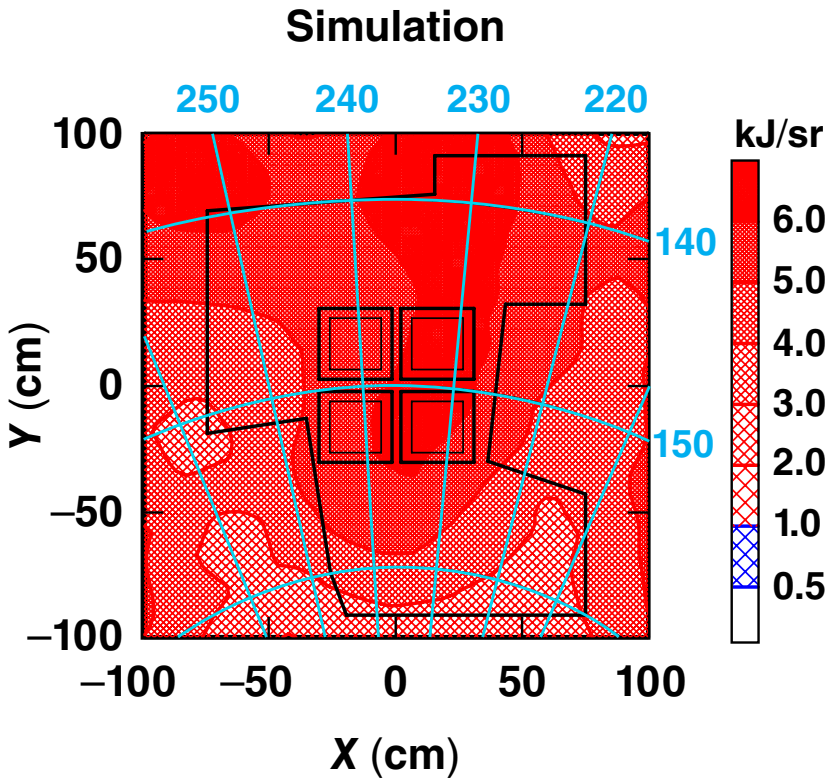
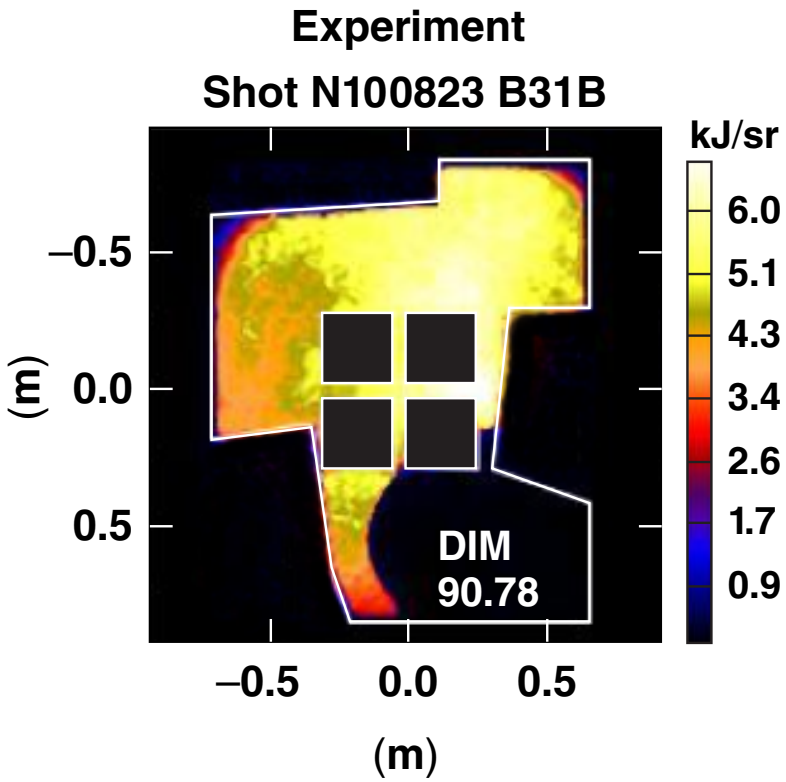
Three-Dimensional Distributions of Scattered Light in NIF "Exploding-Pusher" Polar-Drive Experiments





R. S. Craxton
University of Rochester
Laboratory for Laser Energetics

53rd Annual Meeting of the
American Physical Society
Division of Plasma Physics
Salt Lake City, UT
14–18 November 2011

Summary

SAGE modeling of NIF "exploding-pusher" polar-drive experiments is consistent with experimental scattered-light observations

UR LLE

- The simulations combine 2-D hydrodynamics with 3-D ray tracing including all 192 NIF beam directions
- The scattered light predicted on the NBI plates shows strong spatial variations consistent with observations

