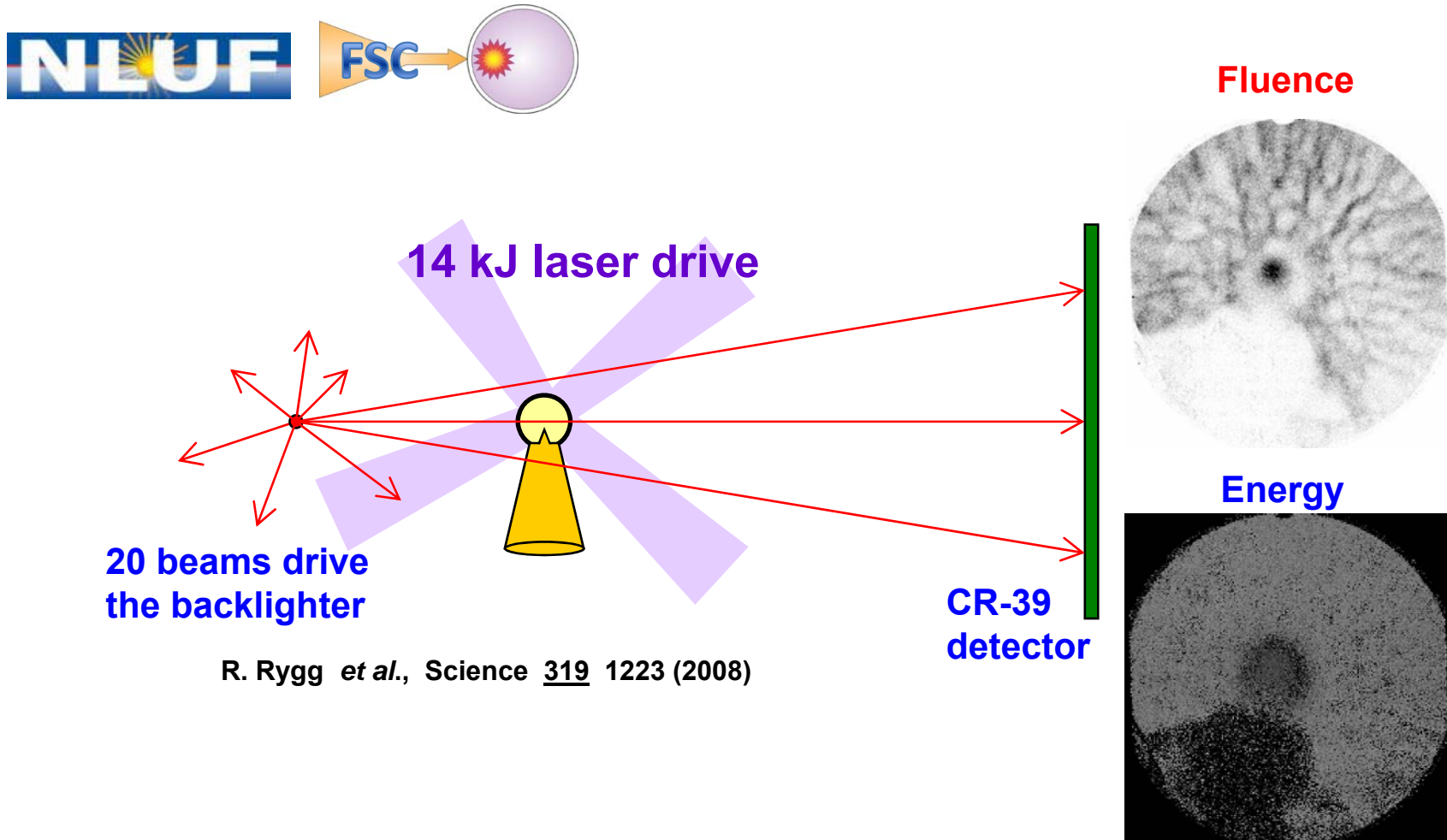


Proton Radiography of Laser-Produced High-Energy-Density Plasmas on OMEGA



Summary

Proton radiography provides unique diagnostics for probing laser-produced HED plasmas on OMEGA and OMEGA-EP

- **Observations and quantifications of dynamic E and B fields with monoenergetic proton radiography on OMEGA**
 - laser-foil interactions
 - direct-drive ICF capsule implosions
 - laser-irradiated hohlraums
 - laser-driven astrophysical-scaled plasma jets
- **Studies of ICF implosion physics with monoenergetic proton radiography on OMEGA**
 - implosion dynamics of direct-drive ICF capsule
 - supersonic plasma jets in laser-driven vacuum hohlraums

