Publications and Conference Presentations

Publications

T. R. Boehly, D. Munro, P. M. Celliers, R. E. Olson, D. G. Hicks, V. N. Goncharov, G. W. Collins, H. F. Robey, S. X. Hu, J. A. Marozas, T. C. Sangster, O. L. Landen, and D. D. Meyerhofer, "Demonstration of the Shock-Timing Technique for Ignition Targets on the National Ignition Facility," Phys. Plasmas **16**, 056302 (2009) (invited).

X. L. Cross, X. Zheng, P. D. Cunningham, L. M. Hayden, Š. Chromik, M. Sojkova, V. Štrbík, P. Odier, and R. Sobolewski, "Pulsed-THz Characterization of Hg-Based, High-Temperature Superconductors," IEEE Trans. Appl. Supercond. **19**, 3614 (2009).

V. N. Goncharov, "Ablative Richtmyer-Meshkov Instability: Theory and Experimental Results," in *Laser-Plasma Interactions*, Scottish Graduate Series, edited by D. A. Jaroszynski, R. Bingham, and R. A. Cairns (CRC Press, Boca Raton, FL, 2009), pp. 419–427.

V. N. Goncharov, "Direct-Drive Inertial Fusion: Basic Concepts and Ignition Target Designing," in *Laser-Plasma Interactions*, Scottish Graduate Series, edited by D. A. Jaroszynski, R. Bingham, and R. A. Cairns (CRC Press, Boca Raton, FL, 2009), pp. 409–418.

O. V. Gotchev, J. P. Knauer, P. Y. Chang, N. W. Jang, M. J. Shoup III, D. D. Meyerhofer, and R. Betti, "Seeding Magnetic Fields for Laser-Driven Flux Compression in High-Energy-Density Plasmas," Rev. Sci. Instrum. **80**, 043504 (2009).

Z. Jiang and J. R. Marciante, "Comments on 'Beam Quality Factor of Higher Order Modes in a Step-Index Fiber,'" J. Lightwave Technol. **27**, 1236 (2009).

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F. J. Marshall, P. W. McKenty, J. A. Delettrez, R. Epstein, J. P. Knauer, V. A. Smalyuk, J. A. Frenje, C. K. Li, R. D. Petrasso, F. H. Séguin, and R. C. Mancini, "Plasma-Density Determination from X-Ray Radiography of Laser-Driven Spherical Implosions," Phys. Rev. Lett. **102**, 185004 (2009).

C. Miao, S. N. Shafrir, J. C. Lambropoulos, J. Mici, and S. D. Jacobs, "Shear Stress in Magnetorheological Finishing for Glasses," Appl. Opt. **48**, 2585 (2009).

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G. P. Pepe, D. Pan, V. Pagliarulo, L. Parlato, N. Marrocco, C. De Lisio, G. Peluso, A. Barone, U. Scotti di Uccio, A. Casaburi, F. Tafuri, M. Khafizov, T. Taneda, and R. Sobolewski, "Ultrafast Photoresponse of Superconductor/Ferromagnet Nano-Layered Hybrids," IEEE Trans. Appl. Supercond. **19**, 376 (2009).

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B. Yaakobi, and R. C. Mancini, "Al 1*s*–2*p* Absorption Spectroscopy of Shock-Wave Heating and Compression in Laser-Driven Planar Foil," Phys. Plasmas **16**, 052702 (2009).

J. E. Schoenly, W. Seka, and P. Rechmann, "Laser Ablation of Dental Calculus at 400 nm Using a Ti:Sapphire Laser," in *Lasers in Dentistry XV*, edited by R. Rechmann and D. Fried (SPIE, Bellingham, WA, 2009), Vol. 7162, Paper 71620E.

W. Seka, D. H. Edgell, J. A. Myatt, A. V. Maximov, R. W. Short, V. N. Goncharov, and H. A. Baldis, "Two-Plasmon-Decay Instability in Direct-Drive Inertial Confinement Fusion Experiments," Phys. Plasmas **16**, 052701 (2009).

V. A. Smalyuk, R. Betti, T. R. Boehly, R. S. Craxton, J. A. Delettrez, D. H. Edgell, V. Yu. Glebov, V. N. Goncharov, D. R. Harding, S. X. Hu, J. P. Knauer, F. J. Marshall, R. L. McCrory, P. W. McKenty, D. D. Meyerhofer, P. B. Radha, S. P. Regan, T. C. Sangster, W. Seka, R. W. Short, D. Shvarts, S. Skupsky, J. M. Soures, C. Stoeckl, B. Yaakobi, J. A. Frenje, C. K. Li, R. D. Petrasso, and F. H. Séguin, "Cryogenic-Target Performance and Implosion Physics Studies on OMEGA," Phys. Plasmas **16**, 056301 (2009) (invited).