Collaborators

P. W. McKenty

University of Rochester
Laboratory for Laser Energetics

E. Bond, S. LePape, A. J. MacKinnon,
P. A. Michel, and J. D. Moody

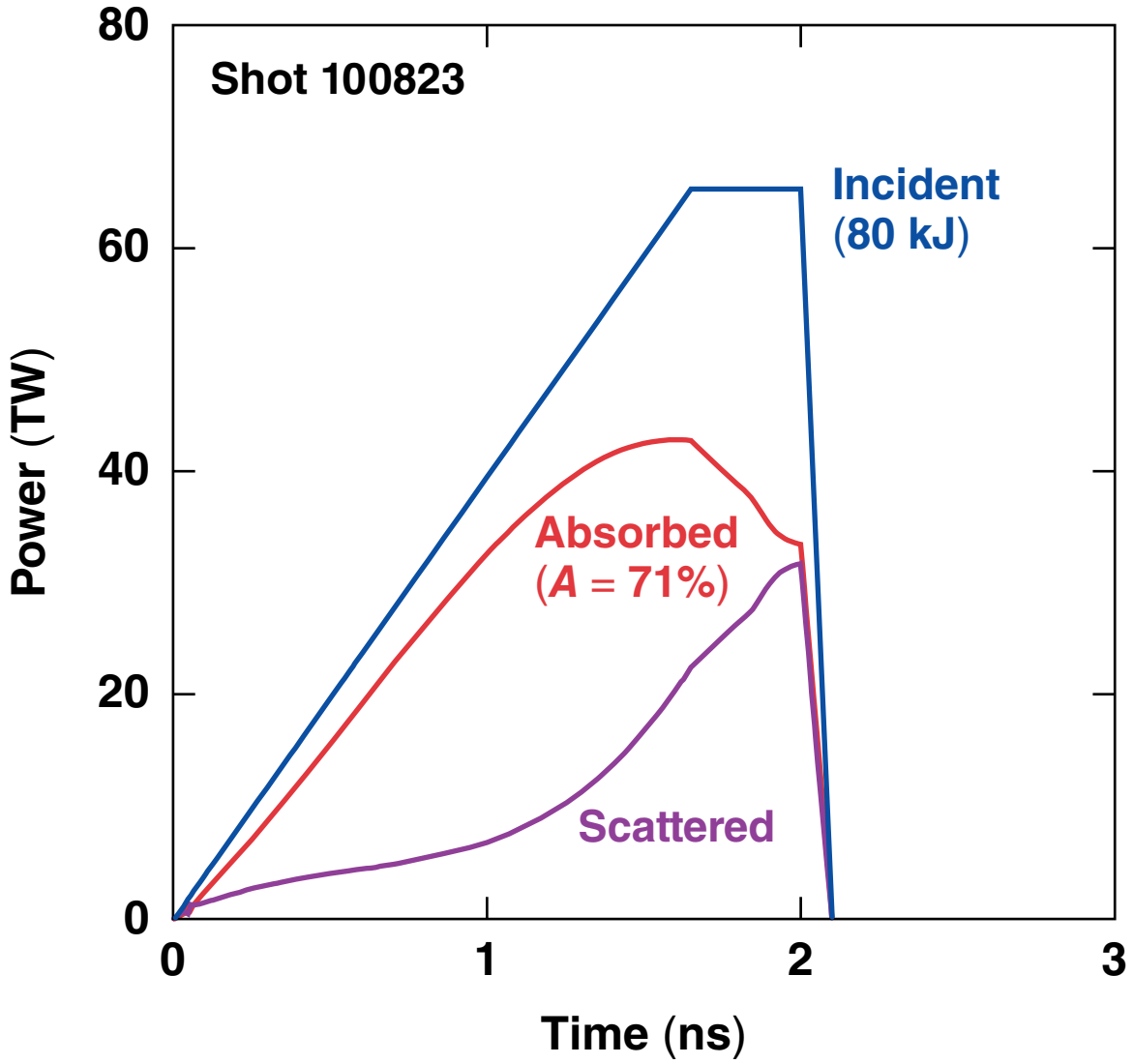
Lawrence Livermore National Laboratory

Understanding the scattered-light distribution in NIF polar-drive experiments is important for two primary reasons

UR LLE

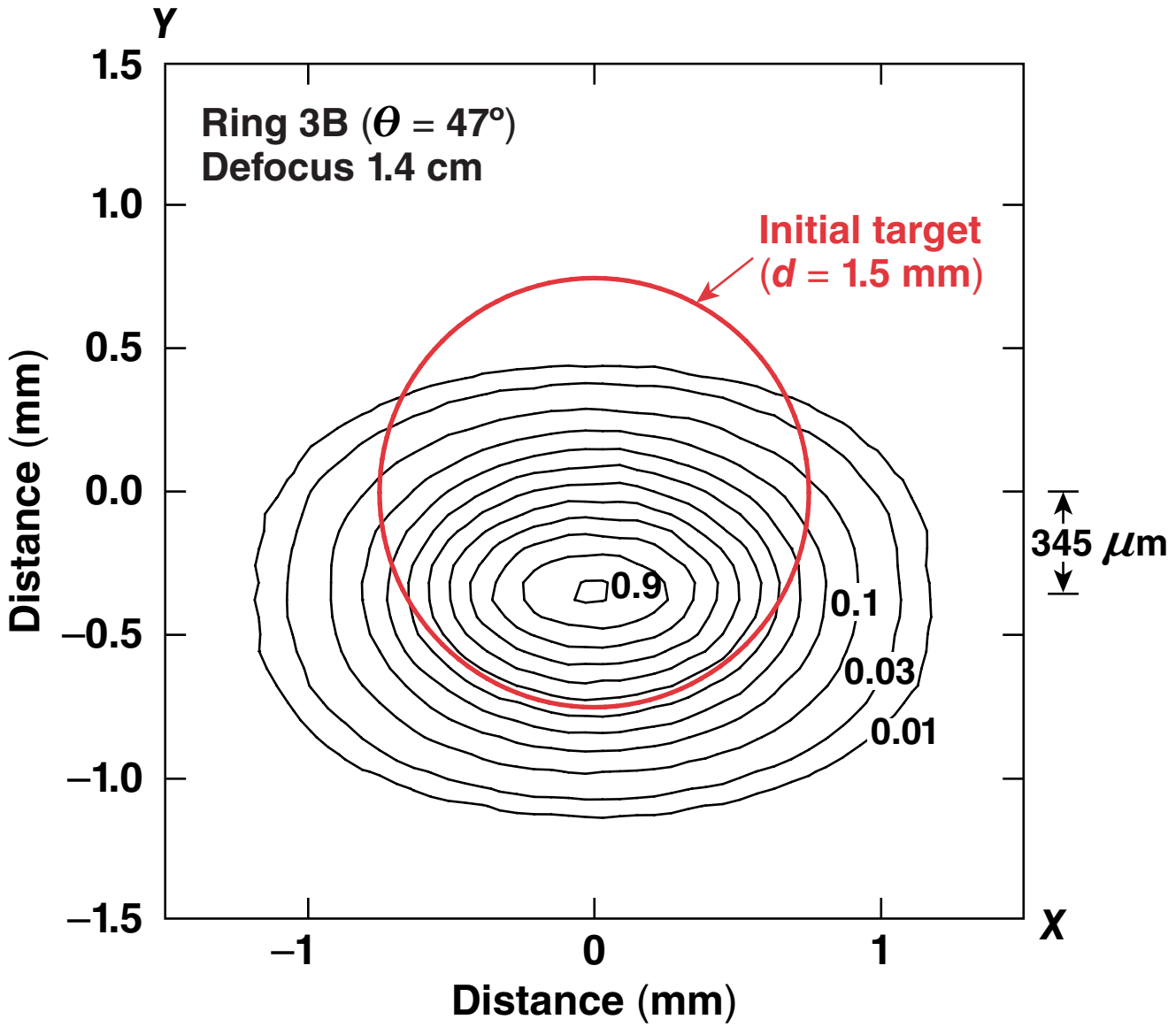
- By matching NBI/FABS observations to simulations one may estimate the target absorption for polar drive
- For assessment of potential damage to NIF optics one needs realistic estimates of the scattered-light flux