Collaborators



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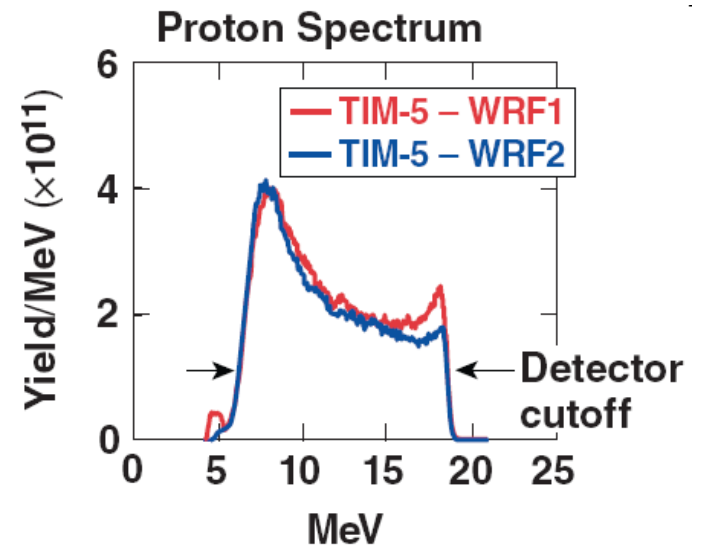
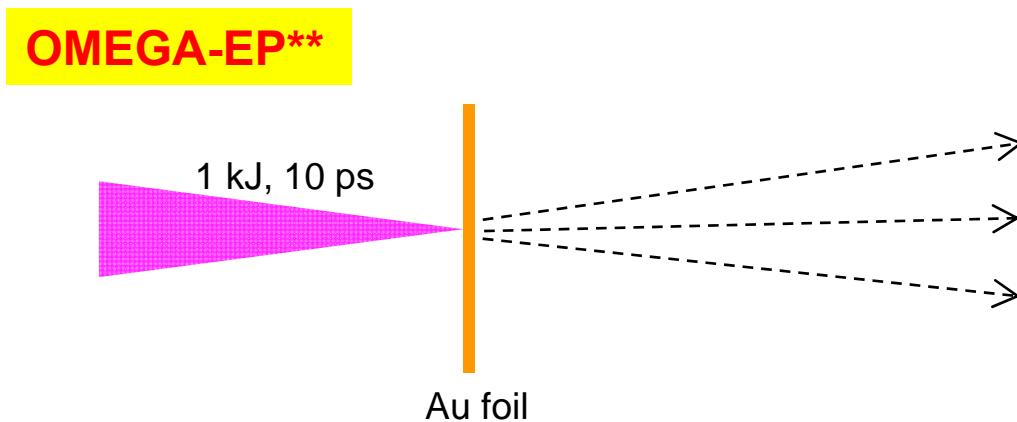
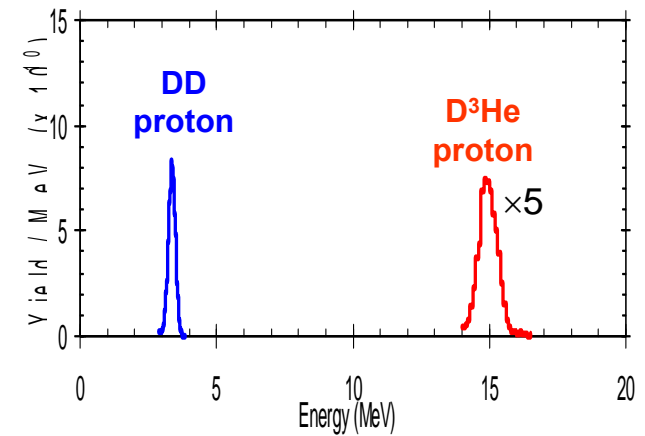
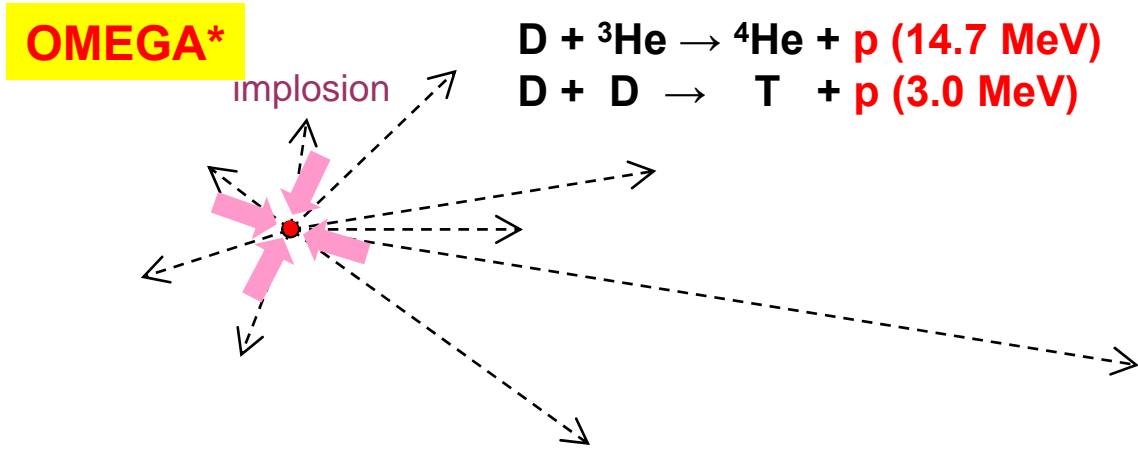
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D. Shvarts
V. Smalyuk
J. Soures