A. A. Solodov, K. S. Anderson, R. Betti, V. Gotcheva, J. Myatt, J. A. Delettrez, S. Skupsky, W. Theobald, and C. Stoeckl, "Integrated Simulations of Implosion, Electron Transport, and Heating for Direct-Drive Fast-Ignition Targets," Phys. Plasmas **16**, 056309 (2009).

M. Storm, A. A. Solodov, J. F. Myatt, D. D. Meyerhofer, C. Stoeckl, C. Mileham, R. Betti, P. M. Nilson, T. C. Sangster, W. Theobald, and C. Guo, "High-Current, Relativistic Electron-Beam Transport in Metals and the Role of Magnetic Collimation," Phys. Rev. Lett. **102**, 235004 (2009).

L. Sun, S. Jiang, J. D. Zuegel, and J. R. Marciante, "Effective Verdet Constant in a Terbium-Doped-Core Phosphate Fiber," Opt. Lett. **34**, 1699 (2009).

I. A. Walmsley and C. Dorrer, "Characterization of Ultrashort Electromagnetic Pulses," Adv. Opt. Photon. **1**, 308 (2009).

L. Zeng, F. Yan, S. K.-H. Wei, S. W. Culligan, and S. H. Chen, "Synthesis and Processing of Monodisperse Oligo(fluorene-*co*-bithiophene)s into Oriented Films by Thermal and Solvent Annealing," Adv. Funct. Mater. **19**, 1978 (2009).

J. D. Zuegel, S.-W. Bahk, J. Bromage, C. Dorrer, R. Earley, T. J. Kessler, B. J. Kruschwitz, S. F. B. Morse, D. N. Maywar, J. B. Oliver, J. Qiao, A. L. Rigatti, A. W. Schmid, M. J. Shoup III, L. J. Waxer, and J. H. Kelly, "Novel Laser and Diagnostic Technologies for the OMEGA EP High-Energy Petawatt Laser," Rev. Laser Eng. **37**, 437 (2009).

Forthcoming Publications

A. Belousov, S. Katrych, J. Jun, J. Karpinski, B. Batlogg, D. Günther, J. Zhang, and R. Sobolewski, "Bulk Single-Crystal Growth of the Ternary $Al_xGa_{1-x}N$ from Solution in Gallium Under High Pressure," to be published in Applied Physics Letters.

J. Bromage, C. Dorrer, J. R. Marciante, M. J. Shoup III, and J. D. Zuegel, "Modal Measurement of a Large-Mode-Area Photonic-Crystal Fiber Amplifier Using Spatially Resolved Spectral Interferometry," to be published in Solid-State Diode Laser Technology Review.

B. Ciftcioglu, L. Zhang, J. Zhang, J. R. Marciante, J. Zuegel, R. Sobolewski, and H. Wu, "Integrated Silicon PIN Photodiodes Using Deep N-Well in a Standard 0.18-μm CMOS Technology," to be published in the Journal of Lightwave Technology.

W. R. Donaldson, J. R. Marciante, and R. G. Roides, "An Optical Replicator for Single-Shot Measurements at 10 GHz with a Dynamic Range of 1800:1," to be published in the IEEE Journal of Quantum Electronics.

C. Dorrer, "High-Damage-Threshold Beam Shaping Using Binary Phase Plates," to be published in Optics Letters.

E. Glowacki, C. W. Ching, and K. L. Marshall, "Photoswitchable Gas Permeation Membranes Based on Azobenzene-Doped Liquid Crystals," to be published in Optics and Photonics (invited).

G. Guarino, W. R. Donaldson, M. Mikulics, M. Marso, P. Kordoš, and R. Sobolewski, "Finite Element Simulation of Metal–Semiconductor–Metal Photodetector," to be published in Solid-State Electronics.

S. X. Hu, L. A. Collins, and B. I. Schneider, "Attosecond Photoelectron Microscopy of H_2^+," to be published in Physical Review A.

I. V. Igumenshchev, F. J. Marshall, J. A. Marozas, V. A. Smalyuk, R. Epstein, V. N. Goncharov, T. J. B. Collins, T. C. Sangster, and S. Skupsky, "The Effects of Target Mounts in Direct-Drive Implosions on OMEGA," to be published in Physics of Plasmas.

J. Kitaygorsky, R. Shouten, S. Dorenbos, E. Reiger, V. Zwiller, and R. Sobolewski, "Resolving Dark Pulses from Photon Pulses in NbN Superconducting Single-Photon Detectors," to be published in the Journal of Modern Optics.

