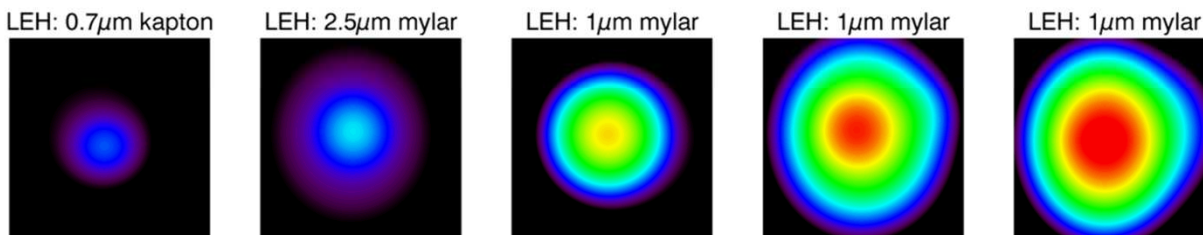
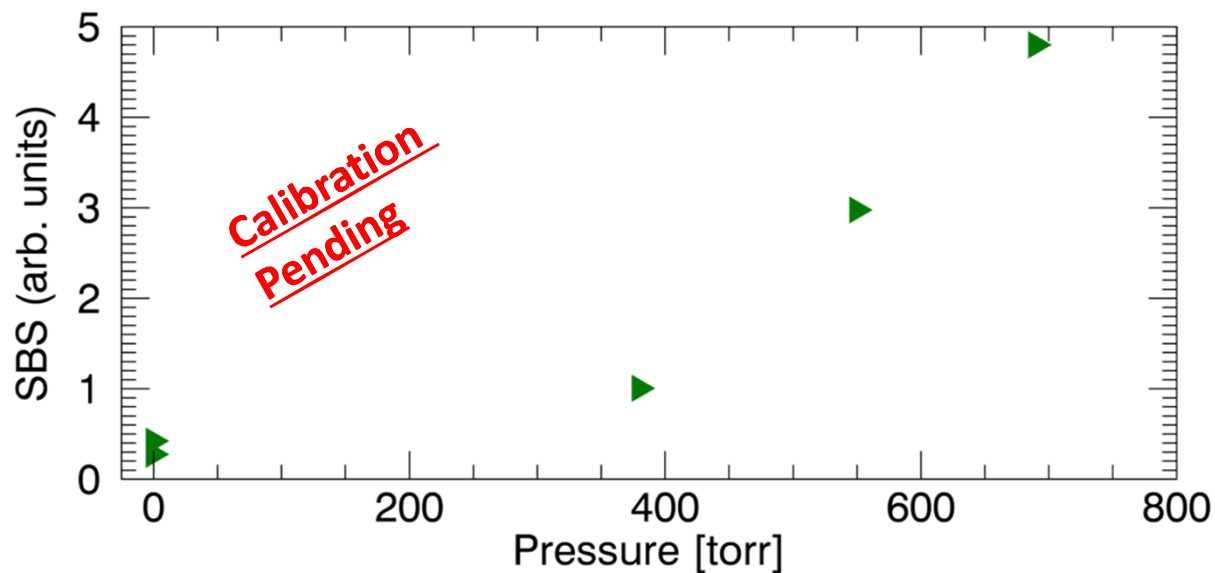
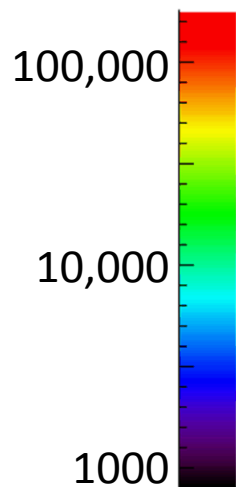
SBS Backscatter Measurements

SBS images with
750 μ m DPP
(log-scale)

DATA



FIT

Image Brightness
(arb. units)