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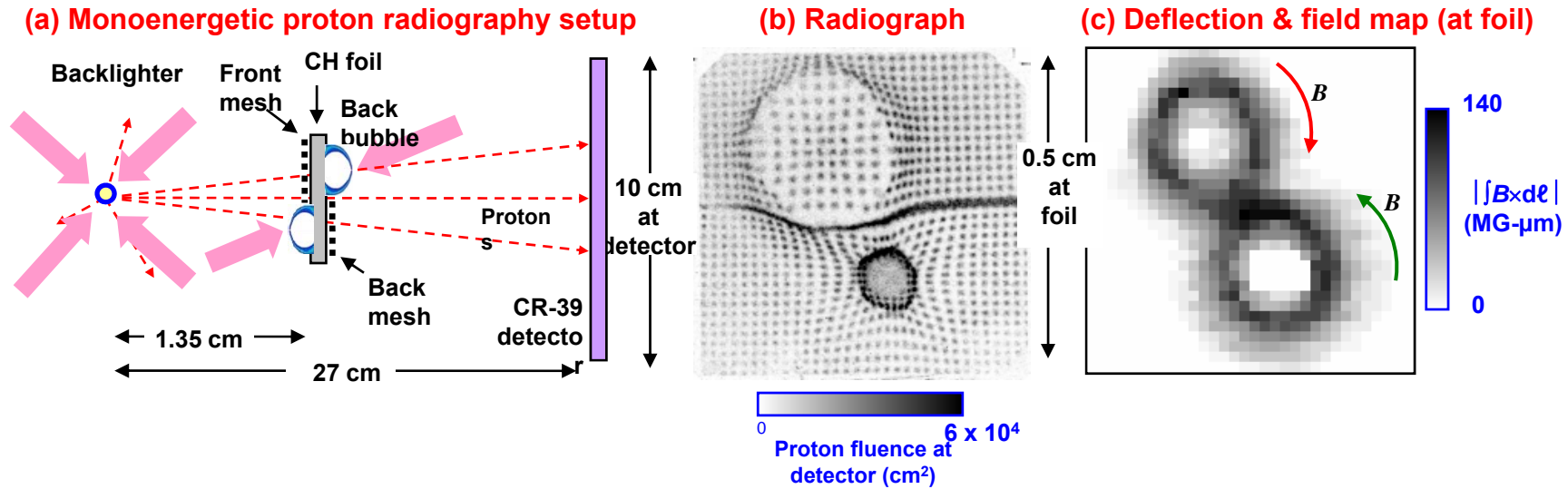
Two types of proton backlighter are utilized for radiography experiments