C. Miao, J. C. Lambropoulos, S. N. Shafrir, H. Romanofsky, and S. D. Jacobs, "Contributions of Nanodiamond Abrasives and Deionized Water in Magnetorheological Finishing of Aluminum Oxynitride," to be published in Optical Manufacturing and Testing VIII.

C. Miao, S. N. Shafrir, J. C. Lambropoulos, and S. D. Jacobs, "Normal Force and Drag Force in Magnetorheological Finishing," to be published in Optical Manufacturing and Testing VIII.

A. V. Okishev, D. Westerfeld, L. Shterengas, and G. Belenky, "A Stable Mid-IR, GaSb-Based Diode Laser Source for Cryogenic Target Handling at the Omega Laser Facility," to be published in Optics Express.

G. P. Pepe, L. Parlato, N. Marrocco, V. Pagliarulo, G. Peluso, A. Barone, F. Tafuri, U. Scotti di Uccio, F. Miletto, M. Radovic, D. Pan, and R. Sobolewski, "Novel Superconducting Proximized Heterostructures for Ultrafast Photodetection," to be published in Cryogenics.

S. P. Regan, "Applied Plasma Spectroscopy I: Laser-Fusion Experiments," to be published in High Energy Density Physics.

J. Sanz, R. Betti, V. A. Smalyuk, M. Olazabal-Loume, V. Drean, V. Tikhonchuk, X. Ribeyre, and J. Feugeas, "Radiation Hydrodynamic Theory of Double Ablation Fronts in Direct-Drive Inertial Confinement Fusion," to be published in Physics of Plasmas.

S. N. Shafrir, H. J. Romanofsky, M. Skarlinski, M. Wang, C. Miao, S. Salzman, T. Chartier, J. Mici, J. C. Lambropoulos, R. Shen, H. Yang, and S. D. Jacobs, "Zirconia Coated Carbonyl Iron Particle-Based Magnetorheological Fluid for Polishing Optical Glasses and Ceramics," to be published in Optical Manufacturing and Testing VIII.

W. Theobald, K. S. Anderson, R. Betti, R. S. Craxton, J. A. Delettrez, J. A. Frenje, V. Yu. Glebov, O. V. Gotchev, J. H. Kelly, C. K. Li, A. J. Mackinnon, F. J. Marshall, R. L. McCrory, D. D. Meyerhofer, J. F. Myatt, P. A. Norreys, P. M. Nilson, P. K. Patel, R. D. Petrasso, P. B. Radha, C. Ren, T. C. Sangster, W. Seka, V. A. Smalyuk, A. A. Solodov, R. B. Stephens, C. Stoeckl, and B. Yaakobi, "Advanced-Ignition-Concept Exploration on OMEGA," to be published in Plasma Physics and Controlled Fusion.

W. Theobald, C. Stoeckl, P. A. Jaanimagi, P. M. Nilson, M. Storm, D. D. Meyerhofer, T. C. Sangster, D. Hey, A. J. MacKinnon, H.-S. Park, P. K. Patel, R. Shepherd, R. A. Snavely, M. H. Key, J. A. King, B. Zhang, R. B. Stephens, K. U. Akli, K. Highbarger, R. L. Daskalova, L. Van Woerkom, R. R. Freeman, J. S. Green, G. Gregori, K. Lancaster, and P. A. Norreys, "A Dual-Channel, Curved-Crystal Spectrograph for Petawatt-Laser, X-Ray Backlighter Source Studies," to be published in Review of Scientific Instruments.

Conference Presentations

The following presentations were made at OMEGA Laser Facility Users' Group Workshop, Rochester, NY, 29 April–1 May 2009:

M. A. Barrios, D. E. Fratanduono, T. R. Boehly, D. D. Meyerhofer, D. G. Hicks, P. M. Celliers, and J. H. Eggert, "Precision Equation of State (EOS) Measurements Using Laser-Driven Shock Waves on the OMEGA Laser."

D. E. Fratanduono, M. A. Barrios, T. R. Boehly, D. D. Meyerhofer, J. Eggert, R. Smith, D. G. Hicks, and G. Collins, "Measurements of Strain-Induced Refractive Index Changes in Shocked LiF Using Laser-Driven Flyer Plates."

O. V. Gotchev, R. Betti, P. Y. Chang, J. P. Knauer, O. Polomarov, D. D. Meyerhofer, J. A. Frenje, C. K. Li, M. Manuel, R. D. Petrasso, and F. H. Séguin, "Embedding Strong External Magnetic Fields in OMEGA Implosions—An Experimental Reality with Applications to Fusion, Exotic Plasma States, and More. The Designer and Use Perspectives."

