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## Publications and Conference Presentations

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### Publications

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- P. J. Adrian, J. Frenje, B. Aguirre, B. Bachmann, A. Birkel, M. Gatu Johnson, N. V. Kabadi, B. Lahmann, C. K. Li, O. M. Mannion, W. Martin, Z. L. Mohamed, S. P. Regan, H. G. Rinderknecht, B. Scheiner, M. J. Schmitt, F. H. Séguin, R. C. Shah, H. Sio, C. Sorce, G. D. Sutcliffe, and R. D. Petrasso, “An X-Ray Penumbral Imager for Measurements of Electron–Temperature Profiles in Inertial Confinement Fusion Implosions at OMEGA,” *Rev. Sci. Instrum.* **92**, 043548 (2021).
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A. B. Zylstra, C. Yeaman, S. Le Pape, A. MacKinnon, M. Hohenberger, D. N. Fittinghoff, H. Herrmann, Y. Kim, P. B. Radha, P. W. McKenty, R. S. Craxton, and M. Hoppe, “Enhanced Direct-Drive Implosion Performance on NIF with Wavelength Separation,” *Phys. Plasmas* **27**, 124501 (2020).

### 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. Schwemlein, 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. Stoekli, 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.

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The following presentations were made at the the 45th International Conference on Infrared, Millimeter, and Terahertz Waves, virtual, 8–13 November 2020:

G. Chen, R. Adam, D. Bürgler, D. Cao, A. Pericolo, J. Cheng, I. Komissarov, S. Heidtfeld, L. Gladczuk, P. Przyslupski, H. Hardtdegen, M. Mikulics, C. M. Schneider, and R. Sobolewski, “Onset-Time Control of THz Transients Generated by Spintronic Emitters.”

G. Chen, D. Chakraborty, J. Cheng, C. Chimera, I. Komissarov, M. Mikulics, R. Adam, D. E. Bürgler, C. M. Schneider, H. Hardtdegen, and R. Sobolewski, “Magnetic-Field Enhancement of THz Surface Emission in Highly Resistive GaAs.”

G. Chen, M. Mikulics, R. Adam, A. Pericolo, J. Serafini, S. Preble, J. Cheng, C. Chimera, J. Komissarov, H. H. Hardtdegen, and R. Sobolewski, “Photomixing THz Generation from Nitrogen-Ion-Implanted GaAs Metal-Semiconductor-Metal Diodes Enhanced by a Bragg Mirror.”

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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.

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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<sub>2</sub> Shock Compressed to 1 TPa” (invited).

R. S. Craxton, W. Y. Wang, and E. M. Campbell, “A New Beam Configuration to Support Both Spherical Hohlräume 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. Mastro Simone, 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. Gopalaswamy, 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. Shulderberg, 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."
- S. P. Regan, W. Theobald, P. B. Radha, R. Betti, M. J. Rosenberg, R. S. Craxton, A. A. Solodov, A. Shvydky, K. S. Anderson, J. A. Marozas, T. J. B. Collins, V. N. Goncharov, D. Turnbull, E. M. Campbell, C. M. Shulberg, R. W. Luo, R. Heredia, B. Bachmann, T. Döppner, M. Hohenberger, R. Scott, K. Glize, A. Colaitis, and A. Casner, "Laser-Direct-Drive Energy-Coupling Experiments Using Spherical Solid-Plastic Targets at the National Ignition Facility."
- 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. Schwemlein, 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, “Non-linear 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 $_{\alpha}$  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.”

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 Nonlocal Thermodynamic Equilibrium Plasmas.”

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.”

S. T. Ivancic, W. Theobald, C. Sorce, M. Bedzyk, F. J. Marshall, C. Stoeckl, R. C. Shah, M. Lawrie, S. P. Regan, T. C. Sangster, E. M. Campbell, T. J. Hilsabeck, K. Englehorn, J. D. Kilkenny, T. M. Chung, J. D. Hares, A. K. L. Dymoke-Bradshaw, P. Bell, J. Celeste, A. C. Carpenter, M. Dayton, D. K. Bradley, M. C. Jackson, E. Hurd, L. Pickworth, S. R. Nagel, G. Rochau, J. Porter, M. Sanchez, L. Claus, G. Robertson, and Q. Looker, “Improving Time-Resolved X-Ray Hot-Spot Image Fidelity with Composite Imaging Using a Multiple Pinhole Imager.”

