Publications and Conference Presentations

Publications

K. S. Anderson, C. J. Forrest, O. M. Mannion, F. J. Marshall, R. C. Shah, D. T. Michel, J. A. Marozas, P. B. Radha, D. Edgell, R. Epstein, V. N. Goncharov, J. P. Knauer, M. Gatu Johnson, and S. Laffite, "Effect of Cross-Beam Energy Transfer on Target-Offset Asymmetry in Direct-Drive Inertial Confinement Fusion Implosions," Phys. Plasmas **27**, 112713 (2020).

D. H. Barnak, M. J. Bonino, P.-Y. Chang, J. R. Davies, E. C. Hansen, D. R. Harding, J. L. Peebles, and R. Betti, "Characterizing Laser Preheat for Laser-Driven Magnetized Liner Inertial Fusion Using Soft X-Ray Emission," Phys. Plasmas **27**, 112709 (2020).

E. M. Campbell, T. C. Sangster, V. N. Goncharov, J. D. Zuegel, S. F. B. Morse, C. Sorce, G. W. Collins, M. S. Wei, R. Betti, S. P. Regan, D. H. Froula, C. Dorrer, D. R. Harding, V. Gopalaswamy, J. P. Knauer, R. Shah, O. M. Mannion, J. A. Marozas, P. B. Radha, M. J. Rosenberg, T. J. B. Collins, A. R. Christopherson, A. A. Solodov, D. Cao, J. P. Palastro, R. K. Follett, and M. Farrell, "Direct-Drive Laser Fusion: Status, Plans and Future," Phil. Trans. R. Soc. A **379**, 2020011 (2020).

L. E. Crandall, J. R. Rygg, D. K. Spaulding, T. R. Boehly, S. Brygoo, P. M. Celliers, J. H. Eggert, D. E. Fratanduono, B. J. Henderson, M. F. Huff, R. Jeanloz, A. Lazicki, M. C. Marshall, D. N. Polsin, M. Zaghoo, M. Millot, and G. W. Collins, "Equation of State of CO_2 Shock Compressed to 1 TPa," Phys. Rev. Lett. **125**, 165701 (2020).

R. Epstein, R. C. Mancini, D. T. Cliche, R. C. Shah, T. J. B. Collins, C. Stoeckl, P. W. McKenty, P. B. Radha, S. P. Regan, and V. N. Goncharov, "Self-Radiography of Imploded Shells on OMEGA Based on Additive-Free Multi-Monochromatic Continuum Spectral Analysis," Phys. Plasmas **27**, 122709 (2020).

F. García-Rubio, R. Betti, J. Sanz, and H. Aluie, "Self-Consistent Theory of the Darrieus–Landau and Rayleigh–Taylor Instabilities with Self-Generated Magnetic Fields," Phys. Plasmas **27**, 112715 (2020).

P. E. Grabowski, S. B. Hansen, M. S. Murillo, L. G. Stanton, F. R. Graziani, A. B. Zylstra, S. D. Baalrud, P. Arnault, A. D. Baczewski, L. X. Benedict, C. Blancard, O. Čertik, J. Clérouin, L. A. Collins, S. Copeland, A. A. Correa, J. Dai, J. Daligault, M. P. Desjarlais, M. W. C. Dharma-wardana, G. Faussurier, J. Haack, T. Haxhimali, A. Hayes-Sterbenz, Y. Hou, S. X. Hu, D. Jensen, G. Jungman, G. Kagan, D. Kang, J. D. Kress, Q. Ma, M. Marciante, E. Meyer, R. E. Rudd, D. Saumon, L. Shulenburger, R. L. Singleton Jr., T. Sjostrom, L. J. Stanek, C. E. Starrett, C. Ticknor, S. Valaitis, J. Venzke, and A. White, "Review of the First Charged-Particle Transport Coefficient Comparison Workshop," High Energy Density Phys. **37**, 100905 (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. Hamilton, K. Henderson, Y. Kim, M. N. Lee, T. J. Murphy, J. A. Oertel, R. E. Olson, B. M. Patterson, R. B. Randolph, and D. Schmidt, "The Rate of Development of Atomic Mixing and Temperature Equilibration in Inertial Confinement Fusion Implosions," Phys. Plasmas **27**, 102701 (2020).

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A. J. Harvey-Thompson, M. R. Weis, D. E. Ruiz, M. S. Wei, A. B. Sefkow, T. Nagayama, E. M. Campbell, J. A. Fooks, M. E. Glinsky, and K. J. Peterson, "The Effect of Laser Entrance Hold Foil Thickness on MagLIF-Relevant Laser Preheat," Phys. Plasmas **27**, 113301 (2020).

G. W. Jenkins, C. Feng, and J. Bromage, "Overcoming Gas Ionization Limitations with Divided-Pulse Nonlinear Compression," Opt. Express **28**, 31,943 (2020).

D. Kawahito, M. Bailly-Grandvaux, M. Dozieres, C. McGuffey, P. Forestier-Colleoni, J. Peebles, J. J. Honrubia, B. Khiar,

S. Hansen, P. Tzeferacos, M. S. Wei, C. M. Krauland, P. Gourdain, J. R. Davies, K. Matsuo, S. Fujioka, E. M. Campbell, J. J. Santos, D. Batani, K. Bhutwala, S. Zhang, and F. N. Beg, "Fast Electron Transport Dynamics and Energy Deposition in Magnetized, Imploded Cylindrical Plasma," Phil. Trans. R. Soc. A **379**, 20200052 (2020).

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R. H. Lehmberg, M. F. Wolford, J. L. Weaver, D. Kehne, S. P. Obenschain, D. Eimerl, and J. P. Palastro, "Stimulated Rotational Raman Scattering of Arbitrarily Polarized Broadband Light," Phys. Rev. A **102**, 063530 (2020).

C. A. McCoy, S. X. Hu, M. C. Marshall, D. N. Polsin, D. E. Fratanduono, Y. H. Ding, P. M. Celliers, T. R. Boehly, and D. D. Meyerhofer, "Measurement of the Sound Velocity and Grüneisen Parameter of Polystyrene at Inertial Confinement Fusion Conditions," Phys. Rev. B **102**, 184102 (2020).