SBS from Laser Entrance Hole Windows

Shot
Parameters

B16042604

Window Thickness: 1.63 μm

Defocused by 3.5 mm

Pre-Pulse: Yes

Laser Energy: 2635 J

B16041433

Window Thickness: 1.50 μm

Defocused by 5 mm

Pre-Pulse: Yes

Laser Energy: 2869 J

B16041905

Window Thickness: 1.50 μm

750 μm phase plate

Pre-Pulse: Yes

Laser Energy: 2850 J

B16042503

Window Thickness: 1.63 μm

750 μm phase plate

Pre-Pulse: No

Laser Energy: 2133 J

B16042101

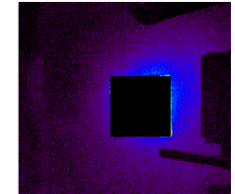
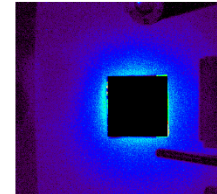
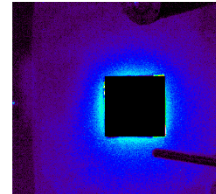
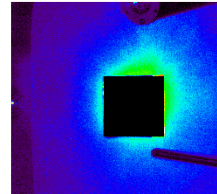
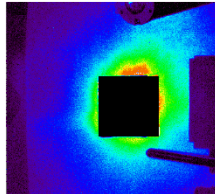
Window Thickness: 1.50 μm

750 μm phase plate

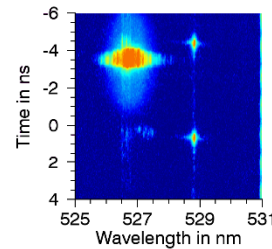
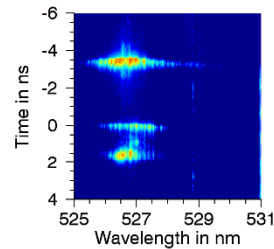
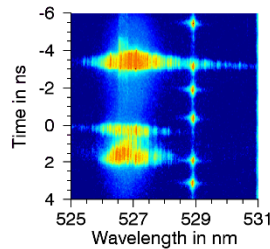
Pre-Pulse: No

Laser Energy: 1269 J

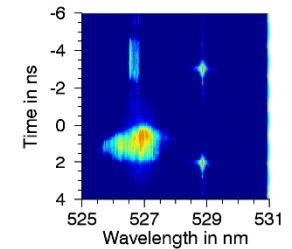
NBI



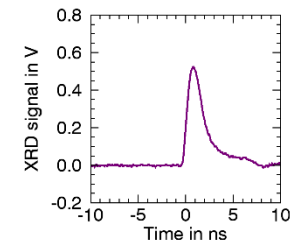
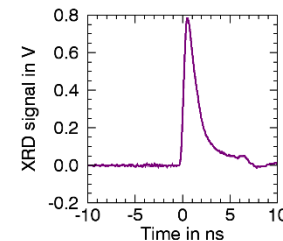
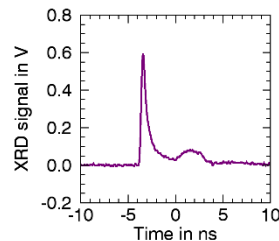
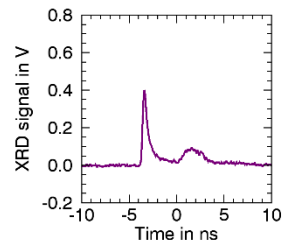
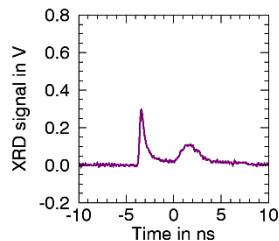
Intra-Beam
SBS (fiber)



(no data return)



LEH X-ray
Response



LEH Window Transmission

Impact of Pulse Form and Focus

B16041905:

