

Publications and Conference Presentations

Publications

- M. Bailly-Grandvaux, J. Kim, C. M. Krauland, S. Zhang, M. Dozières, M. S. Wei, W. Theobald, P. E. Grabowski, J. J. Santos, Ph. Nicolaï, P. McKenna, M. P. Desjarlais, and F. N. Beg, “Transport of kJ-Laser-Driven Relativistic Electron Beams in Cold and Shock-Heated Vitreous Carbon and Diamond,” *New J. Phys.* **22**, 033031 (2020).
- X. Bian, H. Aluie, D. Zhao, H. Zhang, and D. Livescu, “Revisiting the Late-Time Growth of Single-Mode Rayleigh–Taylor Instability and the Role of Vorticity,” *Physica D* **403**, 132250 (2020).
- S. Depierreux, C. Neuville, V. Tassin, M.-C. Monteil, P.-E. Masson-Laborde, C. Baccou, P. Fremerye, F. Philippe, P. Seytor, D. Teychenné, J. Katz, R. Bahr, M. Casanova, N. Borisenko, L. Borisenko, A. Orekhov, A. Colaitis, A. Debayle, G. Duchateau, A. Heron, S. Huller, P. Loiseau, P. Nicolai, C. Riconda, G. Tran, C. Stoeckl, W. Seka, V. Tikhonchuk, D. Pesme, and C. Lobaune, “Experimental Investigation of the Collective Stimulated Brillouin and Raman Scattering of Multiple Laser Beams in Inertial Confinement Fusion Experiments,” *Plasma Phys. Control. Fusion* **62**, 014024 (2020).
- C. Dorrer, E. M. Hill, and J. D. Zuegel, “High-Energy Parametric Amplification of Spectrally Incoherent Broadband Pulses,” *Opt. Express* **28**, 451 (2020).
- M. Dozières, S. Hansen, P. Forestier-Colleoni, C. McGuffey, D. Kawahito, M. Bailly-Grandvaux, K. Bhutwala, C. M. Krauland, M. S. Wei, P. Gourdain, J. R. Davies, K. Matsuo, S. Fujioka, E. M. Campbell, J. L. Peebles, J. J. Santos, D. Batani, S. Zhang, and F. N. Beg, “Characterization of an Imploding Cylindrical Plasma for Electron Transport Studies Using X-Ray Emission Spectroscopy,” *Phys. Plasmas* **27**, 023302 (2020).
- M. Gatu Johnson, P. J. Adrian, K. S. Anderson, B. D. Appelbe, J. P. Chittenden, A. J. Crilly, D. Edgell, C. J. Forrest, J. A. Frenje, V. Yu. Glebov, B. M. Haines, I. Igumenshchev, D. Jacobs-Perkins, R. Janezic, N. V. Kabadi, J. P. Knauer, B. Lahmann, O. M. Mannion, F. J. Marshall, T. Michel, F. H. Séguin, R. Shah, C. Stoeckl, C. A. Walsh, and R. D. Petrasso, “Impact of Stalk on Directly Driven Inertial Confinement Fusion Implosions,” *Phys. Plasmas* **27**, 032704 (2020).
- M. J. Guardalben, M. Barczys, B. E. Kruschwitz, M. Spilatro, L. J. Waxer, and E. M. Hill, “Laser-System Model for Enhanced Operational Performance and Flexibility on OMEGA EP,” *High Power Laser Sci. Eng.* **8**, e8 (2020).
- B. M. Haines, R. C. Shah, J. M. Smidt, B. J. Albright, T. Cardenas, M. R. Douglas, C. Forrest, V. Yu. Glebov, M. A. Gunderson, C. E. Hamilton, K. C. Henderson, Y. Kim, M. N. Lee, T. J. Murphy, J. A. Oertel, R. E. Olson, B. M. Patterson, R. B. Randolph, and D. W. Schmidt, “Observation of Persistent Species Temperature Separation in Inertial Confinement Fusion Mixtures,” *Nat. Commun.* **11**, 544 (2020).
- K. D. Humbird, J. L. Peterson, B. K. Spears, and R. G. McClaren, “Transfer Learning to Model Inertial Confinement Fusion Experiments,” *IEEE Trans. Plasma Sci.* **48**, 61 (2020).
- V. V. Ivanov, A. V. Maximov, A. L. Astanovitskiy, I. A. Begishev, R. Betti, J. R. Davies, C. Mileham, J. D. Moody, C. Stoeckl, K. J. Swanson, N. L. Wong, and J. Bromage, “Study of Laser-Driven Magnetic Fields with a Continuous Wave Faraday Rotation Diagnostic,” *Phys. Plasmas* **27**, 033102 (2020).
- T. Z. Kosc, H. Huang, T. J. Kessler, A. Maltsev, and S. G. Demos, “Measurement of the Angular Dependence of the Spontaneous Raman Scattering in Anisotropic Crystalline Materials Using Spherical Samples: Potassium Dihydrogen Phosphate as a Case Example,” *Rev. Sci. Instrum.* **91**, 015101 (2020).
- N. S. Krasheninnikova, M. J. Schmitt, K. Molvig, S. C. Hsu, B. S. Scheiner, D. W. Schmidt, V. Geppert-Kleinrath, P. W. McKenty, D. T. Michel, D. H. Edgell, F. J. Marshall, and H. Huang, “Development of a Directly Driven Multi-Shell Platform: Laser Drive Energetics,” *Phys. Plasmas* **27**, 022706 (2020).