J. Katz, D. Turnbull, B. E. Kruschwitz, A. Rigatti, R. Rinefield, and D. H. Froula, "A Transmitted Beam Diagnostic for the Wavelength Tunable UV Drive Beam on OMEGA."

O. M. Mannion, C. J. Forrest, V. Yu. Glebov, I. V. Igumenshchev, S. T. Ivancic, D. W. Jacobs-Perkins, J. P. Knauer, Z. L. Mohamed, S. P. Regan, H. G. Rinderknecht, R. C. Shah, C. Stoeckl, W. Theobald, K. M. Woo, J. A. Frenje, M. Gatu Johnson, and A. J. Crilly, "Diagnosing 3-D Asymmetries in Laser-Direct-Drive Implosions on OMEGA" (invited).

F. J. Marshall, S. T. Ivancic, C. Mileham, P. M. Nilson, J. J. Ruby, C. Trejan, J. Kendrick, B. S. Schiener, and M. J. Schmitt, "High-Resolution X-Ray Radiography with Fresnel Zone Plates at the University of Rochester's OMEGA Laser Systems" (invited).

Z. L. Mohamed, O. M. Mannion, J. P. Knauer, C. J. Forrest, V. Yu. Glebov, and C. Stoeckl, "Application of an Energy-Dependent Instrument Response Function of nTOF Data from DT Cryogenic DT Experiments."

M. J. Rosenberg, T. Filkins, R. E. Bahr, R. Jungquist, M. Bedzyk, S. P. Regan, J. Hernandez, N. Butler, G. Swadling, J. Eichmiller, R. Sommers, P. Nyholm, P. Datte, and J. S. Ross, "SLTD: A Time-Resolved Scattered-Light Diagnostic Array at the National Ignition Facility."

S. Zhang, R. Paul, and M. A. Morales, "Benchmarking Phase Transitions in Periclase Under Multi-Megabar Pressures," presented at the American Geophysical Union Fall Meeting, virtual, 16 December 2020.

E. M. Campbell, "Laboratory for Laser Energetics Update," presented at the Fusion Power Associates 41st Annual Meeting and Symposium, virtual, 16–17 December 2020.

J. L. Shaw, M. V. Ambat, S.-W. Bahk, I. A. Begishev, R. Boni, J. Bromage, G. Bruhaug, S. Bucht, E. M. Campbell, A. Davies, C. Dorrer, P. Franke, R. K. Follett, V. N. Goncharov, D. Haberberger, A. Howard, G. W. Jenkins, J. Katz, T. J. Kessler, B. Kruschwitz, M. M. McKie, L. Nguyen, J. B. Oliver,

J. P. Palastro, D. Ramsey, M. A. Romo-Gonzalez, T. T. Simpson, D. Turnbull, L. J. Waxer, H. Wen, D. H. Froula, P. M. King, N. Lemos, G. J. Williams, H. Chen, F. Albert, M. D. Sinclair, C. Joshi, F. A. Hegmann, D. Purschke, S. Stoller, N. Vafaei-Najafabadi, B. Malaca, J. L. Martins, J. Vieira, S. Jolly, F. Quéré, A. Di Piazza, G. Gregori, Z. Li, T. M. Antonsen Jr., A. Arefiev, K. Weichman, and R. Bingham, "New Developments in Laser Wakefield Acceleration at the Laboratory for Laser Energetics," presented at the Oxford Hilary Series Seminar, virtual, 25 January 2021.

J. L. Peebles, J. R. Davies, D. H. Barnak, M. J. Bonino, T. Cracium, R. Betti, and P.-Y. Chang, "Probing Strong Electric and Magnetic Fields using Axial Proton Radiography of Laser-Driven Coils," presented at Charged Particle Radiography in High-Energy-Density Laboratory Plasmas, virtual, 25–28 January 2021.

J. P. Palastro, D. H. Froula, M. 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. Quéré, C. Benedetti, E. Esarey, C. 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," presented at the SOCAL Plasma Seminar, virtual, 9 February 2021.

S. Zhang, S. X. Hu, D. Haberberger, A. Shvydky, V. N. Goncharov, and D. E. Fratanduono, "Species Separation and Hydrogen Streaming: The Physics of CH Shock Release Revealed by Molecular Dynamics Simulations," presented at the NIF and JLF User Group Meeting 2021, virtual, 9–10 February 2021.