- 750 μ m DPP
- Pre-pulse
- Energy (total): 2.85 kJ
- Transmission: 1.35 kJ

B16041433

- 5mm defocus
- Pre-pulse
- Energy (total): 2.87 kJ
- Transmission: 1.35 kJ

B16042604

- 3.5mm defocus
- Pre-pulse
- Energy (total): 2.64 kJ
- Transmission: 1.07 kJ

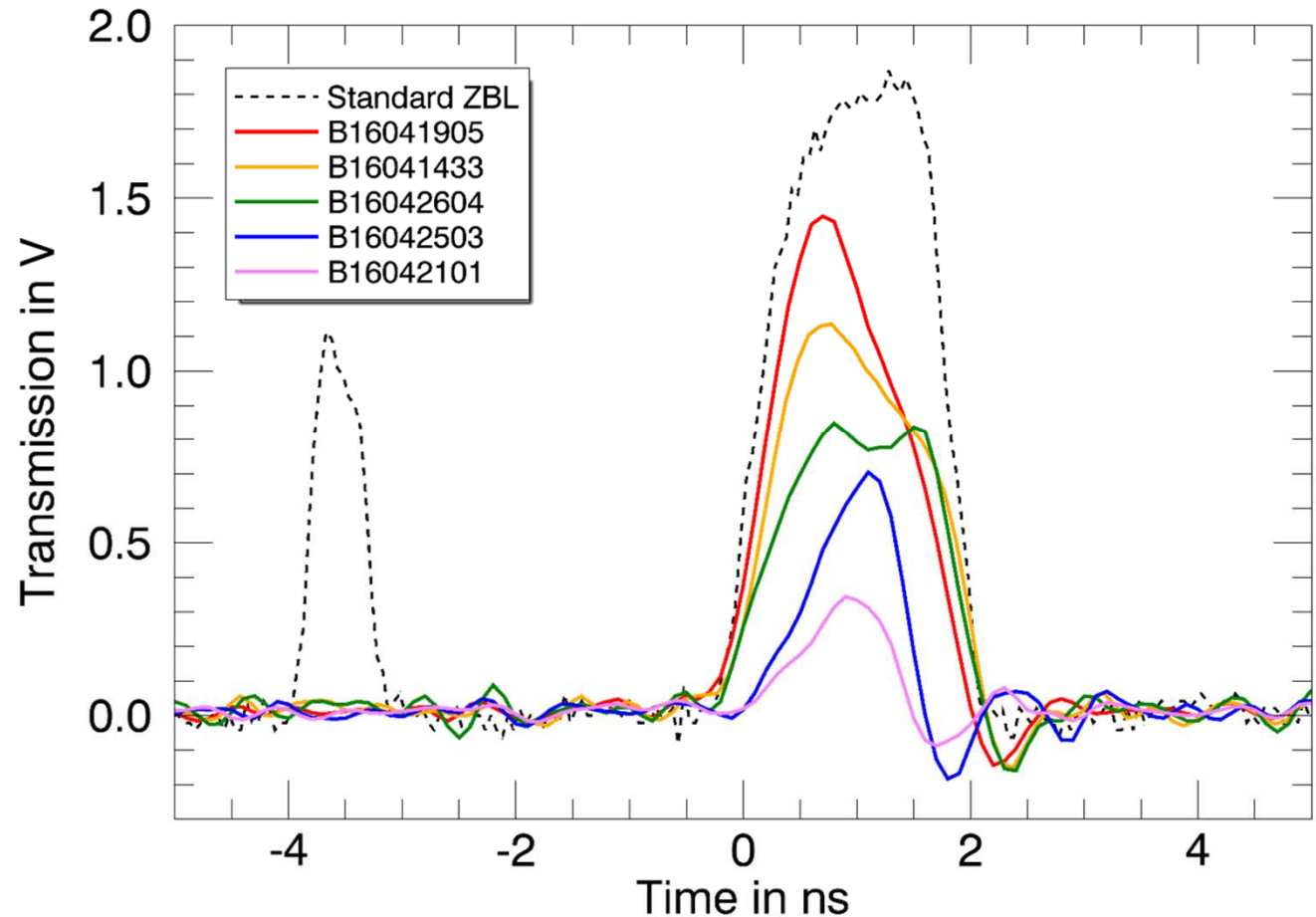
B16042503

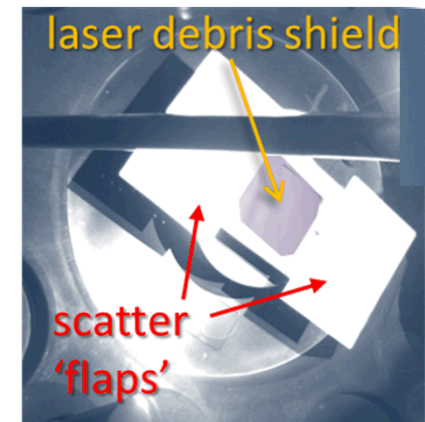
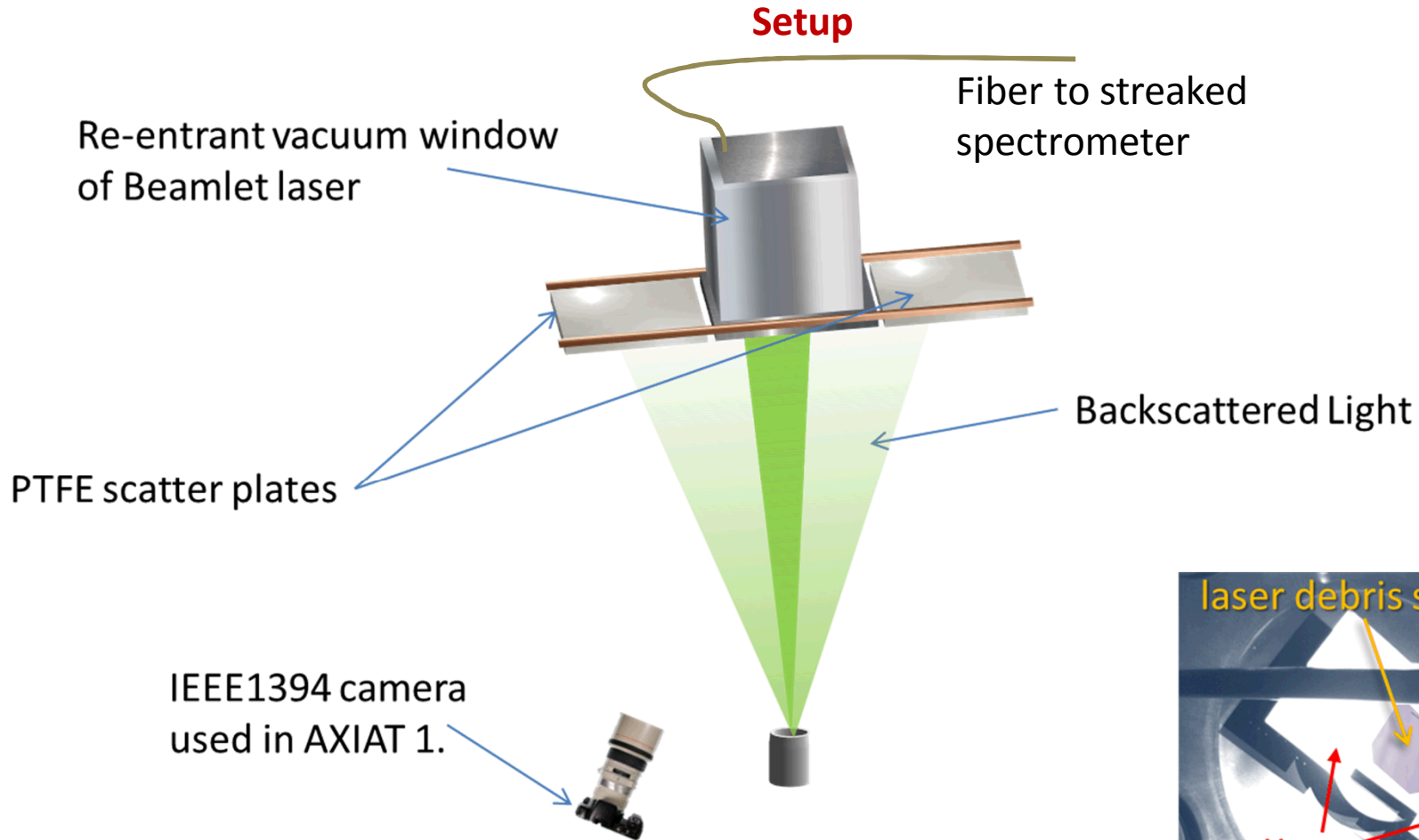
- 750 μ m DPP
- NO pre-pulse
- Energy: 2.13 kJ
- Transmission: 0.34 kJ