“Exploding-pusher” shot 100823 used a ramp laser pulse



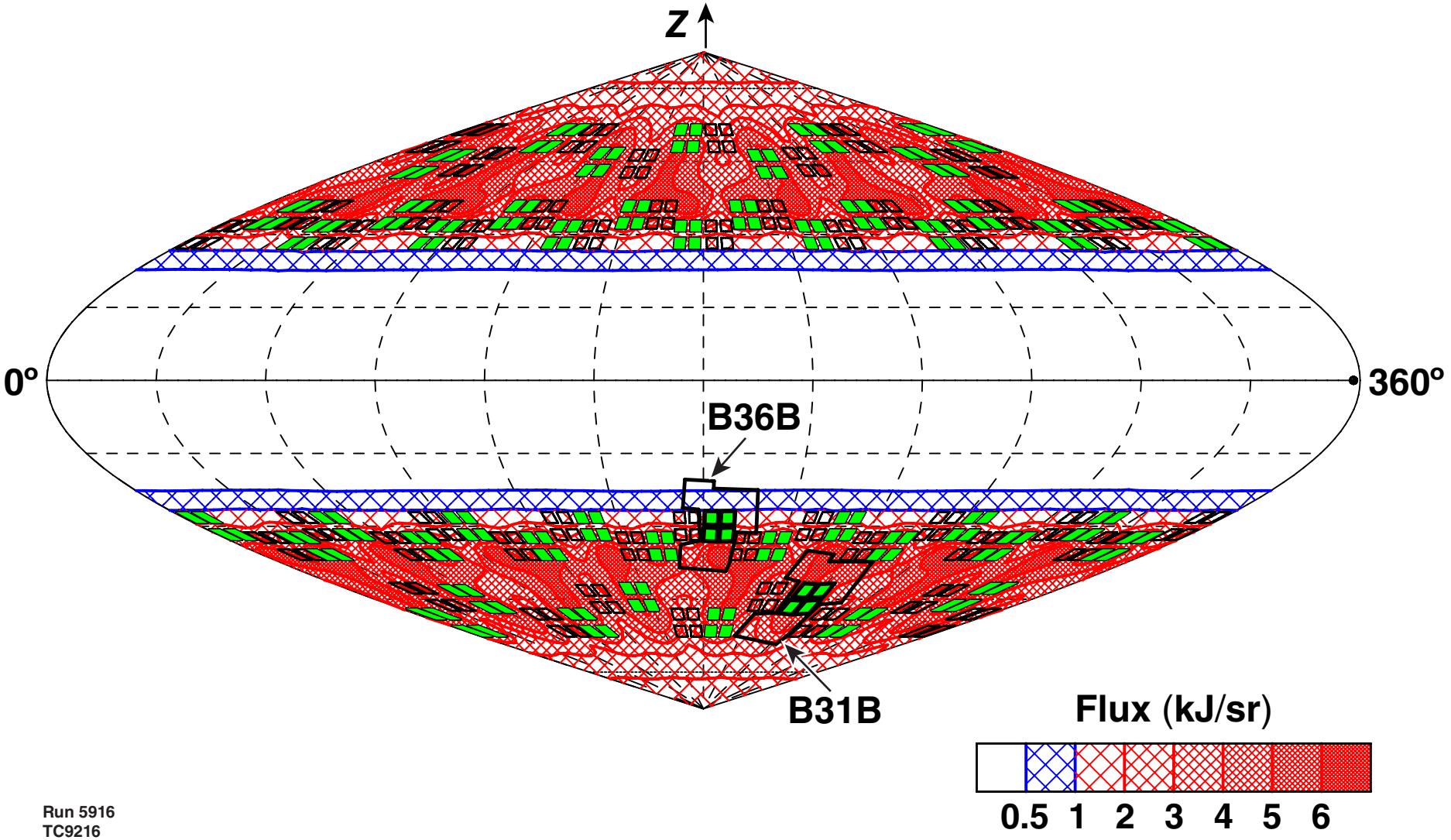
Run 5857
TC9209

The polar-drive design involves defocusing and repointing the NIF beams using the indirect-drive phase plates