- L. S. Leal, A. V. Maximov, R. Betti, A. B. Sefkow, and V. V. Ivanov, "Modeling Magnetic Confinement of Laser-Generated Plasma in Cylindrical Geometry Leading to Disk-Shaped Structures," *Phys. Plasmas* **27**, 022116 (2020).
- J. Li, S. Zhang, C. M. Krauland, H. Wen, F. N. Beg, C. Ren, and M. S. Wei, "Pump Depletion and Hot-Electron Generation in Long-Density-Scale-Length Plasma with Shock-Ignition High-Intensity Laser," *Phys. Rev. E* **101**, 033206 (2020).
- Y. Lu, S. Li, H. Li, K. A. Flippo., D. Barnak, A. Birkel, B. Lahmann, C. K. Li, A. M. Rasmus, K. Kelso, A. Zylstra, E. Liang, P. Tzeferacos, and D. Lamb, "Modeling Hydrodynamics, Magnetic Fields, and Synthetic Radiographs for High-Energy-Density Plasma Flows in Shock-Shear Targets," *Phys. Plasmas* **27**, 012303 (2020).
- K. Luo, V. V. Karasiev, and S. B. Trickey, "Towards Accurate Orbital-Free Simulations: A Generalized Gradient Approximation for the Noninteracting Free Energy Density Functional," *Phys. Rev. B* **101**, 075116 (2020).
- S. MacNally, C. Smith, J. Spaulding, J. Foster, and J. B. Oliver, "Glancing-Angle-Deposited Silica Films for Ultraviolet Wave Plates," *Appl. Opt.* **59**, A155 (2020).
- A. L. Milder, H. P. Le, M. Sherlock, P. Franke, J. Katz, S. T. Ivancic, J. L. Shaw, J. P. Palastro, A. M. Hansen, I. A. Begishev, W. Rozmus, and D. H. Froula, "Evolution of the Electron Distribution Function in the Presence of Inverse Bremsstrahlung Heating and Collisional Ionization," *Phys. Rev. Lett.* **124**, 025001 (2020).
- M. Millot, S. Zhang, D. E. Fratanduono, F. Coppari, S. Hamel, B. Militzer, D. Simonova, S. Shcheka, N. Dubrovinskaia, L. Dubrovinsky, and J. H. Eggert, "Recreating Giants Impacts in the Laboratory: Shock Compression of MgSiO₃ Bridgmanite to 14 Mbar," *Geophys. Res. Lett.* **47**, e2019GL085476 (2020).
- J. Nilsen, A. L. Kritcher, M. E. Martin, R. E. Tipton, H. D. Whitley, D. C. Swift, T. Döppner, B. L. Bachmann, A. E. Lazicki, N. B. Kostinski, B. R. Maddox, G. W. Collins, S. H. Glenzer, and R. W. Falcone, "Understanding the Effects of Radiative Preheat and Self-Emission from Shock Heating on Equation of State Measurement at 100s of Mbar Using Spherically Converging Shock Waves in a NIF Hohlraum," *Matter Radiat. Extremes* **5**, 018401 (2020).