J. Hager, V. A. Smalyuk, I. V. Igumenshchev, D. D. Meyerhofer, and T. C. Sangster, "First Rayleigh–Taylor and Richtmyer–Meshkov Instability Measurements in Laser-Driven Planar Targets on the OMEGA EP Laser."

D. R. Harding and M. J. Bonino, "Target Fabrication: Capabilities and the Ordering Process."

S. F. B. Morse, "Omega Facility: Status and Performance."

P. M. Nilson, W. Theobald, J. F. Myatt, C. Stoeckl, P. A. Jaanimagi, J. A. Delettrez, B. Yaakobi, J. D. Zuegel, R. Betti, D. D. Meyerhofer, T. C. Sangster, P. K. Patel, A. J. Mackinnon, and K. Akli, "Characterization and Optimization of Fast-Electron Sources Using Intense, Multi-kJ Pulses on OMEGA EP."

G. Pien, "Engineering Support and Qualification Process for Interfacing New Experiments."

C. Ren, G. Li, R. Yan, J. Tonge, and W. B. Mori, "Simulations of Laser Channeling in Millimeter-Scale Underdense Plasmas for Fast Ignition."

T. C. Sangster, "Diagnostic Status on OMEGA EP."

C. Stoeckl, "Status of OMEGA EP, an Experimentalist's Perspective."

W. Theobald, K. S. Anderson, R. Betti, R. S. Craxton, J. A. Delettrez, J. A. Frenje, V. Yu. Glebov, O. V. Gotchev, A. J. Mackinnon, F. J. Marshall, R. L. McCrory, D. D. Meyerhofer, J. F. Myatt, P. A. Norreys, P. M. Nilson, P. K. Patel, R. D. Petrasso, P. B. Radha, C. Ren, T. C. Sangster, A. A. Solodov, R. B. Stephens, C. Stoeckl, M. Storm, and C. D. Zhou, "Status of Integrated Fast- and Shock-Ignition Experiments on OMEGA."

K. A. Thorp, "OMEGA Properties and Capabilities."

The following presentations were made at the Second International Conference on High Energy Density Physics, Austin, TX, 19–22 May 2009:

V. N. Goncharov, T. C. Sangster, T. R. Boehly, R. L. McCrory, D. D. Meyerhofer, P. B. Radha, V. A. Smalyuk, S. Skupsky, J. A. Frenje, and R. D. Petrasso, "Multiple-Picket, Low-Adiabat Cryogenic Fuel Compression on OMEGA."

W. Theobald, K. S. Anderson, R. Betti, R. S. Craxton, J. A. Delettrez, B. Eichman, V. Yu. Glebov, O. V. Gotchev, S. Ivancic, F. J. Marshall, R. L. McCrory, D. D. Meyerhofer, J. F. Myatt, P. M. Nilson, P. B. Radha, C. Ren, T. C. Sangster, A. A. Solodov, C. Stoeckl, M. Storm, C. D. Zhou, J. D. Zuegel, J. A. Frenje, R. D. Petrasso, P. A. Norreys, V. M. Ovchinnikov, F. F. Freeman, L. Van Woerkom, D. Hey, M. H. Key, A. J. MacKinnon, P. K. Patel, K. Akli, R. B. Stephens, and R. Lauck, "Integrated Fast- and Shock-Ignition Experiments on OMEGA. "

The following presentations were made at CLEO/IQEC 2009, Baltimore, MD, 31 May–5 June 2009:

S.-W. Bahk and J. D. Zuegel, "A High-Resolution Amplitude and Wavefront Control System Based on a Direct Zonal Closed-Loop Approach."

I. A. Begishev, A. V. Okishev, R. G. Roides, and J. D. Zuegel, "All-Fiber Discrete Arbitrary Picket-Pulse Shaping."

J. Bromage, C. Dorrer, M. J. Shoup III, and J. D. Zuegel, "Optimizing Injection into Large-Mode-Area Photonic Crystal-Fiber Amplifiers by Spatially Resolved Spectral Interferometry."

C. Dorrer, "Near-Field Intensity Shaping with Binary Phase Plates."

C. Dorrer, "Statistical Analysis of Incoherent Pulse Shaping."

C. Dorrer and J. Bromage, "Simple High-Sensitivity, Electro-Optic Sagnac Spectral Shearing Interferometry for Short Optical Pulse Characterization."