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, A. J. Crilly,



J. Chittenden, W. Taitano, P. Adrian, J. A. Frenje, N. Kabadi, and M. Gatu Johnson, “Neutron Spectroscopy in Laser-Direct-Drive Inertial Confinement Fusion Implosions,” presented at the Imperial College Seminar, virtual, 10 February 2021.

D. H. Froula, S. Jolly, F. Quéré, C. Benedetti, E. Esarey, C. Geddes, C. Schroeder, R. Bingham, S. Stoller, N. Vafaei-Najafabadi, G. Gregori, B. Malaca, A. Helm, J. Vieira, A. Di Piazza, A. Howard, A. Arefiev, T. M. Antonsen Jr., and Z. Li, “Spatiotemporal Pulse Shaping for Plasma Base Applications,” presented at the Imperial College Seminar, virtual, 17 February 2021.

R. B. Spielman, K. M. Woo, P. Tzeferacos, A. Reyes, C. R. Stillman, I. A. Begishev, C. Mileham, and J. Bromage, “Experiments and Modeling of SPL Absorption and Ablation with Picosecond Pulses,” presented at the Pulsed-Laser Workshop, virtual, 18 February 2021.

J. D. Zuegel, “Ultra-Short Pulse Laser (USPL) Science and Technology at LLE,” presented at the High Energy Laser Joint Technology Office Ultrashort Pulse Laser Workshop, virtual, 18 February 2021.

D. H. Froula, S. Jolly, F. Quéré, C. Benedetti, E. Esarey, C. Geddes, C. Schroeder, R. Bingham, S. Stoller, N. Vafaei-Najafabadi, G. Gregori, B. Malaca, A. Helm, J. Vieira, A. Di Piazza, A. Howard, A. Arafiev, T. M. Antonsen Jr., and Z. Li, “Spatiotemporal Pulse Shaping for Plasma Base Applications,” presented at the University of California-Irvine Seminar, virtual, 25 February 2021.

The following presentations were made at Photonics West 2021, virtual, 6–11 March 2021:

I. A. Begishev, S.-W. Bahk, C. Dorrer, C. Feng, M. J. Guardalben, C. Jeon, R. G. Roides, M. Spilatro, B. Webb, D. Weiner, J. D. Zuegel, and J. Bromage, “A Highly Efficient, 10-J Output Signal Amplifier for Ultra-Intense All-OPCPA Systems.”

T. Z. Kosc, T. J. Kessler, H. Huang, and S. G. Demos, “Minimizing Risk of Laser Damage due to Transverse Stimulated Raman Scattering in Large-Aperture KDP/DKDP Plates.”

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, A. J. Crilly, J. Chittenden, W. Taitano, P. Adrian, J. A. Frenje, N. Kabadi, and M. Gatu Johnson, “Neutron Spectroscopy in Laser-Direct-Drive Inertial Confinement Fusion Implosions,” presented at the UR Mechanical Engineering Seminar, virtual, 12 March 2021.

The following presentations were made at the APS March Meeting, virtual, 15–19 March 2021:

S. X. Hu, P. M. Nilson, V. V. Karasiev, R. Paul, M. Ghosh, J. Hinz, S. Zhang, D. Mihaylov, V. Recoules, N. Brouwer, M. Torrent, I. E. Golovkin, and T. Walton, “Understanding Matter at Superdense and Warm Conditions.”

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.”

R. Paul, S. X. Hu, V. V. Karasiev, R. Dias, “Phase Diagram of Ternary Carbon-Sulfur-Hydrogen System up to 300 GPa.”

D. N. Polsin, X. Gong, M. F. Huff, L. E. Crandall, B. J. Henderson, R. Paul, S. Burns, G. W. Collins, J. R. Rygg, A. Lazicki, F. Coppari, R. Smith, M. Millot, J. H. Eggert, M. I. McMahon, X. Wang, K. Hilleke, and E. Zurek, “High-Pressure Structural and Electronic Properties of Ramp-Compressed Sodium.”