- J. B. Oliver, A. L. Rigatti, T. Noll, J. Spaulding, J. Hettrick, V. Gruschow, G. Mitchell, D. Sadowski, C. Smith, and B. Charles, "Large-Aperture Coatings for Fusion-Class Laser Systems," *Appl. Opt.* **59**, A7 (2020).
- J. B. Oliver, J. Spaulding, and B. Charles, "Stress Compensation by Deposition of a Nonuniform Corrective Coating," *Appl. Opt.* **59**, A54 (2020).
- J. P. Palastro, J. L. Shaw, P. Franke, D. Ramsey, T. T. Simpson, and D. H. Froula, "Dephasingless Laser Wakefield Acceleration," *Phys. Rev. Lett.* **124**, 134802 (2020).
- V. A. Smalyuk, C. R. Weber, O. L. Landen, S. Ali, B. Bachmann, P. M. Celliers, E. L. Dewald, A. Fernandez, B. A. Hammel, G. Hall, A. G. MacPhee, L. Pickworth, H. F. Robey, N. Alfonso, K. L. Baker, L. F. Berzak Hopkins, L. Carlson, D. T. Casey, D. S. Clark, J. Crippen, L. Divol, T. Döppner, M. J. Edwards, M. Farrell, S. Felker, J. E. Field, S. W. Haan, A. V. Hamza, M. Havre, M. C. Herrmann, W. W. Hsing, S. Khan, J. Kline, J. J. Kroll, S. LePape, E. Loomis, B. J. MacGowan, D. Martinez, L. Masse, M. Mauldin, J. L. Milovich, A. S. Moore, A. Nikroo, A. Pak, P. K. Patel, J. L. Peterson, K. Raman, B. A. Remington, N. Rice, M. Schoff, and M. Stadermann, "Review of Hydrodynamic Instability Experiments in Inertially Confined Fusion Implosions on National Ignition Facility," *Plasma Phys. Control. Fusion* **62**, 014007 (2020).
- C. Smith, S. MacNally, and J. B. Oliver, "Ellipsometric Modeling of Serially Bi-Deposited Glancing-Angle-Deposition Coatings," *Appl. Opt.* **59**, A26 (2020).
- W. Theobald, C. Sorce, W. R. Donaldson, R. Epstein, R. L. Keck, C. Kellogg, T. J. Kessler, J. Kwiatkowski, F. J. Marshall, S. Sampat, W. Seka, R. C. Shah, A. Shvydky, C. Stoeckl, L. J. Waxer, and S. P. Regan, "Inferred UV Fluence Focal-Spot Profiles from Soft X-Ray Pinhole-Camera Measurements on OMEGA," *Rev. Sci. Instrum.* **91**, 023505 (2020).
- D. Turnbull, A. Colaitis, A. M. Hansen, A. L. Milder, J. P. Palastro, J. Katz, C. Dorrer, B. E. Kruschwitz, D. J. Strozzi, and D. H. Froula, "Impact of the Langdon Effect on Crossed-Beam Energy Transfer," *Nat. Phys.* **16**, 181 (2020).
- M. P. Valdivia, D. Stutman, C. Stoeckl, C. Mileham, J. Zou, S. Muller, K. Kaiser, C. Sorce, P. A. Keitner, J. R. Fein, M. Trantham, R. P. Drake, and S. P. Regan, "Implementation of a Talbot-Lau X-Ray Deflectometer Diagnostic Platform for the OMEGA EP Laser," *Rev. Sci. Instrum.* **91**, 023511 (2020).