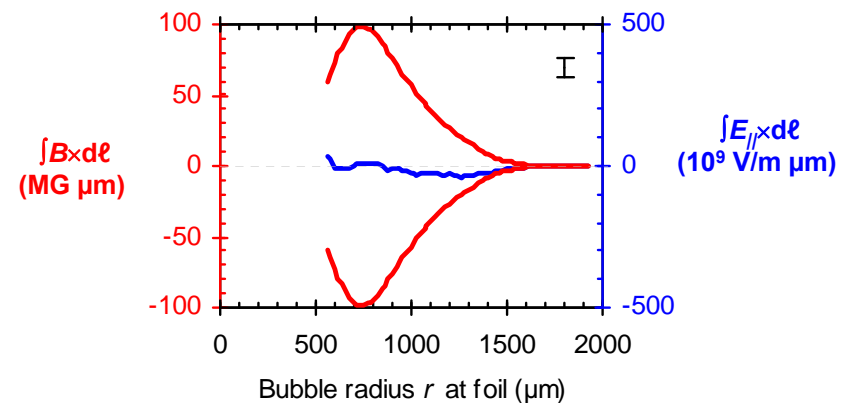
* C. K. Li *et al.*, PRL **97**, 135003 (2006).

**D. D. Meyerhofer *et al.*, DPP-APS (2008).

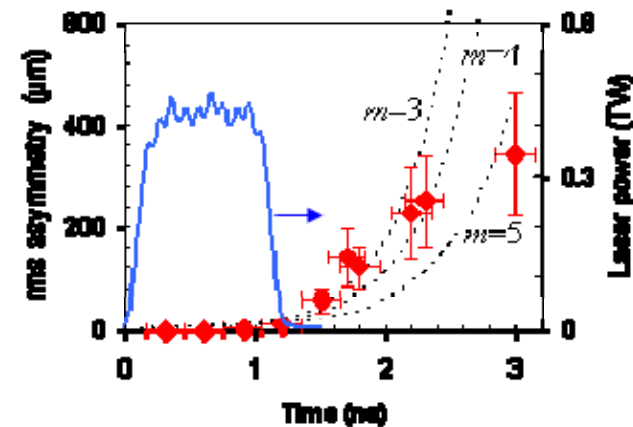
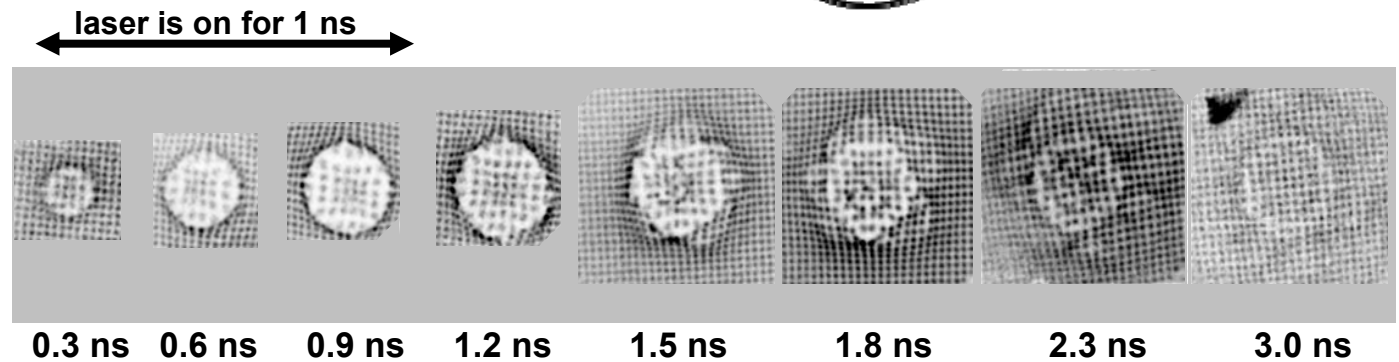
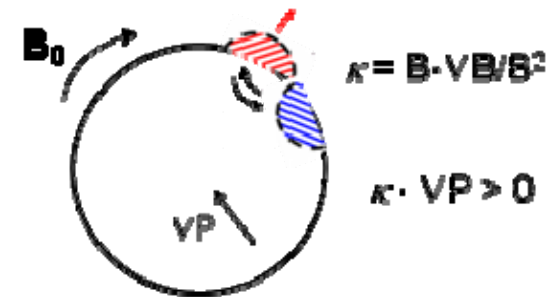
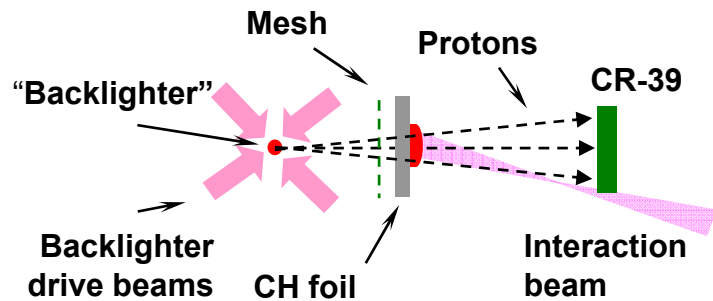
Face-on radiographs of laser-generated plasma bubbles on opposite sides of a foil prove that deflecting fields are B rather than E