B. Militzer, F. González-Cataldo, S. Zhang, H. D. Whitley, D. C. Swift, and M. Millot, "Nonideal Mixing Effects in Warm Dense Matter Studied with First-Principles Computer Simulations," J. Chem. Phys. **153**, 184101 (2020).

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G. Pien, B. E. Kruschwitz, S. F. B. Morse, and T. J. Kessler, "Experimental Operations at the Omega Laser Facility Amid COVID-19," ICUIL News **11**, 10 (2020).

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J. J. Ruby, J. R. Rygg, D. A. Chin, J. A. Gaffney, P. J. Adrian, C. J. Forrest, V. Yu. Glebov, N. V. Kabadi, P. M. Nilson, Y. Ping, C. Stoeckl, and G. W. Collins, "Energy Flow in Thin Shell Implosions and Explosions," Phys. Rev. Lett. **125**, 215001 (2020).

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C. A. Thomas, E. M. Campbell, K. L. Baker, D. T. Casey, M. Hohenberger, A. L. Kritcher, B. K. Spears, S. F. Khan, R. Nora, D. T. Woods, J. L. Milovich, R. L. Berger, D. Strozzi, D. D. Ho, D. Clark, B. Bachmann, L. R. Benedetti, R. Bionta, P. M. Celliers, D. N. Fittinghoff, G. Grim, R. Hatarik, N. Izumi, G. Kyrala, T. Ma, M. Millot, S. R. Nagel, P. K. Patel, C. Yeamans, A. Nikroo, M. Tabak, M. Gatu Johnson, P. Volegov, and S. M. Finnegan, "Experiments to Explore the Influence of Pulse Shaping at the National Ignition Facility," Phys. Plasmas **27**, 112708 (2020).

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D. Turnbull, A. V. Maximov, D. Cao, A. R. Christopherson, D. H. Edgell, R. K. Follett, V. Gopalaswamy, J. P. Knauer, J. P. Palastro, A. Shvydky, C. Stoeckl, H. Wen, and D. H. Froula, "Impact of Spatiotemporal Smoothing on the Two-Plasmon–Decay Instability," Phys. Plasmas **27**, 102710 (2020).

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Forthcoming Publications

I. A. Begishev, G. Brent, S. Carey, R. Chapman, I. A. Kulagin, M. H. Romanofsky, M. J. Shoup III, J. D. Zuegel, and J. Bromage, "High-Efficiency, Fifth-Harmonic-Generation of a Joule-Level Neodymium Laser in a Large-Aperture Ammonium Dihydrogen Phosphate Crystal," to be published in Optics Express.

F. Coppari, R. F. Smith, J. Wang, M. Millot, D. Kim, J. R. Rygg, S. Hamel, J. H. Eggert, and T. S. Duffy, "Implications of the Iron Oxide Phase Transition on the Interiors of Rocky Exoplanets," to be published in Nature Geoscience.

J. R. Davies, H. Wen, J.-Y. Ji, and E. D. Held, "Transport Coefficients for Magnetic-Field Evolution in Inviscid Magnetohydrodynamics," to be published in Physics of Plasmas.

F. García-Rubio, R. Betti, J. Sanz, and H. Aluie, "Magnetic-Field Generation and Effect on Ablative Rayleigh–Taylor Instability in Diffusive Ablation Fronts," to be published in Physics of Plasmas.

V. Yu. Glebov, C. Stoeckl, C. J. Forrest, J. P. Knauer, O. M. Mannion, M. H. Romanofsky, T. C. Sangster, and S. P. Regan, "A Novel Photomultiplier Tube Neutron Time-of-Flight Detector," to be published in Review of Scientific Instruments.

K. R. P. Kafka, B. N. Hoffman, H. Huang, and S. G. Demos, "Mechanisms of Picosecond Laser-Induced Damage from Interaction with Model Contamination Particles on a High Reflector," to be published in Optical Engineering.

Y. Kim, H. W. Herrmann, N. M. Hoffman, M. J. Schmitt, G. Kagan, A. M. McEvoy, A. B. Zylstra, J. M. Smidt, S. Gales, A. Leatherland, M. Rubery, M. Gatu Johnson, J. A. Frenje, V. Yu. Glebov, and C. Forrest, "First Observation of Increased DT Yield over Prediction due to Addition of Hydrogen," to be published in Physics of Plasmas.

P. Koester, F. Baffigi, G. Cristoforetti, L. Labate, L. A. Gizzi, S. Baton, M. Koenig, A. Colaïtis, D. Batani, A. Casner, D. Raffestin, A. Tentori, J. Trela, C. Rousseaux, G. Boutoux, S. Brygoo, L. Jacquet, C. Reverdin, E. Le Bel, L. LeDeroff, W. Theobald, and K. Shigemori, "Bremsstrahlung Cannon Design for Shock Ignition Relevant Regime," to be published in Review of Scientific Instruments.

A. A. Kozlov, S. G. Demos, D. Canning, B. N. Hoffman, B. E. Kruschwitz, A. L. Rigatti, N. Savidis, and L. J. Waxer, "Long-Term Monitoring the Damage Performance of Multilayer Dielectric Grating Samples Residing Inside the Compressor Chamber of the OMEGA EP Laser," to be published in Optical Engineering.

L. Lamaignère, A. Ollé, M. Chorel, N. Roquin, A. A. Kozlov, B. N. Hoffman, J. B. Oliver, S. G. Demos, L. Gallais, R. A. Negres, and A. Melninkaitis, "Round-Robin Measurements of the Laser-Induced Damage Threshold with Sub-Picosecond Pulses on Optical Single Layers," to be published in Optical Engineering.

A. Lazicki, D. McGonegle, J. R. Rygg, D. G. Braun, D. C. Swift, M. G. Gorman, R. F. Smith, P. G. Heighway, A. Higginbotham, M. J. Suggit, D. E. Fratanduono, F. Coppari, C. E. Wehrenberg, R. G. Kraus, D. Erskine, J. V. Bernier, J. M. McNaney, R. E. Rudd, G. W. Collins, J. H. Eggert, and J. S. Wark, "Metastability of Diamond Ramp-Compressed to 2 Terapascals," to be published in Nature.