S. Zhang, C. M. Krauland, J. Peebles, J. Li, F. N. Beg, N. Alexander, W. Theobald, R. Betti, D. Haberberger, E. M. Campbell, R. Yan, E. Borwick, C. Ren, and M. S. Wei,

“Experimental Study of Hot Electron Generation in Shock Ignition Relevant High-Intensity Regime with Large Scale Hot Plasmas,” *Phys. Plasmas* **27**, 023111 (2020).

Forthcoming Publications

S. H. Cao, R. Yan, H. Wen, J. Li, and C. Ren, “Cogeneration of Hot Electrons from Multiple Laser–Plasma Instabilities,” to be published in *Physical Review E*.

B. Lahmann, F. J. Marshall, T. Michel, F. H. Séguin, C. Stoeckl, and R. D. Petrasso “3D xRAGE Simulation of Inertial Confinement Fusion Implosion with Imposed Mode 2 Laser Drive Asymmetry,” to be published in *High Energy Density Physics*.

L. Ceurvorst, R. Betti, A. Casner, V. Gopalaswamy, A. Bose, S. X. Hu, E. M. Campbell, S. P. Regan, C. A. McCoy, M. Karasik, J. Peebles, M. Tabak, and W. Theobald, “Hybrid Target Design for Imprint Mitigation in Direct-Drive Inertial Confinement Fusion,” to be published in *Physical Review E*.

B. M. Haines, D. E. Keller, J. A. Marozas, P. W. McKenty, K. S. Anderson, T. J. B. Collins, W. W. Dai, M. L. Hall, S. Jones, M. D. McKay Jr., R. M. Rauenzahn, and D. N. Woods, “Coupling Laser Physics to Radiation-Hydrodynamics,” to be published in *Computers and Fluids*.

L. E. Chen, A. F. A. Bott, P. Tzeferacos, A. Rigby, A. Bell, R. Bingham, C. Graziani, J. Katz, M. Koenig, C. K. Li, R. Petrasso, H.-S. Park, J. S. Ross, D. Ryu, T. G. White, B. Reville, J. Matthews, J. Meinecke, F. Miniati, E. G. Zweibel, S. Sarkar, A. A. Schekochihin, D. Q. Lamb, D. H. Froula, and G. Gregori, “Transport of High-Energy Charged Particles Through Spatially Intermittent Turbulent Magnetic Fields,” to be published in *The Astrophysical Journal*.

E. C. Hansen, J. R. Davies, D. H. Barnak, R. Betti, E. M. Campbell, V. Yu. Glebov, J. P. Knauer, L. S. Leal, J. L. Peebles, A. B. Sefkow, and K. M. Woo, “Neutron Yield Enhancement and Suppression by Magnetization in Laser-Driven Cylindrical Implosions,” to be published in *Physics of Plasmas* (invited).

A. R. Christopherson, R. Betti, S. Miller, V. Gopalaswamy, O. M. Mannion, and D. Cao, “Theory of Ignition and Burn Propagation in Inertial Fusion Implosions,” to be published in *Physics of Plasmas*.

S. X. Hu, V. V. Karasiev, V. Recoules, P. M. Nilson, N. Brouwer, and M. Torrent, “Interspecies Radiative Transition in Warm and Superdense Plasma Mixtures,” to be published in *Nature Communications*.

C. Fagan, M. Sharpe, W. T. Shmayda, and W. U. Schröder, “A Thin Alumina Film as a Tritium Adsorption Inhibitor for Stainless-Steel 316,” to be published in *Fusion Science and Technology*.

A. Kar, S. X. Hu, G. Duchateau, J. Carroll-Nellenback, and P. B. Radha, “Implementing a Microphysics Model in Hydrodynamic Simulations to Study the Initial Plasma Formation in Dielectric Ablator Materials for Direct-Drive Implosions,” to be published in *Physical Review E*.

R. K. Follett, J. G. Shaw, J. F. Myatt, D. H. Froula, and J. P. Palastro, “Multibeam Absolute Stimulated Raman Scattering and Two-Plasmon Decay,” to be published in *Physical Review E*.

O. M. Mannion, J. P. Knauer, V. Yu. Glebov, C. J. Forrest, A. Liu, Z. L. Mohamed, M. H. Romanofsky, T. C. Sangster, C. Stoeckl, and S. P. Regan, “A Suite of Neutron Time-of-Flight Detectors to Measure Hot-Spot Motion in Direct-Drive Inertial Confinement Fusion Experiments on OMEGA,” to be published in *Nuclear Instruments and Methods in Physics Research, A*.