S. Zhang, R. Paul, S. X. Hu, M. A. Morales, and F. D. Malone, “Benchmarking a Multi-Megabar Phase Diagram of MgO.”

D. H. Froula, J. P. Palastro, R. Boni, M. Ambat, P. Franke, J. Oliver, D. Ramsey, J. L. Shaw, T. T. Simpson, D. Turnbull,

S. Jolly, F. Quéré, C. Benedetti, E. Esarey, C. Geddes, C. Schroeder, R. Bingham, S. Stoller, N. Vafaei-Najafabadi, G. Gregori, B. Malaca, A. Helm, J. Vieira, A. DiPiazza, A. Howard, A. Arefiev, T. M. Antonsen Jr., and Z. Li, “Spatiotemporal Pulse Shaping for Plasma-Based Applications,” presented at the Industrial Associates Bi-Annual Meeting, virtual, 17–19 March 2021.

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E. M. Campbell, “Nuclear Energy, Today and Tomorrow,” presented at Oklahoma University, virtual, 19 March 2021.

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The following presentations were made at the 16th Direct-Drive and Fast-Ignition Workshop, virtual, 22–24 March 2021:

V. N. Goncharov, I. V. Igumenshchev, T. J. B. Collins, P. B. Radha, S. X. Hu, S. P. Regan, D. H. Froula, D. Harding, W. Theobald, M. J. Rosenberg, A. Shvydky, S. F. B. Morse, J. D. Zuegel, C. Dorrer, T. C. Sangster, and E. M. Campbell, “Expanding Ignition Parameter Space with the Dynamic Shell Formation Concept.”

S. X. Hu, V. V. Karasiev, P. M. Nilson, S. Zhang, M. Zaghoo, D. Mihaylov, J. Hinz, R. Paul, M. Ghosh, J. R. Rygg, V. N. Goncharov, G. W. Collins, E. M. Campbell, L. A. Collins, A. J. White, J. D. Kress, J. P. Colgan, O. Certik, V. Recoules, N. Brouwer, M. Torrent, I. E. Golovkin, M. Gu, T. Walton, and S. B. Hansen, “Overview of High-Energy-Density–Physics Research for the Direct-Drive Inertial Confinement Fusion Program at the Laboratory for Laser Energetics.”

K. L. Nguyen, A. M. Hansen, D. Turnbull, R. K. Follett, D. H. Froula, J. P. Palastro, L. Yin, and B. J. Albright, “Cross-Beam Energy Transfer Saturation by Ion Trapping-Induced Detuning.”

J. L. Peebles, S. X. Hu, W. Theobald, V. N. Goncharov, D. R. Harding, M. J. Bonino, P. M. Celliers, S. J. Ali, G. Duchateau, E. M. Campbell, T. R. Boehly, and S. P. Regan, “Experimental Measurements of Laser Imprint and Target-Based Mitigation Techniques on OMEGA and OMEGA EP.”

P. B. Radha, D. Cao, R. S. Craxton, D. H. Edgell, J. P. Knauer, J. A. Marozas, F. J. Marshall, M. J. Rosenberg, W. Seka, A. Shvydky, A. A. Solodov, C. Stoeckl, W. Theobald, C. A. Thomas, D. Turnbull, K. S. Anderson, R. Betti, E. M. Campbell, D. H. Froula, V. N. Goncharov, S. X. Hu, S. P. Regan,

M. Hohenberger, and J. D. Moody, “Laser-Coupling Studies on OMEGA and the National Ignition Facility.”

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.”

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

W. Theobald, S. P. Regan, J. Baltazar, K. A. Bauer, R. Betti, D. Bredesen, E. M. Campbell, D. Cao, K. Churnetski, D. H. Edgell, R. Epstein, C. J. Forrest, V. Yu. Glebov, V. N. Goncharov, V. Gopalaswamy, S. X. Hu, I. V. Igumenshchev, T. Joshi, S. T. Ivancic, D. W. Jacobs-Perkins, R. T. Janezic, T. J. Kessler, J. P. Knauer, J. Kwiatkowski, A. Lees, O. M. Mannon, F. J. Marshall, M. Michalko, Z. Mohamed, P. M. Nilson, D. Patel, J. L. Peebles, P. B. Radha, H. G. Rinderknecht, M. J. Rosenberg, S. Sampat, T. C. Sangster, R. C. Shah, A. Shvydky, A. A. Solodov, C. Sorce, C. Stoeckl, C. A. Thomas, L. J. Waxer, K. M. Woo, J. D. Zuegel, A. C. Carpenter, J. A. Frenje, M. Gatu Johnson, J. D. Hares, and J. D. Kilkenny, “Subscale Cryogenic Implosions and Diagnostic Development for Laser-Direct-Drive Research on OMEGA.”