B. Militzer, F. González-Cataldo, S. Zhang, K. P. Driver, and F. Soubiran, "First-Principles Equation of State Database for Warm Dense Matter Computation," to be published in Physical Review E.

J. P. Palastro, B. Malaca, J. Vieira, D. Ramsey, T. T. Simpson, P. Franke, J. L. Shaw, and D. H. Froula, "Laser-Plasma Acceleration Beyond Wave Breaking," to be published in Physical Review Letters.

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

J. U. Wallace, K. L. Marshall, D. J. Batesky, T. Z. Kosc, B. N. Hoffman, S. Papernov, L. Garrett, J. Shojaie, and S. G. Demos, "Highly Saturated Glassy Liquid Crystal Films Having Nano- and Microscale Thicknesses for High-Power Laser Applications," to be published in ACS Applied Nanomaterials.

Conference Presentations

B. E. Ugur, "Computational Modeling and Design of Liquid Crystal Materials for Applications in the Terahertz Regime," presented at the 2020 American Institute of Chemical Engineers Eckhardt Northeast Region Conference, virtual, 3–4 October 2020.

S. G. Demos, K. R. P. Kafka, B. N. Hoffman, A. A. Kozlov, H. Huang, J. B. Oliver, A. L. Rigatti, T. J. Kessler, T. Z. Kosc, N. Liu, R. Dent, A. A. Shestopalov, and J. C. Lambropoulos, "The Fundamental Mechanism of Laser-Induced Damage in Optical Components for Ultrashort-Pulse Laser Systems," presented at OSA Laser Congress, virtual, 12–16 October 2020.

N. D. Urban, J. U. Wallace, K. L. Marshall, and S. G. Demos, "Photoswitchable Liquid Crystal Beam Shapers for High-Power Laser Applications," presented at the Clarkson University Seminar, virtual, 13 October 2020.

C. J. Forrest, J. P. Knauer, W. U. Schröder, V. Yu. Glebov, O. M. Mannion, K. L. Marshall, Z. L. Mohamed, P. B. Radha, S. P. Regan, M. Romanofsky, T. C. Sangster, A. Schwemmlein, M. Sickles, C. Sorce, C. Stoeckl, and J. Szczepanski, "Nuclear Science at the University of Rochester's Omega Laser Facility," presented at Ohio University, virtual, 20 October 2020.

B. Webb, "Next Generation Petawatt Laser Technology," presented at the 8th Texas STEM Conference, virtual, 24 October 2020.

The following presentations were made at the 4th Asia-Pacific Conference on Plasma Physics, virtual, 26–31 October 2020:

R. K. Follett, J. G. Shaw, C. Dorrer, D. H. Edgell, D. H. Froula, H. Wen, J. Bromage, E. M. Hill, T. J. Kessler, A. V. Maximov, A. A. Solodov, E. M. Campbell, J. P. Palastro, J. F. Myatt, J. W. Bates, and J. L. Weaver, "Broadband Mitigation of the Multibeam Two-Plasmon Decay and Stimulated Raman Scattering Instabilities."

A. A. Solodov, M. J. Rosenberg, M. Stoeckl, A. R. Christopherson, R. Betti, W. Seka, R. Epstein, C. Stoeckl, R. K. Follett, P. B. Radha, S. P. Regan, D. H. Froula, J. P. Palastro, V. N. Goncharov,

J. F. Myatt, M. Hohenberger, B. Bachmann, and P. Michel, "Scaling and Mitigation of Hot-Electron Preheat Polar-Direct-Drive Experiments at the National Ignition Facility."

H. Wen, R. K. Follett, A. V. Maximov, D. H. Froula, J. P. Palastro, and F. S. Tsung, "Kinetic Inflation of Stimulated Raman Scattering Driven by a Broadband Frequency-Modulated Laser Pulse."

O. M. Mannion, K. S. Anderson, R. Betti, E. M. Campbell, D. Cao, C. J. Forrest, V. Yu. Glebov, V. N. Goncharov, V. Gopalaswamy, I. V. Igumenshchev, S. T. Ivancic, D. W. Jacobs-Perkins, J. P. Knauer, A. Lees, F. J. Marshall, Z. L. Mohamed, D. Patel, S. P. Regan, H. G. Rinderknecht, R. C. Shah, C. Stoeckl, W. Theobald, K. M. Woo, B. D. Appelbe, J. P. Chittenden, A. J. Crilly, W. Taitano, P. Adrian, J. A. Frenje, N. V. Kabadi, and M. Gatu Johnson, "Applications of Neutron Spectroscopy in High-Energy-Density Science," presented at the High Energy Density Science Association, virtual, 8 November 2020.

J. Bromage, S.-W. Bahk, I. A. Begishev, S. Bucht, C. Dorrer, C. Feng, B. N. Hoffman, C. Jeon, C. Mileham, J. B. Oliver, R. G. Roides, M. J. Shoup III, M. Spilatro, B. Webb, and J. D. Zuegel, "MTW-OPAL: A Technology Development Platform for Ultra-Intense OPCPA Systems," presented at ELI-NP Autumn School (ELIAS 2020), virtual, 9 November 2020.

The following presentations were made at the 62nd Annual Meeting of the American Physical Society Division of Plasmas Physics, virtual, 9–13 November 2020:

K. S. Anderson, W. Theobald, M. J. Rosenberg, J. A. Marozas, R. H. H. Scott, and K. Glize, "Cross-Beam Energy Transfer in Simulations of NIF-Scale Strong Spherical Shock Experiments."

J. Baltazar, R. C. Shah, S. X. Hu, K. Churnetski, R. Epstein, V. N. Goncharov, I. V. Igumenshchev, T. Joshi, W. Theobald, and S. P. Regan, "Feasibility Study of Measuring In-Flight Shell Thickness for a Laser-Direct-Drive DT Cryogenic Implosion."

Z. Barfield, D. H. Froula, J. P. Palastro, J. L. Peebles, D. Mastrosimone, A. M. Hansen, J. Katz, and P. Tzeferacos, "Thermal Transport in Low-Beta Laser-Produced Plasmas."