W. Fox, D. B. Schaeffer, M. J. Rosenberg, G. Fiksel, J. Matteucci, H.-S. Park, A. F. A. Bott, K. Lezhnin, A. Bhattacharjee, D. Kalantar, B. A. Remington, D. Uzdensky, C. K. Li, F. H. Séguin, and S. X. Hu, “Fast Magnetic Reconnection in Highly Extended Current Sheets at the National Ignition Facility,” to be published in *Physics of Plasmas*.

D. I. Mihaylov, V. V. Karasiev, and S. X. Hu, “Thermal Hybrid Exchange-Correlation Density Functional for Improving the Description of Warm Dense Matter,” to be published in *Physical Review B*.

M. Gatu Johnson, B. M. Haines, P. J. Adrian, C. Forrest, J. A. Frenje, V. Yu. Glebov, W. Grimble, R. Janezic, J. P. Knauer,

H. G. Rinderknecht, D. T. Casey, R. Hatarik, R. M. Bionta, B. J. MacGowan, P. Patel, O. L. Landen, E. P. Hartouni, and O. A.

Hurricane, “Azimuthal Drive Asymmetry in Inertial Confinement Fusion Implosions on the National Ignition Facility,” to be published in *Physical Review Letters*

M. J. Rosenberg, A. A. Solodov, W. Seka, R. K. Follett, J. F. Myatt, A. V. Maximov, C. Ren, S. Cao, P. Michel, M. Hohenberger, J. P. Palastro, C. Goyon, T. Chapman, J. E. Ralph, J. D. Moody, R. H. H. Scott, K. Glize, and S. P. Regan, “Stimulated Raman Scattering Mechanisms and Scaling Behavior in Planar Direct-Drive Experiments at the National Ignition Facility,” to be published in *Physics of Plasmas*.

J. R. Rygg, R. F. Smith, A. E. Lazicki, D. G. Braun, D. E. Fratanduono, R. G. Kraus, J. M. McNaney, D. C. Swift, C. E. Wehrenberg, F. Coppari, M. F. Ahmed, M. A. Barrios, K. J. M. Blobaum, G. W. Collins, A. L. Cook, P. Di Nicola, E. G. Dzenitis, S. Gonzales, B. F. Heidl, M. Hohenberger, A. House, N. Izumi, D. H. Kalantar, S. F. Khan, T. R. Kohut, C. Kumar, N. D. Masters, D. N. Polsin, S. P. Regan, C. A. Smith, R. M. Vignes, M. A. Wall, J. Ward, J. S. Wark, T. L. Zobrist, A. Arsenlis, and J. H. Eggert, “X-Ray Diffraction at the National Ignition Facility,” to be published in *Review of Scientific Instruments*.

R. W. Short, “Absolute Stimulated Raman Side Scatter in Direct-Drive Laser-Produced Plasmas,” to be published in *Physics of Plasmas*.

R. Sobolewski, “Optical Detectors and Sensors,” to be published in the *Handbook of Superconducting Materials*.

A. A. Solodov, M. J. Rosenberg, W. Seka, J. F. Myatt, M. Hohenberger, R. Epstein, C. Stoeckl, R. W. Short, S. P. Regan, P. Michel, T. Chapman, R. K. Follett, J. P. Palastro, D. H. Froula, P. B. Radha, J. D. Moody, and V. N. Goncharov, “Hot-Electron Generation at Direct-Drive Ignition-Relevant Plasma Conditions at the National Ignition Facility,” to be published in *Physics of Plasmas*.

G. F. Swadling, C. Bruulsema, F. Fiuza, D. P. Higginson, C. M. Huntington, H.-S. Park, B. B. Pollock, W. Rozmus, H. G. Rinderknecht, J. Katz, A. Birkel, and J. S. Ross, “Measurement of Kinetic-Scale Current Filamentation Dynamics and Associated Magnetic Fields in Interpenetrating Plasmas,” to be published in *Physical Review Letters*.

S. Tochitsky, A. Pak, F. Fiuza, D. Haberberger, N. Lemos, A. Link, D. H. Froula, and C. Joshi, “Laser-Driven Collisionless Shock Acceleration of Ions from Near-Critical Plasmas,” to be published in *Physics of Plasmas*.