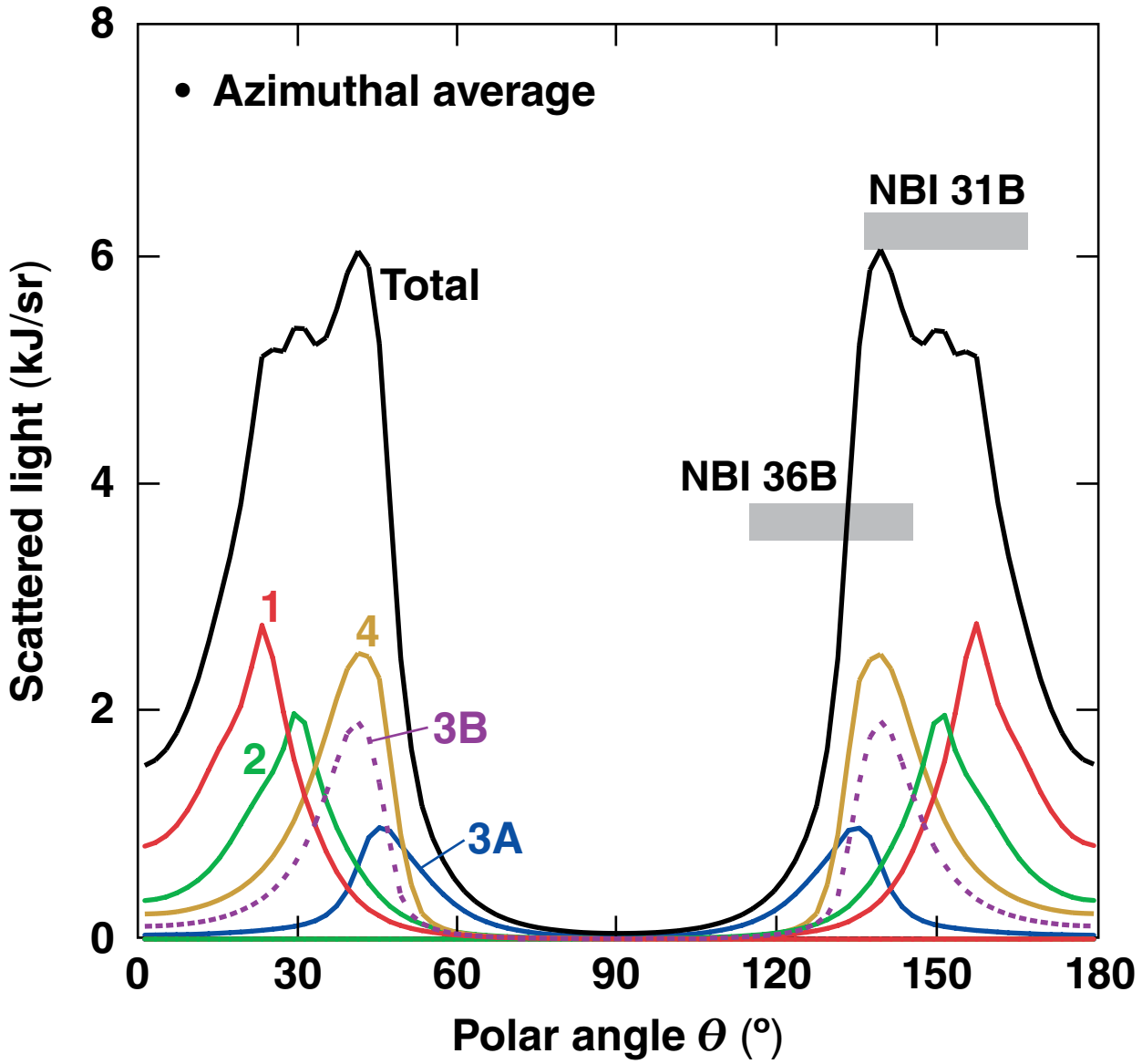
Sub 41
TC9210

The cumulative scattered light is concentrated in a narrow range of angles θ sampled by the two NBI plates