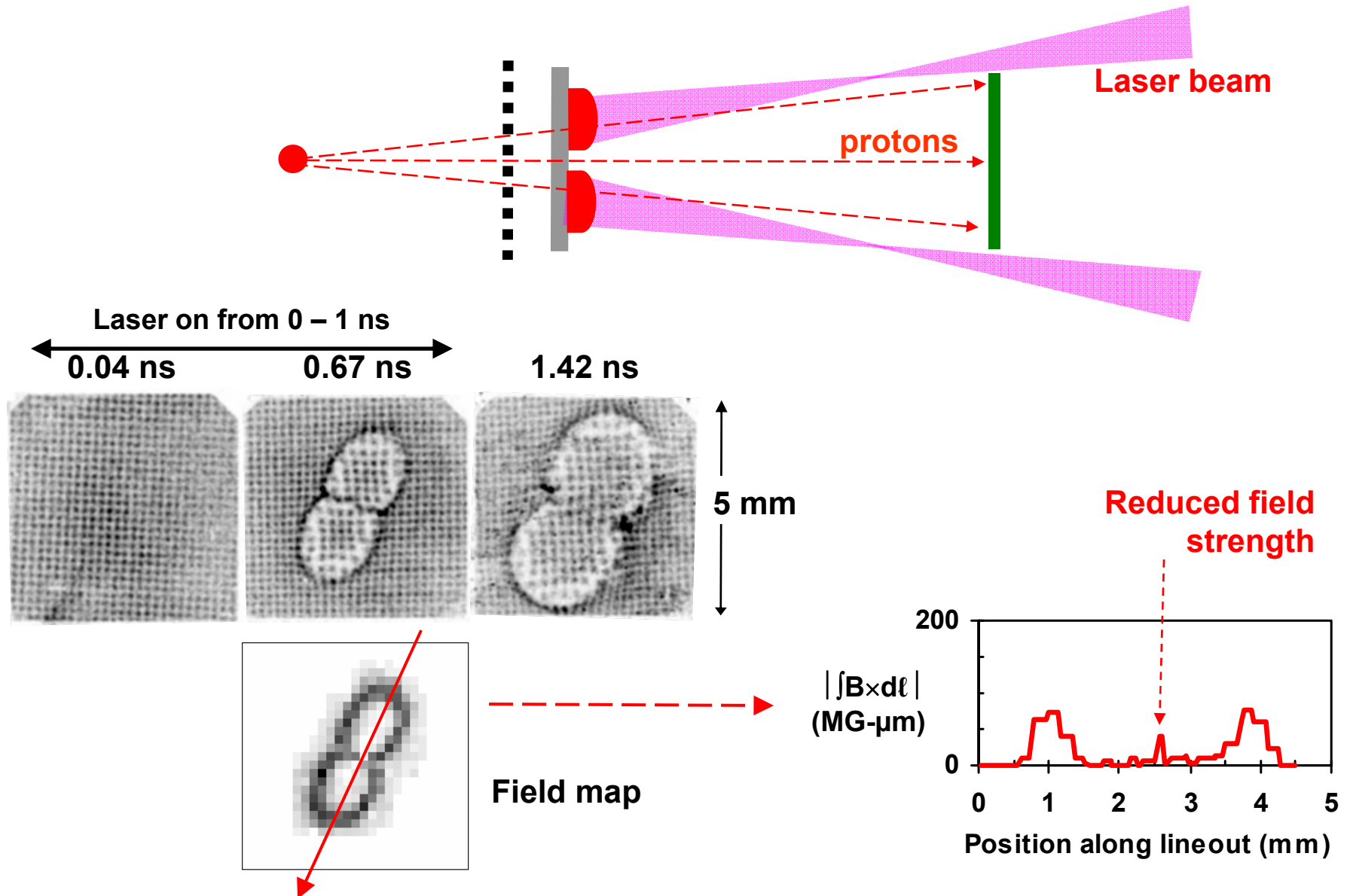
Inferred radial profiles of B and E



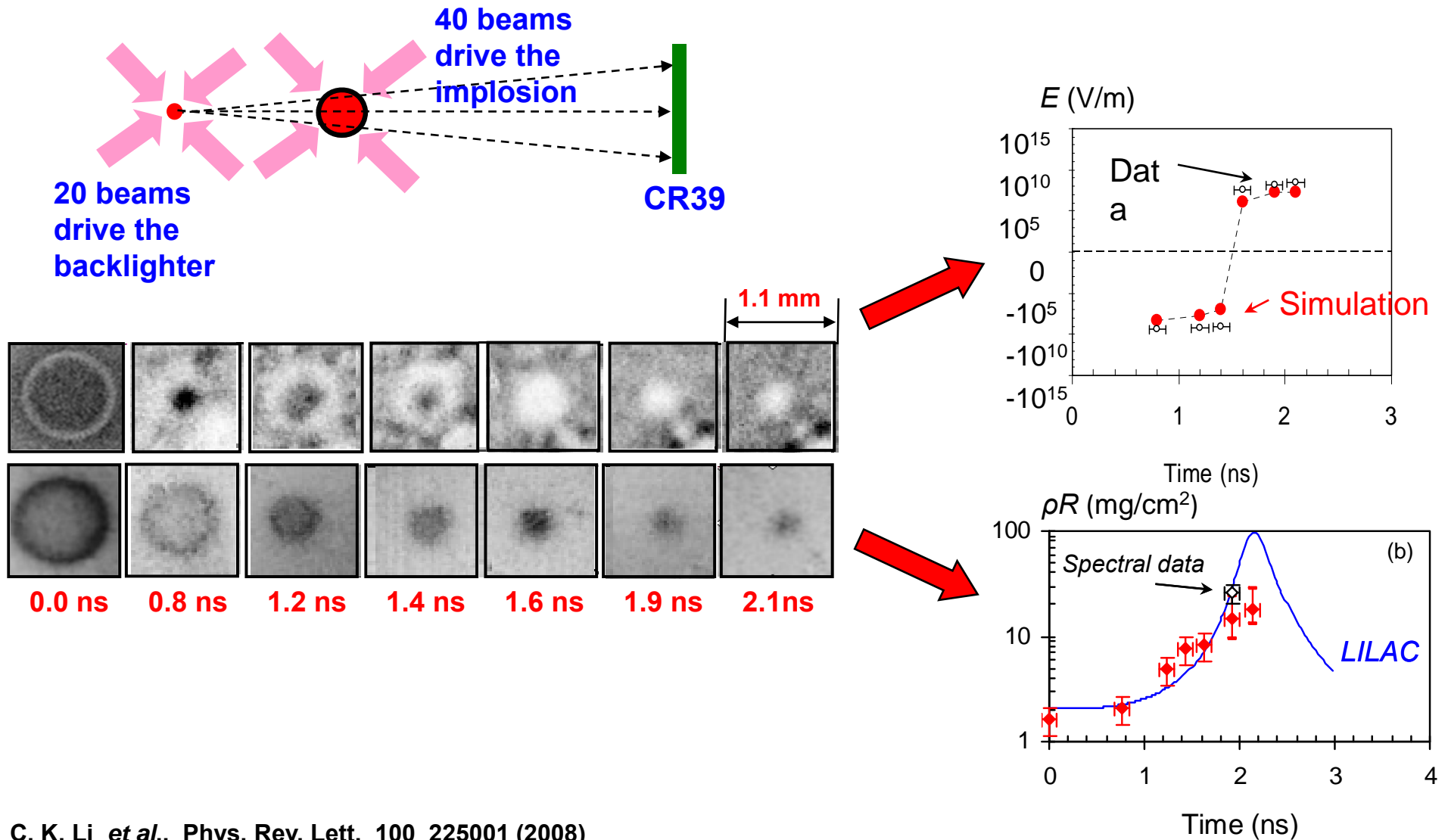
Pressure-driven, resistive MHD interchange instabilities occur in laser-generated plasma bubbles after the laser is off