D. H. Barnak, M. J. Bonino, J. R. Davies, E. C. Hansen, D. R. Harding, L. S. Leal, J. L. Peebles, P.-Y. Chang, R. Betti, J. D. Moody, and B. B. Pollock, "Achieving an Azimuthal Uniform Cylindrical Implosion on OMEGA."

R. Betti, V. Gopalaswamy, J. P. Knauer, A. Lees, D. Patel, C. A. Thomas, and W. Theobald, "Exploring Pathways to Hydro-Equivalent Ignition on the OMEGA Laser."

D. T. Bishel, E. V. Marley, M. B. Schneider, D. A. Liedahl, R. F. Heeter, M. E. Foord, G. E. Kemp, Y. Frank, J. A. Emig, G. Perez-Callejo, J. R. Rygg, G. W. Collins, and P. M. Nilson, "Open L-Shell Spectroscopy of Non-Local-Thermodynamic-Equilibrium Plasmas."

G. Bruhaug, H. G. Rinderknecht, M. S. Wei, G. W. Collins, J. R. Rygg, Y. E. K. Garriga, and X. C. Zhang, "High-Power THz Sources for High-Energy-Density–Physics Applications."

D. Cao, R. C. Shah, R. Epstein, A. R. Christopherson, V. Gopalaswamy, S. P. Regan, W. Theobald, and V. N. Goncharov, "Analysis of Techniques to Infer Hot-Spot Mixing Using Absolute X-Ray Emission for OMEGA Direct-Drive Layered Implosions."

L. Ceurvorst, R. Betti, A. Bose, S. X. Hu, E. M. Campbell, S. P. Regan, J. L. Peebles, W. Theobald, A. Casner, C. A. McCoy, M. Karasik, and M. Tabak, "Imprint Mitigation with Hybrid Targets."

D. A. Chin, P. M. Nilson, J. J. Ruby, X. Gong, M. K. Ginnane, B. J. Henderson, L. Crandall, D. N. Polsin, T. R. Boehly, J. R. Rygg, G. W. Collins, D. Trail, A. Amouretti, M. Harmand, R. Torchio, F. Coppari, A. Coleman, and Y. Ping, "Using X-Ray Absorption Spectroscopy to Study Iron Oxides at Extreme Compressions."

K. Churnetski, W. Theobald, K. A. Woo, R. Ejaz, I. V. Igumenshchev, S. T. Ivancic, A. Kish, M. Michalko, R. C. Shah, R. Spielman, S. P. Regan, A. Raymond, P. Bell, A. Carpenter, A. McPhee, C. Trosseille, D. K. Bradley, J. D. Hares, A. K. L. Dymoke-Bradshaw, G. Rochau, L. Claus, M. Sanchez, and D. Garand "The Third Line-of-Sight Time-Gated X-Ray Imager for OMEGA DT Cryogenic Implosions."

T. J. B. Collins, M. Hohenberger, L. Divol, W. W. Hsing, J. A. Marozas, K. A. Bauer, R. S. Craxton, P. W. McKenty, P. B. Radha, S. P. Regan, M. J. Rosenberg, and E. M. Campbell, "Optimization of OMEGA Exploding-Pusher Performance Using Shaped Pulses."

L. E. Crandall, J. R. Rygg, T. R. Boehly, B. J. Henderson, M. F. Huff, D. N. Polsin, M. Zaghoo, G. W. Collins, D. K. Spaulding, S. Brygoo, P. M. Celliers, J. H. Eggert, D. E. Fratanduono, A. Lazicki, M. C. Marshall, M. Millot, and R. Jeanloz, "Equation of State and Transport of CO_2 Shock Compressed to 1 TPa" (invited).

R. S. Craxton, W. Y. Wang, and E. M. Campbell, "A New Beam Configuration to Support Both Spherical Hohlraums and Symmetric Direct Drive."

J. R. Davies, H. Wen, E. D. Held, and J.-Y. Ji, "Transport Coefficients for Magnetic-Field Evolution in Inviscid Magnetohydrodynamics."

D. H. Edgell, R. K. Follett, J. Katz, J. A. Marozas, D. Turnbull, and D. H. Froula, "Low-Mode Asymmetry due to Polarization Smoothing in OMEGA Implosions."

R. Epstein, A. Shvydky, I. E. Golovkin, and W.-F. Fong, "Non-equilibrium Thermodynamics of Plasma Under Collisional-Radiative Equilibrium."

R. K. Follett, J. G. Shaw, C. Dorrer, D. H. Edgell, D. H. Froula, H. Wen, J. Bromage, E. M. Hill, T. J. Kessler, A. V. Maximov, A. A. Solodov, E. M. Campbell, J. P. Palastro, J. F. Myatt, J. W. Bates, and J. L. Weaver, "Broadband Mitigation of the Multibeam Two-Plasmon Decay and Stimulated Raman Scattering Instabilities."

C. J. Forrest, V. Yu. Glebov, V. N. Goncharov, J. P. Knauer, O. M. Mannion, Z. L. Mohamed, P. B. Radha, S. P. Regan, R. C. Shah, C. Stoeckl, and K. M. Woo, "Evaluating the Residual Kinetic Energy in Direct-Drive Cryogenic Implosions on OMEGA."

P. Franke, J. P. Palastro, D. Ramsey, T. T. Simpson, D. Turnbull, and D. H. Froula, "Dynamically Guided Self-Photon Acceleration."

F. Garcia-Rubio, R. Betti, H. Aluie, and J. Sanz Recio, "Magnetic-Field Effect on Rayleigh-Taylor and Darrieus–Landau Instabilities."

M. K. Ginnane, D. N. Polsin, X. Gong, 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 Measurements of Dynamically Compressed Platinum."

V. N. Goncharov, I. V. Igumenshchev, D. R. Harding, S. F. B. Morse, S. X. Hu, P. B. Radha, D. H. Froula, S. P. Regan, T. C. Sangster, and E. M. Campbell, "Novel Hot-Spot-Ignition Designs for Inertial Confinement Fusion with Liquid Deuterium–Tritium Spheres."