J. R. Marciante and R. G. Roides, "Mode Control in Large-Mode-Area Fiber Lasers Via Gain Filtering."

W. Yang and C. Dorrer, "Ultrafast Pulse Characterization of Semiconductor Single-Section Fabry–Perot Mode-Locked Lasers."

The following presentations were made at ICOPS/SOFE 2009, San Diego, CA, 31 May–5 June 2009:

D. R. Harding, D. H. Edgell, L. M. Elasky, R. Q. Gram, T. B. Jones, S. J. Verbridge, A. J. Weaver, and M. D. Wittman, "Cryogenic Targets for Inertial Confinement Fusion Experiments and Future Fusion-Energy Applications."

W. T. Shmayda, G. Wainwright, and R. Janezic, "Cryogenic Tritium Operations at OMEGA."

The following presentations were made at the 39th Anomalous Absorption Conference, Bodega Bay, CA, 14–19 June 2009:

D. DuBois, D. Russell, H. Vu, and J. Myatt, "1/2 ω_0 Emission from the Nonlinear Currents Generated by the Two Plasmon Decay Instability."

D. H. Edgell, W. Seka, V. N. Goncharov, I. V. Igumenshchev, R. S. Craxton, J. A. Delettrez, J. F. Myatt, A. V. Maximov, R. W. Short, R. E. Bahr, "Time-Dependent Scattered-Light Spectroscopy in Direct-Drive-Implosion Experiments."

A. V. Maximov, J. F. Myatt, R. W. Short, W. Seka, J. A. Delettrez, and C. Stoeckl, "Modeling of Two-Plasmon-Decay Instability Under Crossed-Beam Irradiation."

J. F. Myatt, A. V. Maximov, R. W. Short, J. A. Delettrez, W. Seka, D. H. Edgell, D. F. DuBois, H. X. Vu, and D. A. Russell, "Extended Zakharov Modeling of the Two-Plasmon-Decay Instability in Inhomogeneous Direct-Drive ICF-Relevant Plasma."

D. Russell, D. DuBois, H. Vu, and J. Myatt, "3/2 ω_0 Emission from the LDI Langmuir Waves Excited in the Nonlinear Saturation of the Two Plasmon Decay Instability."

W. Seka, D. H. Edgell, J. F. Myatt, A. V. Maximov, R. W. Short, V. N. Goncharov, D. F. DuBois, H. X. Vu, D. A. Russell, and H. A. Baldis, "Two-Plasmon-Decay Instability Relevant to Direct-Drive Experiments."

R. W. Short, "Anistropy of Two-Plasmon Decay for Multiple Obliquely Incident Laser Beams."

H. Vu, D. DuBois, D. Russell, and J. Myatt, "Hot Electrons Production from the Two-Plasmon Decay Instability."

The following presentations were made at the 16th APS Topical Conference in Shock Compression of Condensed Matter, Nashville, TN, 28 June–3 July 2009:

M. A. Barrios, D. E. Fratanduono, T. R. Boehly, D. D. Meyerhofer, D. G. Hicks, P. M. Celliers, and J. H. Eggert, "High-Precision Measurements of the Equation of State (EOS) of Polymers at 100 to 1000 GPa Using Laser-Driven Shock Waves."

D. E. Fratanduono, M. A. Barrios, T. R. Boehly, D. D. Meyerhofer, R. Smith, J. H. Eggert, D. G. Hicks, P. M. Celliers, and G. W. Collins, "Measurements of Strain-Induced Refractive-Index Changes in Shocked LiF Using Laser-Driven Flyer Plates."

J. Bromage, C. Dorrer, J. R. Marciante, M. J. Shoup III, and J. D. Zuegel, "Modal Measurement of a Large-Mode-Area Photonic-Crystal Fiber Amplifier Using Spatially Resolved Spectral Interferometry," 22nd Annual Solid State and Diode Laser Technology Review, Newton, MA, 29 June–1 July 2009.

W. Theobald, K. S. Anderson, R. Betti, R. S. Craxton, J. A. Delettrez, J. A. Frenje, V. Yu. Glebov, O. V. Gotchev, J. H. Kelly, C. K. Li, A. J. Mackinnon, F. J. Marshall, R. L. McCrory, D. D. Meyerhofer, J. F. Myatt, P. A. Norreys, P. M. Nilson, P. K. Patel, R. D. Petrasso, P. B. Radha, C. Ren, T. C. Sangster, W. Seka, V. A. Smalyuk, A. A. Solodov, R. B. Stephens, C. Stoeckl, and B. Yaakobi, "Advanced-Ignition-Concept Exploration on OMEGA," 36th EPS Conference on Plasma Physics, Sofia, Bulgaria, 29 June–3 July 2009.