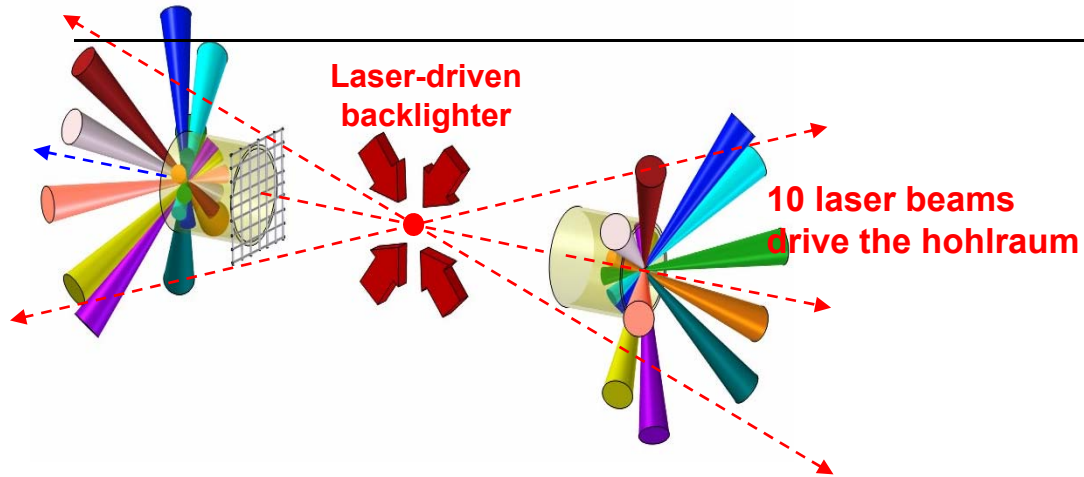
MG B-field reconnection has been observed and quantified at OMEGA with 14.7-MeV-proton radiography



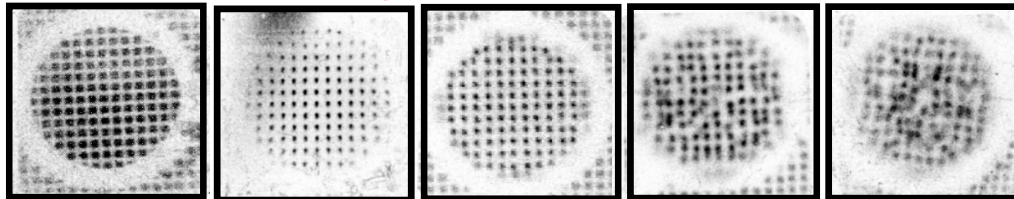
Proton radiographs of at different times provide the information of fields and capsule compressions



Proton radiography of laser-irradiated vacuum Au hohlraums at OMEGA reveal fields and hydrodynamic flows

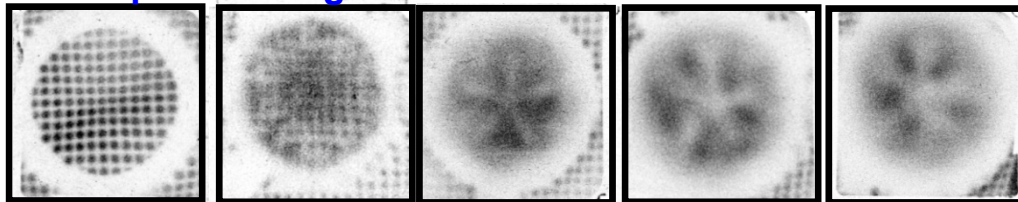


14.7-MeV proton images

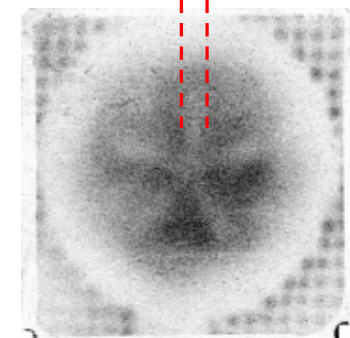
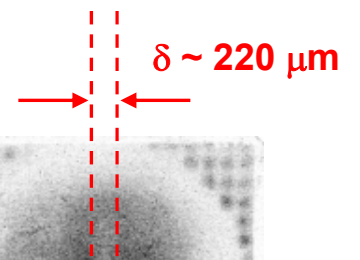
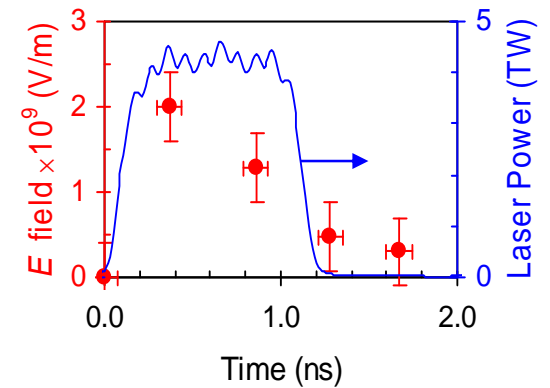