V. Gopalaswamy, R. Betti, J. P. Knauer, A. Lees, D. Patel, A. R. Christopherson, K. M. Woo, D. Cao, C. A. Thomas, I. V. Igumenshchev, S. P. Regan, W. Theobald, R. C. Shah, P. B. Radha, and K. S. Anderson, "Inferring Degradation Mechanisms in OMEGA Cryogenic Implosions Through Statistical Modeling."

A. M. Hansen, K. L. Nguyen, D. Turnbull, R. K. Follett, R. Huff, J. Katz, D. Mastrosimone, A. L. Milder, J. P. Palastro, D. H. Froula, B. Albright, and L. Yin, "Cross-Beam Energy Transfer Saturation."

B. J. Henderson, T. R. Boehly, M. Zaghoo, J. R. Rygg, D. N. Polsin, X. Gong, L. Crandall, M. Huff, M. K. Ginnane, G. W. Collins, S. Ali, and P. M. Celliers, "Optical Spectroscopy Measurements of Decaying Shocks in Transparent Crystals."

J. Hinz, V. V. Karasiev, and S. X. Hu, "A Machine-Learned, Orbital-Free, Force-Correction Model: Extending the Thermodynamic Range of Affordable Kohn–Sham Level Accuracy."

S. X. Hu, P. M. Nilson, V. V. Karasiev, S. B. Hansen, T. Walton, and I. E. Golovkin, "Extreme Atomic Physics at 5- to 100-Gbar Pressures."

M. Huff, J. R. Rygg, G. W. Collins, T. R. Boehly, M. Zaghoo, D. N. Polsin, M. Nakajima, B. J. Henderson, L. E. Crandall, M. C. Marshall, D. E. Fratanduono, M. Millot, R. F. Smith, J. H. Eggert, P. M. Celliers, and C. A. McCoy, "Measurements of Sound Speed in Iron Shock-Compressed to ~4000 GPa."

I. V. Igumenshchev, O. M. Mannion, J. P. Knauer, R. Betti, E. M. Campbell, D. Cao, V. N. Goncharov, V. Goplaswamy, D. Patel, S. P. Regan, R. C. Shah, A. Shvydky, W. Theobald, D. S. Clark, M. M. Marinak, and B. M. Haines, "Modeling Effects of Ion Viscosity on Dynamics of OMEGA Direct-Drive Cryogenic Implosions."

V. V. Karasiev, D. I. Mihaylov, S. X. Hu, and S. B. Trickey, "Accurate Density Functional Theory Simulations Across Warm-Dense-Matter Regime: Thermal meta-GGA Exchange-Correlation and Nuclear-Quantum Effects."

J. P. Knauer, R. Betti, V. Gopalaswamy, D. Cao, D. Patel, A. Lees, A. Shvydky, M. J. Bonino, E. M. Campbell, T. J. B.

Collins, C. J. Forrest, V. Yu. Glebov, V. N. Goncharov, D. R. Harding, J. A. Marozas, F. J. Marshall, P. W. McKenty, J. L. Peebles, P. B. Radha, S. P. Regan, T. C. Sangster, C. Stoeckl, M. Gatu Johnson, J. A. Frenje, and R. D. Petrasso, "A Systematic Study of Laser Imprint for Direct Drive—From Seeds to Integrated Implosions."

L. S. Leal, A. V. Maximov, E. C. Hansen, J. R. Davies, D. H. Barnak, J. L. Peebles, A. B. Sefkow, and R. Betti, "Simulations of Laser Preheat Effects on Yield in Mini-MagLIF Implosions on OMEGA."

A. Lees, R. Betti, J. P. Knauer, V. Gopalaswamy, D. Patel, R. Epstein, J. Carroll-Nellenback, A. R. Christopherson, K. M. Woo, O. M. Mannion, Z. L. Mohamed, F. J. Marshall, C. Stoeckl, V. Yu. Glebov, S. P. Regan, R. C. Shah, D. H. Edgell, D. Cao, V. N. Goncharov, I. V. Igumenshchev, P. B. Radha, T. J. B. Collins, T. C. Sangster, E. M. Campbell, M. Gatu Johnson, R. D. Petrasso, C. K. Li, and J. A. Frenje, "Understanding the Fusion Yield and All of Its Dependencies Using Statistical Modeling of Experimental Data" (invited).

O. M. Mannion, K. S. Anderson, R. Betti, E. M. Campbell, D. Cao, C. J. Forrest, V. Yu. Glebov, V. N. Goncharov, V. Gopalaswamy, I. V. Igumenshchev, S. T. Ivancic, D. W. Jacobs-Perkins, J. P. Knauer, A. Lees, F. J. Marshall, Z. L. Mohamed, D. Patel, S. P. Regan, H. G. Rinderknecht, R. C. Shah, C. Stoeckl, W. Theobald, K. M. Woo, and M. Gatu Johnson, "Mode One Asymmetry in Laser-Direct-Drive Inertial Confinement Fusion Implosions" (invited).

O. M. Mannion, C. J. Forrest, V. Yu. Glebov, J. P. Knauer, P. W. McKenty, Z. L. Mohamed, S. P. Regan, C. Stoeckl, B. D. Appelbe, A. J. Crilly, W. Taitano, P. J. Adrian, J. A. Frenje, N. V. Kabadi, and M. Gatu Johnson, "Measurements of the DT and DD Neutron Energy Spectrum in High Temperature Fusing Plasmas."