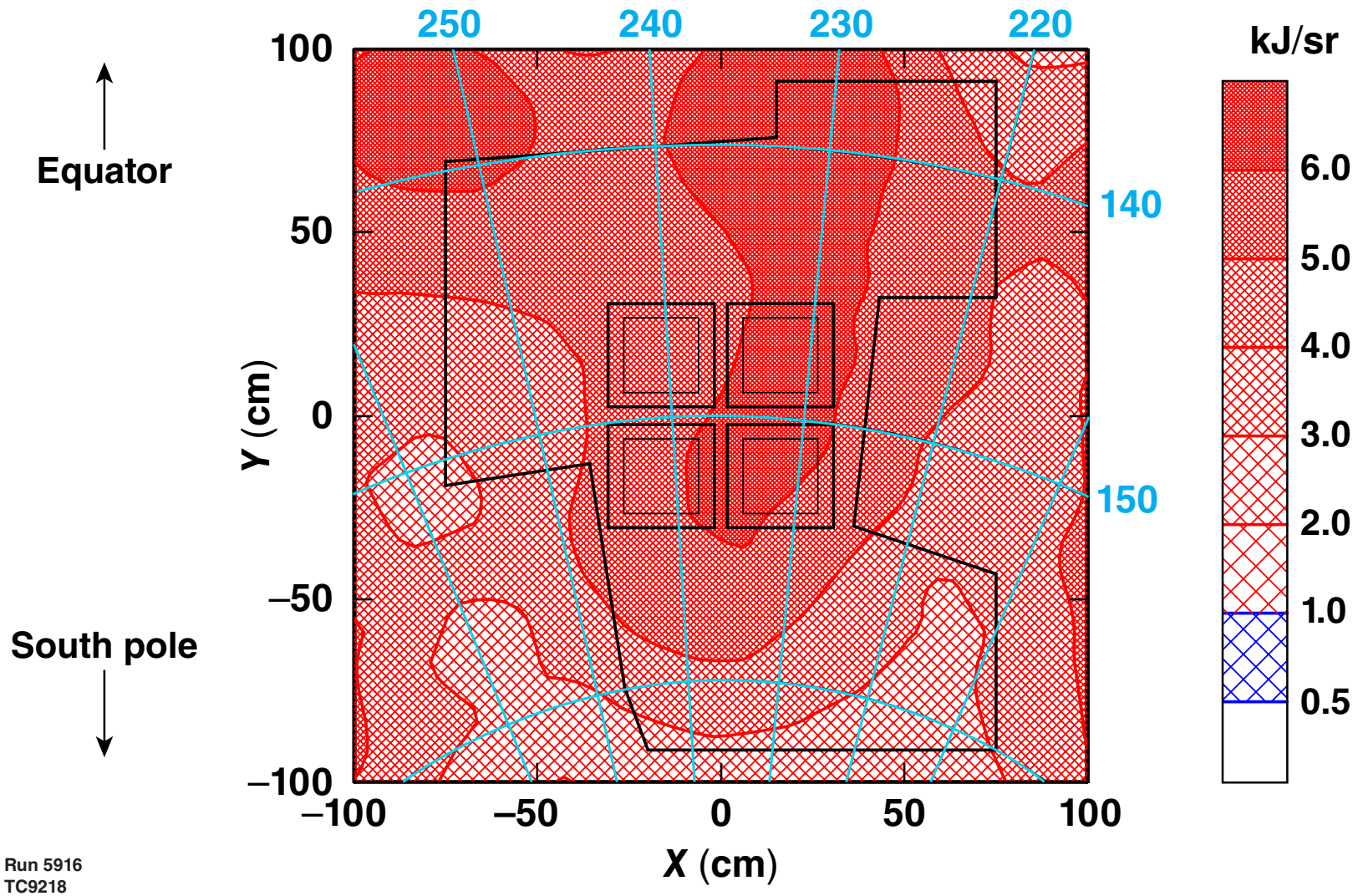
Run 5916
TC9216

The contributions of the individual rings to the cumulative scattered light can be identified