0.00 ns 0.37 ns 0.86 ns 1.28 ns 1.67 ns

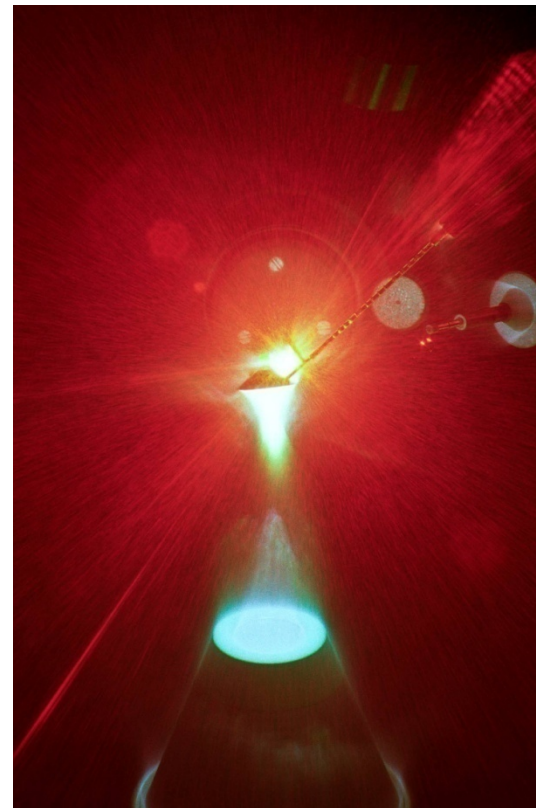
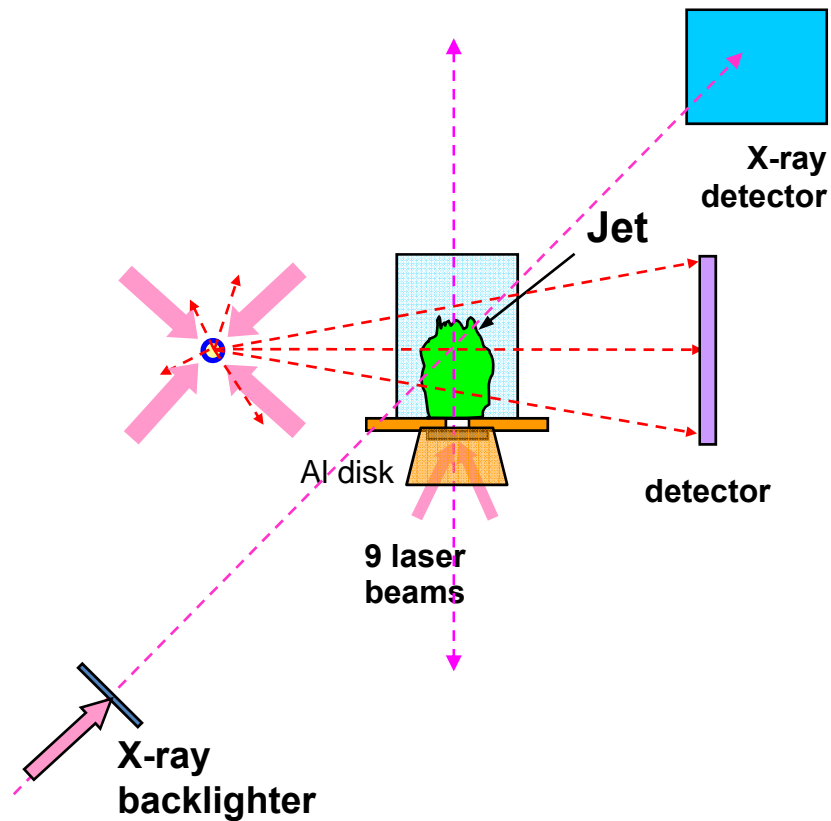
3-MeV proton images



0.00 ns 0.52 ns 1.01 ns 1.43 ns 1.82 ns



On 19 Feb. 09, MIT NLUF shots on OMEGA will be used to study scaled “astrophysical” jets



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