J. A. Marozas, K. S. Anderson, R. Betti, T. R. Boehly, R. Boni, M. J. Bonino, E. M. Campbell, D. Canning, D. Cao, T. J. B. Collins, R. S. Craxton, A. K. Davis, J. A. Delettrez, W. R. Donaldson, D. H. Edgell, R. Epstein, C. J. Forrest, D. H. Froula, V. Yu. Glebov, V. N. Goncharov, D. R. Harding, S. X. Hu, H. Huang, I. V. Igumenshchev, R. T. Janezic, D. W. Jacobs-Perkins, J. Katz, R. L. Keck, J. H. Kelly, T. J. Kessler, B. E. Kruschwitz, J. P. Knauer, T. Z. Kosc, S. J. Loucks, F. J. Marshall, A. V. Maximov, P. W. McKenty, S. F. B. Morse, P. M. Nilson, J. C. Puth, P. B. Radha, S. P. Regan, H. G. Rinderknecht, M. J. Rosenberg, T. C. Sangster, R. Shah, W. T. Shmayda, R. W. Short, A. Shvydky, M. J. Shoup III, S. Skupsky, A. A. Solodov, C. Sorce, S. Stagnitto, C. Stoeckl, W. Theobald, D. Turnbull, J. Ulreich, M. D. Wittman, V. Gopalaswamy, J. D. Zuegel, J. A. Frenje, M. Gatu Johnson, R. D. Petrasso, H. Sio, B. Lahmann, P. Bell, B. E. Blue, S. Bhandarkar, D. K. Bradley, D. A. Callahan, A. Carpenter, D. T. Casey, J. Celeste, M. Dayton, C. S. Goyon, M. Hohenberger, O. A. Hurricane, G. E. Kemp, S. Le Pape, L. Masse, P. Michel, J. D. Moody, S. R. Nagel, A. Nikroo, R. Nora, L. Pickworth, J. E. Ralph, R. P. J. Town, R. J. Wallace, Z. B. Walters, P. Wegner, H. D. Whitley, C. B. Yeamans, M. Farrell, P. Fitzsimmons, C. Gibson, A. Greenwood, L. Carlson, T. Hilsabeck, H. Huang, J. D. Kilkenny, R. W. Luo, N. Rice, M. Schoff, W. Sweet, A. Tambazidis, T. Bernat, N. Petta, J. Hund, S. P. Obenschain, J. W. Bates, M. Karasik, A. J. Schmitt, J. Weaver, J. Hares, T. Dymoke-Bradshaw, R. E. Olson, M. J. Schmitt, S. Hsu, G. Rochau, L. Claus, Q. Looker, J. Porter, G. Robertson, M. Sanchez, and W. J. Garbett, "Laser-Direct-Drive Inertial Confinement Fusion—A Pathway to Ignition" (invited).

M. C. Marshall, M. Millot, D. E. Fratanduono, P. C. Myint, J. L. Belof, Y.-J. Kim, F. Coppari, J. H. Eggert, R. F. Smith, J. M. McNaney, D. M. Sterbentz, J. R. Rygg, and G. W. Collins, "Probing the Metastability Limit of Liquid Water Under Dynamic Compression."

A. V. Maximov, D. Turnbull, D. H. Edgell, J. G. Shaw, R. K. Follett, H. Wen, D. H. Froula, and J. P. Palastro, "Nonlinear Absorption of Multiple Laser Beams due to the Two-Plasmon–Decay Instability."

P. W. McKenty, M. J. Rosenberg, F. J. Marshall, D. R. Harding, R. S. Craxton, J. A. Marozas, T. J. B. Collins, R. Epstein, E. M. Campbell, S. Schiaffino, B. E. Blue, C. B. Yeamans, W. W. Hsing, C. Shuldberg, and M. Farrell, "Evaluation of Polar-Direct-Drive, Contoured-Shell Experiments at the National Ignition Facility."

B. McLellan and S. Zhang, "Kinetic Transition Pathway of Pressure Driven Structural Transformations: The Case of Magnesium Oxide."

D. I. Mihaylov, V. V. Karasiev, and S. X. Hu, "Progress in Development of Thermal Hybrid Exchange-Correlation Density Functionals for Improving the Description of Warm Dense Matter."

A. Milder, J. Katz, R. Boni, D. Nelson, D. Turnbull, J. P. Palastro, K. Daub, R. K. Follett, D. H. Froula, M. Sherlock,

T. Chapman, and W. Rozmus, "Measurements of Electron Distribution Functions in Laser-Produced Plasmas Using Angularly Resolved Thomson Scattering" (invited).

S. C. Miller, V. N. Goncharov, T. J. B. Collins, and J. Carroll-Nellenback, "A Study of 2D Internal Perturbation Evolution in Inertial Confinement Fusion Implosions."

Z. L. Mohamed, O. M. Mannion, C. J. Forrest, J. P. Knauer, and E. P. Hartouni, "Construction and Implementation of an Energy-Dependent Instrument Response Function for Accurate Analysis of Neutron Time-of-Flight Data."

K. L. Nguyen, A. M. Hansen, D. Turnbull, R. K. Follett, D. H. Froula, J. P. Palastro, L. Yin, and B. J. Albright, "Nonlinear Saturation of Cross-Beam Energy Transfer."

P. M. Nilson, F. J. Marshall, J. Kendrick, J. J. Ruby, D. A. Chin, D. Bishel, D. Guy, S. T. Ivancic, C. Stoeckl, R. F. Earley, D. R. Harding, M. Bedzyk, G. Gates, D. W. Jacobs-Perkins, V. N. Goncharov, T. J. B. Collins, and R. Epstein, "Imaging of Hydrodynamic Perturbation Evolution Using a Fresnel Phase Zone Plate."

J. P. Palastro, D. H. Froula, M. V. Ambat, R. Boni, E. M. Campbell, R. K. Follett, P. Franke, V. N. Goncharov, J. B. Oliver, D. Ramsey, J. L. Shaw, T. T. Simpson, D. Turnbull, H. Wen, S. Jolly, F. Quere, C. Benedetti, E. Esarey, G. Geddes, C. Schroeder, R. Bingham, S. Stoller, N. Vafaei-Najafabadi, G. Gregori, B. Malaca, A. Helm, J. Vieira, A. DiPiazza, A. Howard, K. Weichman, A. Arefiev, T. M. Antonsen, Jr., and Z. Li, "Laser–Plasma Interactions Driven by Spatiotemporally Structured Light Pulses" (invited).

D. Patel, R. Betti, K. M. Woo, V. Gopalaswamy, J. C. Carrol, and A. Bose, "Hydrodynamic Scaling Relations for OMEGA Cryogenic Implosions."

J. L. Peebles, J. R. Davies, D. H. Barnak, M. J. Bonino, T. Cracium, R. Betti, and P.-Y. Chang, "Axial Proton Radiography of Electric and Magnetic Fields Inside Laser-Driven Coils."