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D. H. Froula, S. Jolly, F. Quéré, C. Benedetti, E. Esarey, C. Geddes, C. Schroeder, R. Bingham, S. Stoller, N. Vafaei-Najafabadi, G. Gregori, B. Malaca, A. Helm, J. Vieira, A. DiPiazza, A. Howard, A. Arefiev, T. M. Antonsen Jr., and Z. Li, “Controlling Laser Beams for Grand Challenge Applications,” presented at UR ECE Seminar, virtual, 24 March 2021.

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The following presentations were made at the High Energy Density Plasma Diagnostics Course, virtual, 30 March–3 June 2021:

K. Churnetski, M. Michalko, and S. T. Ivancic, “The Single Line-of-Sight Time-Resolved X-Ray Imager.”

S. T. Ivancic, “Omega Overview.”

S. T. Ivancic, “Test Project.”

S. T. Ivancic, “TRXI Install.”

H. McCLOW, O. M. Mannion, and Z. Mohamed, “Neutron Time-of-Flight Diagnostics.”

J. L. Peebles, J. R. Davies, D. H. Barnak, M. J. Bonino, G. Brent, T. Cracium, and R. Betti, “Laser-Drive Coils, How Well Do They Work?” presented at the HEDS Seminar, virtual, 1 April 2021.

E. M. Campbell, “LLE: Today and Tomorrow,” presented at the Institute of Optics Colloquium, virtual, 5 April 2021.

J. L. Shaw, G. Bruhaug, M. Freeman, F. Merrill, V. Geppert-Kleinrath, C. Wilde, and D. H. Froula, “Electron Radiography Based on Electron Beams from Self-Modulated Laser Wake-field Acceleration,” presented at LANSCE Futures Spring 2021 Workshop Series, virtual, 6 April 2021.

The following presentations were made at the 4th International Symposium on High Power Laser Science and Engineering, virtual, 11–16 April 2021:

J. Bromage, S.-W. Bahk, M. Bedzyk, I. A. Begishev, S. Bucht, C. Dorrer, C. Feng, C. Jeon, C. Mileham, R. G. Roides, K. Shaughnessy, M. J. Shoup III, M. Spilatro, B. Webb, D. Weiner, and J. D. Zuegel, “MTW-OPAL: A Technology Development Platform for Ultra-Intense OPCPA Systems.”

E. M. Campbell, “A Vision of the Future for High-Power Laser Research and Its Applications.”

E. M. Campbell, “Laser Fusion: Present Status and the Path to Fusion Energy,” presented at Cornell Energy Seminar, Cornell, NY, 15 April 2021.

S. P. Regan, “JASON Briefing,” presented at JASON, virtual, 15 April 2021.

A. K. Schwemmlin, C. Stoeckl, W. T. Shmayda, C. J. Forrest, J. P. Knauer, S. P. Regan, and W. U. Schröder, “Generating a TNSA Tritium Beam on OMEGA,” presented at the APS April Meeting, virtual, 17–20 April 2021.

J. P. Palastro, D. H. Froula, M. Ambat, E. M. Campbell, R. K. Follett, P. Franke, V. N. Goncharov, D. Ramsey, J. L. Shaw, T. T. Simpson, D. Turnbull, K. Weichman, H. Wen, S. Jolly, F. Quéré, C. Benedetti, E. Esarey, C. Geddes, C. Schroeder, R. Bingham, S. Stoller, N. Vafaei-Najafabadi, G. Gregori, B. Malaca, A. Helm, J. Vieira, A. Di Piazza, A. Howard, A. Arefiev, T. M. Antonsen, Jr., and Z. Li, “Laser–Plasma Interactions Driven by Spatiotemporally Structured Light Pulses,” presented at the Bothe Colloquium, virtual, 21 April 2021.

The following presentations were made at the Omega Laser Facility Users Group 2021 Workshop, virtual, 27–30 April 2021:

J. Bromage, S.-W. Bahk, M. Bedzyk, I. A. Begishev, S. Bucht, C. Dorrer, C. Feng, B. N. Hoffman, C. Jeon, C. Mileham, J. B. Oliver, R. G. Roides, E. M. Schiesser, K. Shaughnessy, M. J. Shoup III, M. Spilatro, B. Webb, D. Weiner, J. D. Zuegel, D. H. Froula, J. L. Shaw, P. M. Nilson, H. G. Rinderknecht, L. J. Waxer, J. C. Puth, and E. M. Hill, “Commissioned MTW-OPAL Laser and Proposed  $2 \times 25$  PW EP-OPAL Laser.”