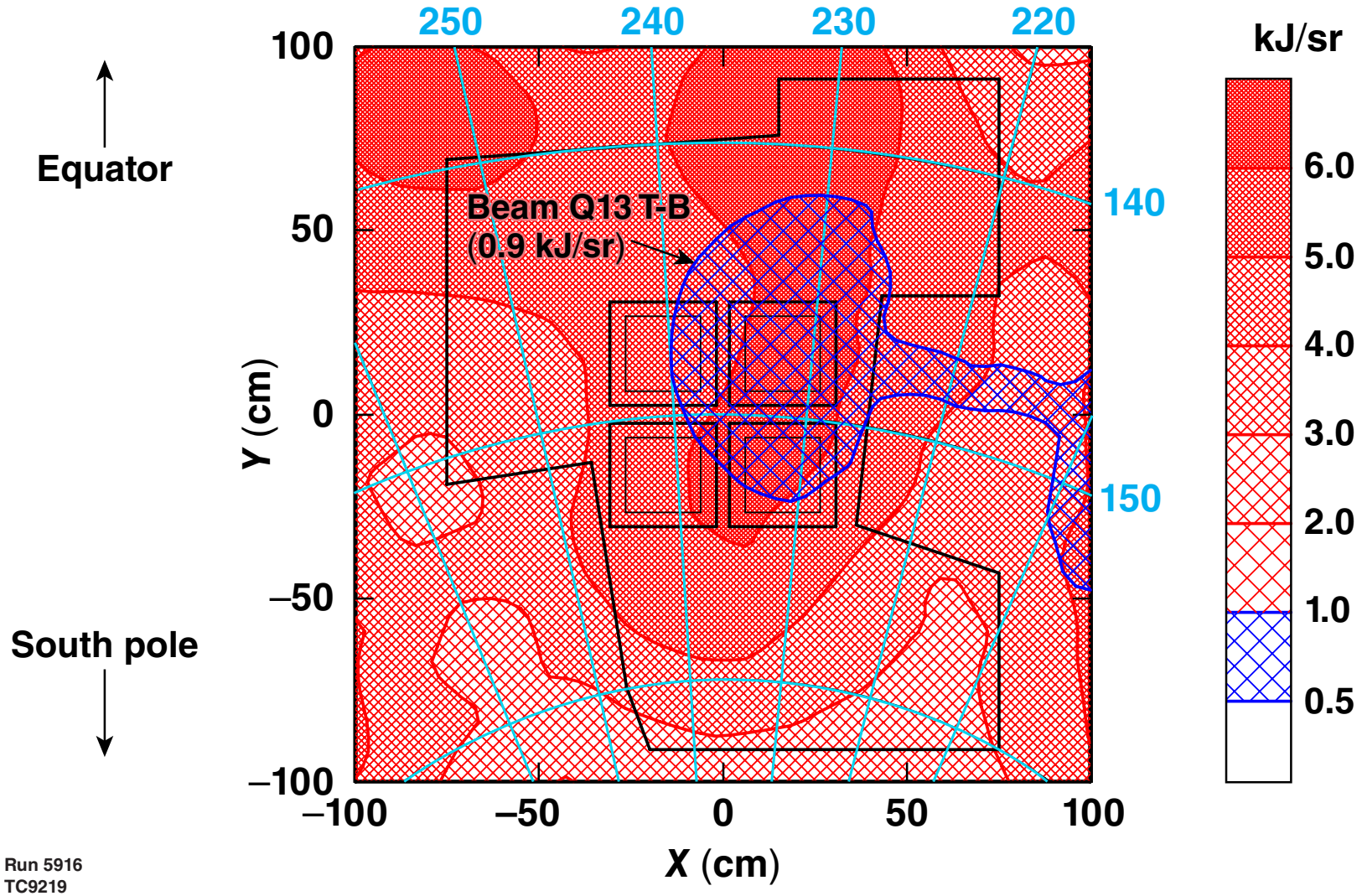
Run 5857
TC9217

The calculated scattered light on NBI plate B31B shows significant structure



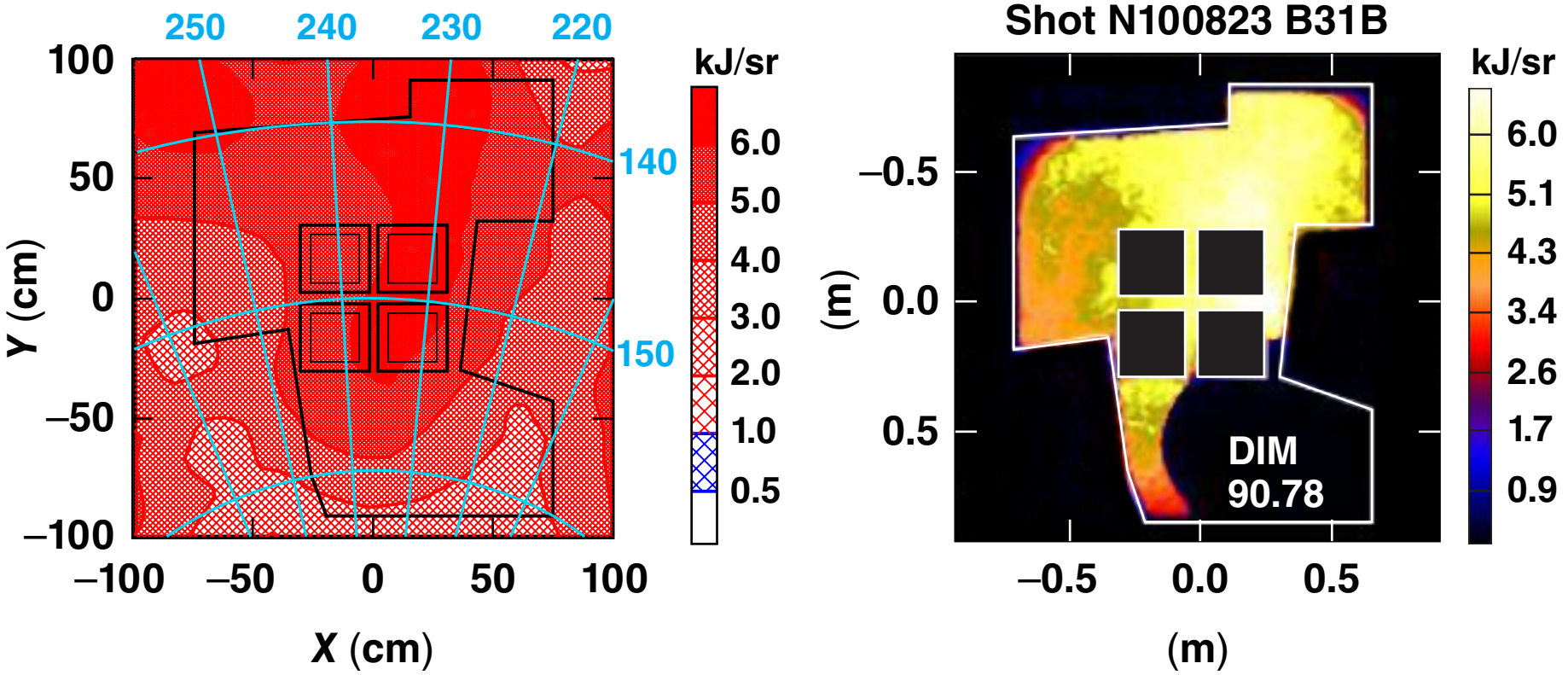
Run 5916
TC9218

The calculated scattered light on NBI plate B31B shows significant structure