B16042101

- 750 μ m DPP
- NO pre-pulse
- Energy: 1.27 kJ
- Transmission: 0.14 kJ

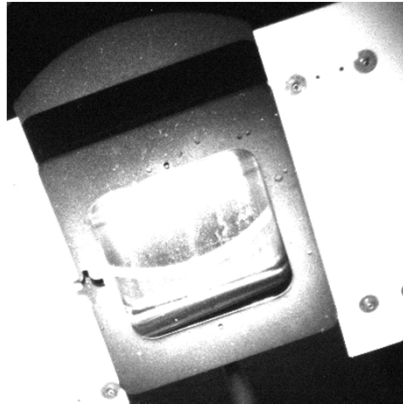
Transmission Diode Traces



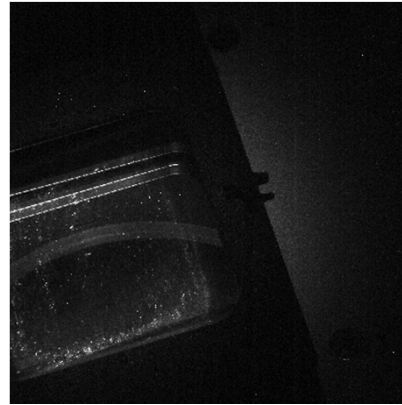


SBS Backscatter Measurements in Z

Measurements



no phase plate



w/ phase plate



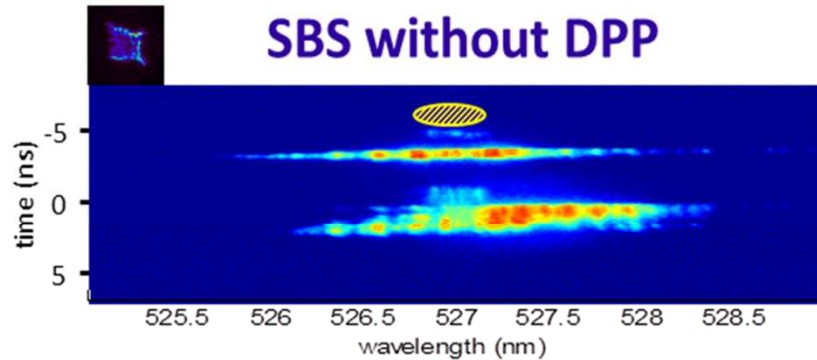
w/ phase plate
(adjusted brightness)



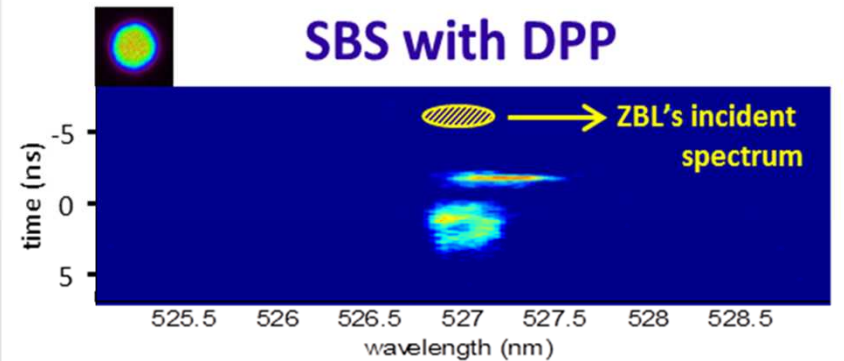
(Different camera and lens)

SBS Backscatter Measurements

Temporally and spectrally resolved



Courtesy of David Bliss



Poor beam quality:

- More SBS
- Bigger $\Delta\lambda$ (filamentation)
- Spectral shift

Note: Gas is D₂ (less SBS than Ne)

... Last Words

- Even with phase plates there seems to be significant LPI in the experiments.
- Much needs to be added for better understanding:
 - NBI diodes
 - Better calibration
 - SRS !!!
- Simulations are in preparation
- We appreciate help and insight into this complex physics challenge.