G. W. Collins, “Extreme Matters: Pressure to Explore New Worlds and Exotic Solids.”

E. C. Hansen, A. C. Reyes, M. B. P. Adams, J. Carroll-Nellenback, J. R. Davies, K. Weide, D. Q. Lamb, and P. Tzeferacos, “Implicit Anisotropic Magnetic Resistivity in the *FLASH* Code.”

P. V. Heuer, D. Stanczak, E. T. Everson, N. A. Murphy, and J. R. Davies, “Open Source High-Energy-Density–Physics Diagnostic Tools in PlasmaPy.”

T. R. Joshi, R. C. Shah, W. Theobald, I. V. Igumenshchev, D. Cao, and S. P. Regan, “Observations of the Modulations

Associated with the 60-Beam Overlap in X-Ray Self-Emission Images of Directly Driven Implosions.”

Y. Lu, H. Li, K. Flippo, K. Kelso, A. Liao, S. Li, E. Liang, and P. Tzeferacos, “Monte Carlo Simulations for Proton Radiography in High-Energy-Density Plasma Experiments.”

S. F. B. Morse, “Omega Facility OLUG 2021 Update: Progress on Recommendations and Items of General Interest.”

S. P. Regan, “2020 Review of Inertial Confinement Fusion Approaches: The Research Path to Ignition.”

A. Reyes and P. Tzeferacos, “High-Order Implicit-Explicit ADER-RK Methods for Hyperbolic Systems with Stiff Source Terms in the *FLASH* Code.”

P. Tzeferacos, A. Reyes, E. C. Hansen, Y. Lu, D. Michta, M. P. A. Adams, C. J. Armstrong, K. Moczulski, and D. Q. Lamb, “The *FLASH* Code for Computational High-Energy-Density Physics—Recent Additions and Improvements.”

M. S. Wei, “Omega Basic Science User Programs Update.”

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E. M. Campbell, “Laser Fusion: Present Status and the Path to Fusion Energy,” presented at Cornell University, virtual, 5 May 2021.

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P. Tzeferacos, “Extended MHD with *FLASH*: A Numerical Toolset for Magnetized Plasma Experiments,” presented at the Center for Matter Under Extreme Conditions Seminar, virtual, 5 May 2021.

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The following presentations were made at CLEO 2021, virtual, 9–14 May 2021:

S.-W. Bahk, I. A. Begishev, B. Webb, C. Jeon, R. G. Roides, C. Feng, M. Spilatro, R. Cuffney, C. Dorrer, C. Mileham, S. Bucht, and J. Bromage, “Effect of Pump Beam on the Amplified Signal Wavefront in DKDP Optical Parametric Amplification.”

J. Bromage, S.-W. Bahk, M. Bedzyk, I. A. Begishev, S. Bucht, C. Dorrer, C. Feng, B. N. Hoffman, C. Jeon, C. Mileham, J. B.

Oliver, R. G. Roides, E. M. Schiesser, K. Shaughnessy, M. J. Shoup III, M. Spilatro, B. Webb, D. Weiner, and J. D. Zuegel, “MTW-OPAL: A Technology Development Platform for Ultra-Intense All-OPCPA Systems.”

C. Dorrer, I. A. Begishev, S.-W. Bahk, and J. Bromage, “Spatially Resolved Characterization of Partially Deuterated KDP Crystals for Parametric Amplification.”

C. Dorrer, M. Spilatro, T. Borger, S. Herman, and E. M. Hill, “Broadband Sum-Frequency Generation in a Novel Angularly Dispersed Noncollinear Geometry.”

C. Feng, C. Dorrer, C. Jeon, R. Roides, B. Webb, and J. Bromage, “Analysis of Pump-to-Signal Noise Transfer in Multi-Stage Optical Parametric Chirped-Pulse Amplification.”

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The following presentations were made at the ARPA-E Summit, virtual, 24–27 May 2021:

J. R. Davies, C. J. Forrest, V. Yu. Glebov, J. P. Knauer, and H. McClow, “The LLE Diagnostic Resource Team for Innovative Fusion Concepts.”