H. Poole, D. Cao, J. R. Rygg, S. X. Hu, I. E. Golovkin, T. Walton, R. Epstein, M. Kasim, S. Vinko, G. Gregori, and S. P. Regan, "A Feasibility Study of Using X-Ray Thomson Scattering to Diagnose the Plasma Conditions of Laser-Direct-Drive, DT Cryogenic Implosions."

P. B. Radha, W. Theobald, R. Betti, D. Cao, R. S. Craxton, C. J. Forrest, V. Yu. Glebov, V. N Goncharov, V. Gopalaswamy, I. V. Igumenshchev, S. T. Ivancic, T. Joshi, J. P. Knauer, O. M. Mannion, F. J. Marshall, S. Miller, Z. L. Mohamed, D. Patel, S. P. Regan, H. G. Rinderknecht, T. C. Sangster, R. C. Shah, C. Stoeckl, C. A. Thomas, E. M. Campbell, M. Gatu Johnson, J. A. Frenje, and R. D. Petrasso, "Understanding the Performance of Polar-Drive Cryogenic Implosions on OMEGA."

D. Ramsey, P. Franke, T. T. Simpson, M. V. Ambat, D. H. Froula, and J. P. Palastro, "Vacuum Acceleration of Electrons in a Dynamic Laser Pulse."

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H. G. Rinderknecht, J. P. Knauer, W. Theobald, R. Fairbanks, B. Brannon, V. Kobilansky, R. Peck, J. Armstrong, M. Weisbeck, J. Brown, P. B. Radha, S. P. Regan, J. Kunimune, P. J. Adrian, M. Gatu Johnson, J. A. Frenje, F. H. Séguin, and B. Bachmann, "Knock-on Deuteron Imaging of the Hot Spot and Compressed Fuel in Direct-Drive Cryogenic ICF Implosions."

M. J. Rosenberg, A. A. Solodov, A. R. Christopherson, R. Betti, P. B. Radha, C. Stoeckl, C. J. Forrest, V. Yu. Glebov, F. J. Marshall, S. P. Regan, T. J. B. Collins, D. H. Froula, J. P. Palastro, V. N. Goncharov, M. Hohenberger, B. Bachmann, G. N. Hall, P. Michel, and C. Kauland, "Hot-Electron Preheat in Hydrodynamically Scaled Direct-Drive Implosions at the National Ignition Facility and OMEGA."

J. J. Ruby, J. R. Rygg, D. A. Chin, C. J. Forrest, V. Yu. Glebov, C. Stoeckl, G. W. Collins, B. Bachmann, J. A. Gaffney, Y. Ping, N. V. Kabadi, and P. J. Adrian, "Bayesian Inference of Energy Transfer in Gigabar Convergent Experiments" (invited).

A. K. Schwemmlein, C. Stoeckl, W. T. Shmayda, C. J. Forrest, J. P. Knauer, S. P. Regan, and W. U. Schröder, "Controllable Target-Normal Sheath Acceleration Deuteron Beams Using Titanium Targets Toward Generating a Tritium Beam."

A. B. Sefkow, B. G. Logan, and J. H. Nuckolls, "Directly Driven Magnetized Targets with Steep Density Gradients for Inertial Fusion Energy."

R. C. Shah, S. X. Hu, I. V. Igumenshchev, J. Baltazar, D. Cao, C. J. Forrest, V. N. Goncharov, V. Gopalaswamy, D. Patel, W. Theobald, S. P. Regan, and F. Philippe, "In-Flight Shell Breakup in Direct-Drive DT Cryogenic Implosion."

J. L. Shaw, M. A. Romo-Gonzalez, G. Bruhaug, C. Dorrer, B. E. Kruschwitz, L. J. Waxer, M. V. Ambat, M. M. McKie, J. P. Palastro, D. H. Froula, N. Lemos, P. M. King, G. J. Williams, H. Chen, F. Albert, M. D. Sinclair, and C. Joshi, "Microcoulomb-Class Laser-Plasma Accelerator on OMEGA EP."

A. Shvydky, D. Haberberger, J. P. Knauer, S. X. Hu, S. T. Ivancic, J. Carroll-Nellenback, D. Cao, I. V. Igumenshchev, V. V. Karasiev, P. B. Radha, A. V. Maximov, S. P. Regan, T. C. Sangster, R. Boni, P. M. Nilson, V. N. Goncharov, D. H. Froula, M. D. Rosen, and V. A. Smalyuk, "Shock-Release Experiments on OMEGA EP."

T. T. Simpson, D. Ramsey, P. Franke, M. V. Ambat, D. Turnbull, D. H. Froula, J. P. Palastro, and N. Vafaei-Najafabadi, "Nonlinear Spatiotemporal Control of Laser Intensity."

A. A. Solodov, M. J. Rosenberg, M. Stoeckl, A. R. Christopherson, R. Betti, W. Seka, R. Epstein, C. Stoeckl, R. K. Follett, P. B. Radha, S. P. Regan, D. H. Froula, J. P. Palastro, V. N. Goncharov, J. F. Myatt, M. Hohenberger, B. Bachmann, and P. Michel, "Scaling and Mitigation of Hot-Electron Preheat in Polar-Direct-Drive Experiments at the National Ignition Facility."

Z. K. Sprowal, L. E. Crandall, J. R. Rygg, T. R. Boehly, D. N. Polsin, G. W. Collins, D. G. Hicks, and P. M. Celliers, "Double Shock Compression in Polystyrene to ~8 Mbar."

C. Stoeckl, M. J. Bonino, C. Mileham, S. P. Regan, W. Theobald, T. Ebert, and S. Sander, "Optimization of a Short-Pulse–Driven Si He_{α} Soft X-Ray Backlighter."