D. Turnbull, A. V. Maximov, D. H. Edgell, W. Seka, R. K. Follett, J. P. Palastro, D. Cao, V. N. Goncharov, C. Stoeckl, and D. H. Froula, “Anomalous Absorption by the Two-Plasmon-Decay Instability,” to be published in *Physical Review Letters*.

T. Walton, J. L. Sebold, I. E. Golovkin, J. J. MacFarlane, V. N. Golovkina, A. A. Solodov, P. M. Nilson, and R. Epstein, “Parameterizing Hot-Electron Energy Distributions for Tabular Emissivities and Opacities,” to be published in *High Energy Density Physics*.

K. M. Woo, R. Betti, O. M. Mannion, C. J. Forrest, J. P. Knauer, V. N. Goncharov, P. B. Radha, D. Patel, V. Gopalaswamy, and V. Yu. Glebov, “Inferring Thermal Ion Temperature and Residual Kinetic Energy from Nuclear Measurements in Inertial Confinement Fusion Implosions,” to be published in *Physics of Plasmas* (invited).

J. Zhang, R. Wei, M. El Kabbash, E. M. Campbell, and C. Guo, “Thin-Film Perfect Infrared Absorbers over Single- and Dual-Band Atmospheric Windows,” to be published in *Optics Letters*.

Y. Zhao and W. R. Donaldson, “Ultrafast UV AlGaIn Metal-Semiconductor-Metal Photodetector With a Response Time Below 25 ps,” to be published in the *IEEE Journal of Quantum Electronics*.

A. B. Zylstra, H. W. Hermann, Y. H. Kim, A. McEvoy, J. A. Frenje, M. Gatu Johnson, R. D. Petrasso, V. Yu. Glebov, C. Forrest, J. Delettrez, S. Gales, and M. Rubery, “ ${}^2\text{H}(p, \gamma){}^3\text{He}$ Cross Section Measurement Using High-Energy-Density Plasmas,” to be published in *Physical Review C*.

A. B. Zylstra, J. R. Rygg, G. W. Collins, C. K. Li, J. A. Frenje, R. D. Petrasso, S. R. Nagel, P. Fitzsimmons, and H. Reynolds, “Platform Development for dE/dx Measurements on Short-Pulse Laser Facilities,” to be published in *High Energy Density Physics*.

Conference Presentations

T. Z. Kosc, T. J. Kessler, H. Huang, and S. G. Demos, "Raman Polarizability Tensor in Potassium Dihydrogen Phosphate and Deuterated Potassium Dihydrogen Phosphate Crystals," presented at Photonics West 2020, San Francisco, CA, 1–6 February 2020.

M. K. Ginnane, D. N. Polsin, X. Gong, L. Crandall, T. R. Boehly, J. R. Rygg, G. W. Collins, A. Lazicki, R. Kraus, J. H. Eggert, M. C. Marshall, D. E. Fratanduono, J.-P. Davis, C. A. McCoy, C. Seagle, and S. Root, "X-Ray Diffraction of Platinum," presented at the NIF User Group, Livermore, CA, 3–5 February 2020.

The following presentations were made at the 60th Sanibel Symposium, St. Simons Island GA, 16–21 February 2020:

M. Ghosh, S. Zhang, and S. X. Hu, "Nanodiamond Formation in Hydrocarbons Under Extreme Pressure-Temperature Conditions-Evidence from First Principles."

V. V. Karasiev, J. Hinz, and S. X. Hu, "Characterization of the Liquid–Liquid Phase Transition in Dense Hydrogen: The Role of Accurate Exchange–Correlation and Nuclear Quantum Effects."

D. H. Froula, "Plasma Physics at the University of Rochester Laboratory for Laser Energetics," presented at the Office of Science, Rochester, NY, 24 February 2020.

J. L. Peebles, J. R. Davies, D. H. Barnak, T. Cracium, M. J. Bonino, and R. Betti, "Axial Proton Probing of Single and Double Plate Laser-Driven Coils," presented at the 2020 Stewardship Science Academic Programs Symposium, Washington, DC, 26–27 February 2020.

M. S. Wei, "OMEGA EP Experimental Capability: First-Year LaserNetUS Experiments and Future Plans," presented at the Laser-NetUS SAB and PI Meeting, Washington, DC, 3–4 March 2020.