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 Source for Innovative Fusion Concepts in the BETHE Program.”

P. Tzeferacos, A. Reyes, E. C. Hansen, Y. Lu, D. Michta, M. P. A. Adams, C. J. Armstrong, K. Moczulski, and D. Q. Lamb, “*FLASH*: A Simulation Code for HEDP and Innovative Fusion Concepts.”

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H. G. Rinderknecht, M. S. Wei, G. Bruhaug, K. Weichmann, J. P. Palastro, J. D. Zuegel, A. Arefiev, T. Wang, T. Toncian, A. Laso Garcia, D. Doria, K. Spohr, H. J. Quevedo, T. Ditmire, J. Williams, A. Haid, and D. Stutman, “Relativistically Transparent Magnetic Filaments as a Gamma-Ray Source for All-Optical Nuclear Photonics,” presented at Nuclear Photonics 2021, virtual, 7–9 June 2021.



W. T. Shmayda, “Fundamentals of Tritium Handling,” presented at TRANSAT Second Tritium School, virtual, 14–16 June 2021.

P. Heuer, “Charged-Particle Radiography with PlasmaPy,” presented at the Summer Undergraduate Laboratory Internship Summer School, virtual, 14–25 June 2021.

E. M. Campbell, “Laboratory for Laser Energetics (LLE): Supporting OES Strategic Goals,” presented at the OES Executive Meeting, virtual, 15–16 June 2021.

J. Bromage, S.-W. Bahk, M. Bedzyk, I. A. Begishev, S. Bucht, C. Dorrer, C. Feng, B. N. Hoffman, C. Jeon, C. Mileham, J. B. Oliver, R. G. Roides, E. M. Schiesser, K. Shaughnessy, M. J. Shoup III, M. Spilatro, B. Webb, D. Weiner, and J. D. Zuegel, “MTW-OPAL—A Technology Development Platform for Ultra-Intense OPCPA Systems,” presented at EQEC, virtual, 20–24 June 2021.

The following presentations were made at the 47th European Physical Society Conference on Plasma Physics, virtual, 21–25 June 2021:

P. Franke, J. P. Palastro, D. Turnbull, D. Ramsey, T. T. Simpson, J. L. Shaw, M. V. Ambat, J. Katz, I. A. Begishev, R. Boni, J. Bromage, K. Daub, J. B. Oliver, C. Dorrer, D. H. Froula, S. Jolly, F. Quéré, C. Benedetti, E. Esarey, C. Geddes, C. Schroeder, R. Bingham, S. Stoller, N. Vafaei-Najafabadi, G. Gregori, B. Malaca, A. Helm, J. Vieira, A. Di Piazza, A. Howard, A. Arefiev, T. M. Antonsen, Jr., and Z. Li, “Spatiotemporal Control of Laser Pulses for Broadband Extreme Ultraviolet Generation.”

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

E. M. Campbell, “Laboratory for Laser Energetics (LLE): Today and Tomorrow,” presented at the Pulsed-Power Sciences Center, virtual, 23 June 2021.

P. Heuer, “Charged-Particle Radiography with PlasmaPy,” presented at Plasma Hack Week, virtual, 28 June–2 July 2021.

E. M. Campbell, “A Vision of the Future for High-Power Laser Research and Its Applications,” presented at Frontiers in Lasers and Applications, virtual, 5–29 July 2021.

E. M. Campbell, “Inertial Confinement Fusion: Present State of Research for Energy Demonstration and Potential Spin-Offs,” presented at Curso de Verano de la Universidad Complutense de Madrid (UCM) El Escorial, virtual, 12–13 July 2021.

W. T. Shmayda, “Overview of Tritium Handling,” presented at the Nevada National Security Site, virtual, 14 July 2021.

K. L. Marshall, B. E. Ugur, and W. Scullin, “Toward High-Performance Terahertz-Region Liquid Crystals: Computational Modeling of Fused-Ring Nematic and Discotic Mesogens,” presented at Liquid Crystals XXV, virtual, 1–5 August 2021 (invited).

K. Churnetski, K. M. Woo, W. Theobald, P. B. Radha, R. Betti, V. Gopalaswamy, I. V. Igumenshchev, S. T. Ivancic, M. Michalko, R. C. Shah, C. A. Thomas, and S. P. Regan, “Three-Dimensional Hot-Spot Reconstruction from Cryogenic Deuterium–Tritium Polar-Direct-Drive Implosions on OMEGA,” presented at High-Energy-Density Science Summer School, virtual, 2–6 August 2021.