W. Theobald, P. B. Radha, S. P. Regan, K. S. Anderson, R. Betti, E. M. Campbell, D. Cao, R. S. Craxton, C. J. Forrest, V. Yu. Glebov, V. N. Goncharov, V. Gopalaswamy, I. V. Igumenshchev, T. Joshi, S. T. Ivancic, J. P. Knauer, A. Lees, O. M. Mannion, F. J. Marshall, M. Michalko, Z. L. Mohamed, D. Patel, R. C. Shah, C. Stoeckl, C. A. Thomas, and M. Gatu Johnson, "OMEGA Subscale Cryogenic Implosions in Symmetric and Polar-Direct-Drive Beam Geometry."

C. A. Thomas, D. Cao, W. Theobald, R. Betti, K. S. Anderson, K. A. Bauer, E. M. Campbell, A. R. Christopherson, T. J. B. Collins, R. S. Craxton, D. H. Edgell, R. Epstein, C. J. Forrest, V. Yu. Glebov, V. Gopalaswamy, I. V. Igumenshchev, S. T. Ivancic, D. W. Jacobs-Perkins, R. T. Janezic, T. Joshi, J. P. Knauer, J. Kwiatkowski, A. Lees, O. M. Mannion, F. J. Marshall, M. Michalko, Z. L. Mohamed, D. Patel, J. L. Peebles, P. B. Radha, S. P. Regan, H. G. Rinderknecht, M. J. Rosenberg, S. Sampat, T. C. Sangster, R. C. Shah, C. Stoeckl, and V. N. Goncharov, "Quantifying the Effects of Scale and Illumination Geometry in Laser Direct Drive."

D. Turnbull, A. V. Maximov, D. Cao, A. R. Christopherson, D. H. Edgell, R. K. Follett, V. Gopalaswamy, J. P. Knauer, J. P. Palastro, A. Shvydky, C. Stoeckl, H. Wen, and D. H. Froula, "Impact of Spatiotemporal Smoothing on the Two-Plasmon–Decay Instability."

P. Tzeferacos, R. Betti, J. R. Davies, F. Garcia-Rubio, E. C. Hansen, D. Michta, C. Ren, A. C. Reyes, W. Scullin, A. B. Sefkow, J. G. Shaw, H. Wen, and K. M. Woo, "A Simulation Resource Team for Innovative Fusion Concepts in the BETHE Program."

W. Y. Wang and R. S. Craxton, "A Proposal for Spherical Hohlraum Experiments on OMEGA Using Seven Laser Entrance Holes."

H. Wen, R. K. Follett, A. V. Maximov, D. H. Froula, J. P. Palastro, and F. S. Tsung, "Kinetic Inflation of Stimulated Raman Scattering Driven by a Broadband Frequency-Modulated Laser Pulse."

K. M. Woo and R. Betti, "Impact of Low-Mode Areal Density Asymmetry on Loss of Confinement for Igniting Capsules."

S. Zhang and S. X. Hu, "Large-Scale Molecular-Dynamics Studies on the Release of Shocked Polystyrene Under Inertial Confinement Fusion Conditions."

Y. Zhang, C. Ren, J. R. Davies, and P. Heuer, "Kinetic Simulation Study of Magnetized Collisionless Shock Formation Using OMEGA EP."

M. Sharpe, W. T. Shmayda, J. Wermer, and C. A. Bond, "Permeation of Isotopes through FeCrAl Alloys," presented at Technology of Fusion Energy (TOFE) 2020, virtual, 15–19 November 2020.

D. H. Froula, "Progress in Flying Focus," presented at High-Intensity Lasers and High-Field Phenomena, virtual, 16–20 November 2020 (invited).

B. E. Ugur and K. L. Marshall, "Computational Modeling and Design of Liquid Crystal Materials for Applications in the Terahertz Regime," presented at the 2020 American Institute of Chemical Engineers Annual Meeting, virtual, 16–20 November 2020.

M. S. Wei, "OMEGA EP Laser Facility," presented at the LaserNetUS Town Hall, virtual, 19 November 2020.

The following presentations were made at the Office of Experimental Science, FY2021 Annual Program Review, virtual, 1–3 December 2020:

E. M. Campbell, "ICF Facility Operations—LLE 10.7."

S. P. Regan, "ICF Diagnostics and Instrumentation: LLE."

T. C. Sangster, "LLE MTE 10.8."

The following presentations were made at the Advanced Accelerator Concepts Seminar Series, virtual, 2 December 2020:

P. Franke, J. P. Palastro, J. L. Shaw, D. Ramsey, T. T. Simpson, M. V. Ambat, K. Daub, J. B. Oliver, R. Boni, C. Dorrer, J. Katz, and D. H. Froula, "Dephasingless Laser Wakefield Acceleration."

J. L. Shaw, M. A. Romo-Gonzalez, G. Bruhaug, C. Dorrer, B. E. Kruschwitz, L. J. Waxer, M. V. Ambat, M. M. McKie, J. P. Palastro, D. H. Froula, N. Lemos, P. M. King, G. J. Williams, H. Chen, F. Albert, M. D. Sinclair, and C. Joshi, "Microcoulomb-Class Laser-Plasma Accelerator on OMEGA EP."

G. W. Collins, M. Zaghoo, M. Hiuff, L. Crandall, G. Tabak, B. J. Henderson, X. Gong, D. A. Chin, Z. K. Sprowal, J. J. Ruby, M. K. Ginnane, P. M. Nilson, D. N. Polsin, M. Marshall, J. R. Rygg, and R. Jeanloz, "Exploring Extrasolar Planets in the Laboratory," presented at the American Geophysical Union Fall Meeting, virtual, 7–11 December 2020.

E. M. Campbell, "Direct-Drive Laser Fusion: Status, Plans, and the Future," presented at the Freeman Dyson Seminar, virtual, 10 December 2020.

The following presentations were made at the 23rd Topical Conference on High-Temperature Plasma Diagnostics, virtual, 13–17 December 2020:

D. H. Barnak, J. R. Davies, J. P. Knauer, and P. M. Kozlowski, "Soft X-Ray Spectrum Unfold of K-Edge–Filtered X-Ray Diode Arrays Using Cubic Splines."

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D. H. Edgell, A. Hansen, J. Katz, D. Turnbull, and D. H. Froula, "Unabsorbed Light Beamlets for Diagnosing Coronal Density Profiles and Absorption Nonuniformity in Direct-Drive Implosions on OMEGA."

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