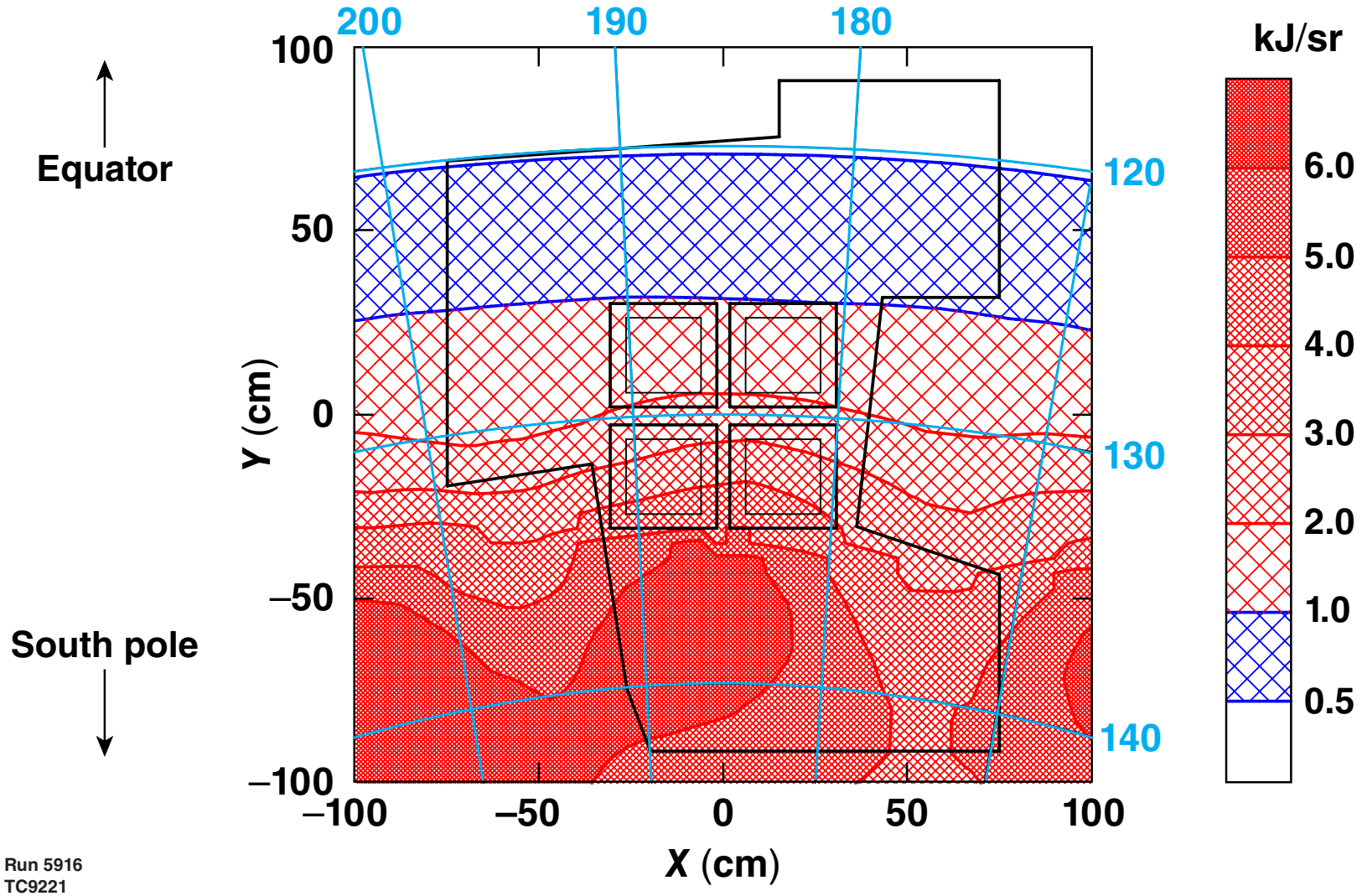
Run 5916
TC9219

The *SAGE* simulation of the B31B NBI image is consistent with the experiment



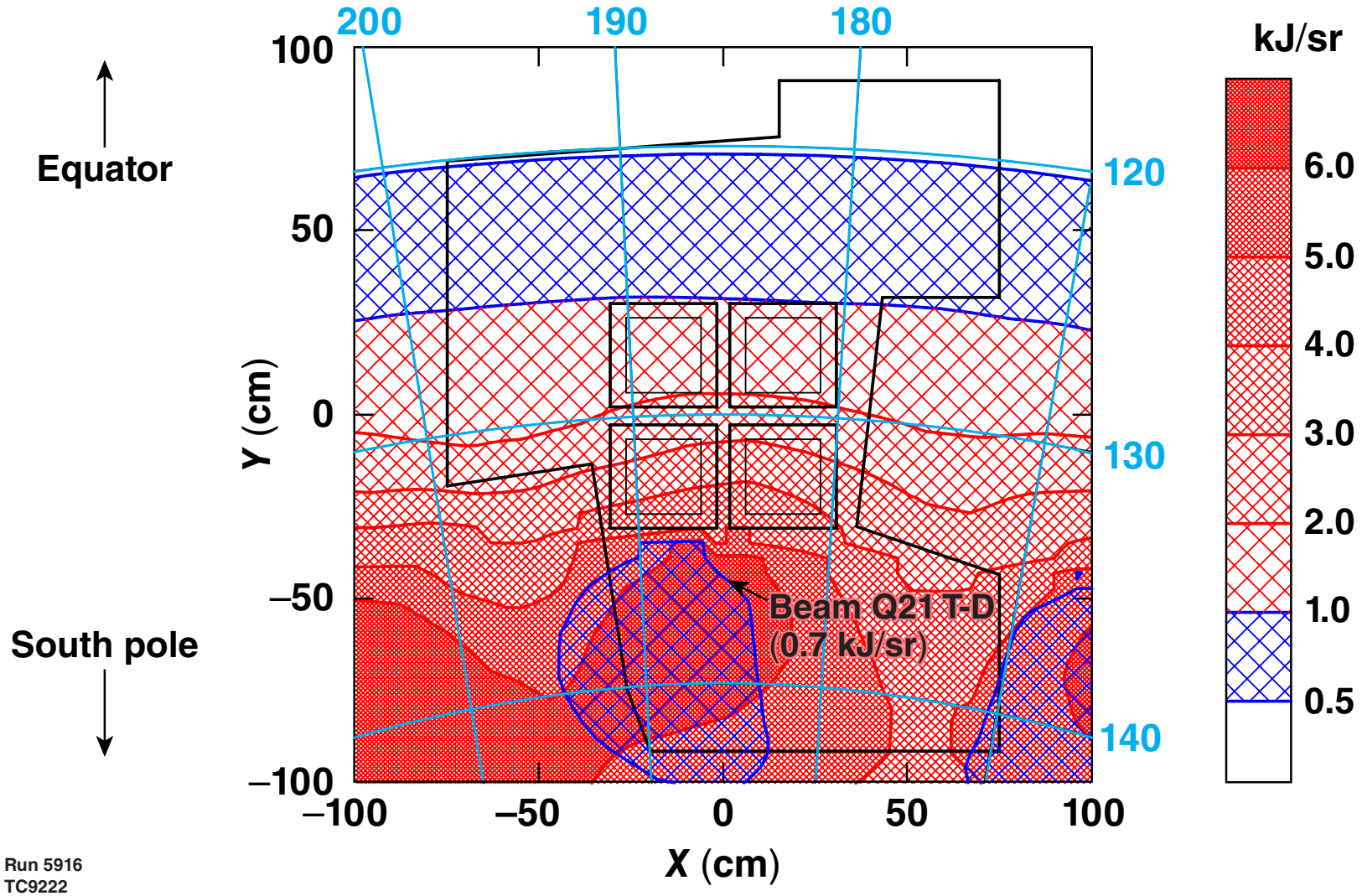
Run 5916
TC9220

The calculated scattered light on NBI plate B36B shows a strong top-to-bottom variation



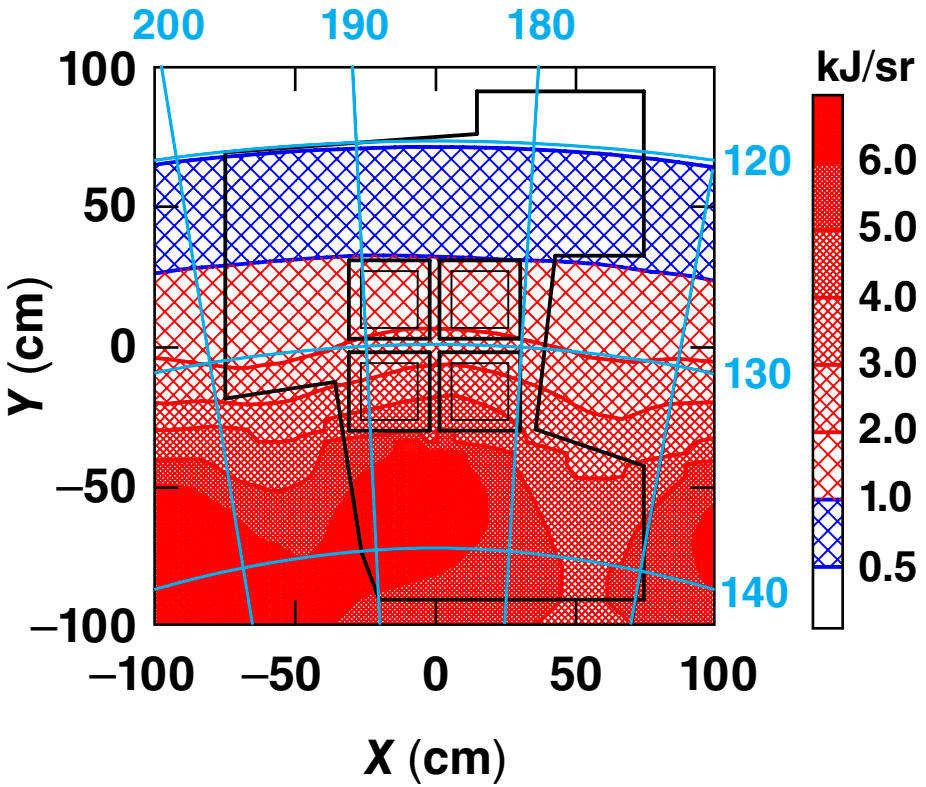
Run 5916
TC9221

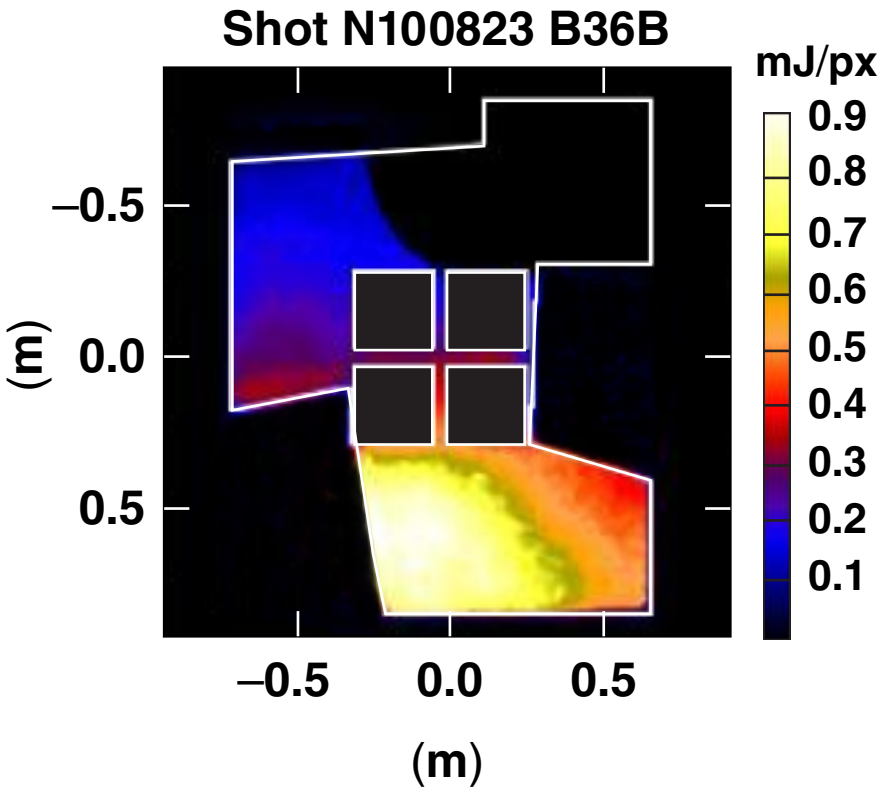
The calculated scattered light on NBI plate B36B shows a strong top-to-bottom variation



Run 5916
TC9222

The *SAGE* simulation of the B36B NBI image is broadly consistent with the experiment





Run 5916
TC9223

Summary/Conclusions

SAGE modeling of NIF "exploding-pusher" polar-drive experiments is consistent with experimental scattered-light observations

UR LLE

- The simulations combine 2-D hydrodynamics with 3-D ray tracing including all 192 NIF beam directions
- The scattered light predicted on the NBI plates shows strong spatial variations consistent with observations