D. Mihaylov, V. V. Karasiev, S. X. Hu, J. R. Rygg, V. N. Goncharov, and G. W. Collins, “Improved First-Principles

Equation-of-State Table of Deuterium,” presented at the American Physical Society Topical Group on Shock Compression of Condensed Matter Early Career Symposium, virtual, 3–4 August 2021.

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C. Dorrer, “Parametric Amplification of Spectrally Incoherent Signals,” presented at the Nonlinear Optics Topical Meeting, virtual, 9–13 August 2021.

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The following presentations were made at the 2021 LaserNetUS User Meeting, virtual, 17–19 August 2021:

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, J. D. Zuegel, and J. Bromage, “‘First Light’ Results from MTW-OPAL: An All-OPCPA Platform for Laser Development and Petawatt Science.”

E. M. Campbell, “Inertial Fusion Energy (IFE): Opportunities and Challenges.”

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E. M. Campbell, “NAS Study on High Energy Density Science,” presented at the National Academy of Sciences Site Visit, virtual, 26 August 2021.

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D. H. Froula, “Taming Plasmas and Controlling Laser Beams for Grand Challenge Applications,” presented at the Fusion Energy Sciences Advisory Committee Meeting, virtual, 30 August 2021.

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E. M. Campbell, “Laboratory for Laser Energetics (LLE) Comments on HIBEF Dedication,” presented at the HIBEF Inauguration, virtual, 31 August 2021.

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R. B. Spielman, “Pulsed-Power Innovations Needed for Next-Generation, High-Current Drivers,” presented at the 48th

IEEE International Conference on Plasma Science, virtual, 12–16 September 2021.

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L. Savino, S. Atzeni, V. N. Goncharov, and I. V. Igumenshev, “Studies on Dynamical Shell Formation for Direct-Drive Laser Fusion,” presented at the 107th Italian Physical Society Conference, virtual, 13–17 September 2021.

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J. D. Zuegel, “2021 Multi-Petawatt Physics Prioritization (MP3) Workshop,” presented at the 4th Extremely High Intensity Laser Physics Conference, virtual, 13–17 September 2021.

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E. M. Campbell, “Inertial Fusion Energy (IFE): Opportunities and Challenges,” Fusion Energy Council of Canada Annual General Meeting, virtual, 15 September 2021.

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S. Zhang, R. Paul, M. Ghosh, S. X. Hu, L. E. Hansen, J. R. Rygg, G. W. Collins, M. Morales, F. Malone, and D. E. Fratanduono, “Multi-Megabar Phase Transitions from First-Principles Examples in MgO and Fe,” presented at the Center for Matter at Atomic Pressures Seminar, virtual, 17 September 2021.

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C. Dorrer, J. Bromage, S.-W. Bahk, M. Bedzyk, I. A. Begishev, S. Bucht, C. Feng, B. N. Hoffman, C. Jeon, C. Mileham, J. B. Oliver, R. G. Roides, E. M. Schiesser, K. Shaughnessy, M. J. Shoup III, M. Spilatro, B. Webb, D. Weiner, and J. D. Zuegel, “MTW-OPAL: A Technology Development Platform for Ultra-Intense OPCPA Systems,” presented at Topical Problems of Nonlinear Wave Physics, virtual, 19–22 September 2021.

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S. Zhang, “Molecular to Atomic Transition in Liquid Silica at Extreme Conditions,” presented at the Emerging Leader Celebration, virtual, 20–21 September 2021.

The following presentations were made at the 5th Asia Pacific Conference on Plasma Physics, virtual, 26 September–1 October 2021:

S. X. Hu, P. M. Nilson, V. V. Karasiev, D. Bishel, V. Recoules, N. Brouwer, M. Torrent, I. E. Golovkin, M. Gu, T. Walton, and S. B. Hansen, “Probing Extreme Atomic Physics of Warm and Superdense Plasmas” (invited).

P. Tzeferacos, “TDYNO: Laser-Driven Laboratory Plasma Astrophysics Experiments of Magnetized Turbulence and Fluctuation Dynamo.”

K. Weichman, A. V. Arefiev, H. Mao, F. N. Beg, J. P. Palastro, A. P. L. Robinson, M. Murakami, S. Fujioka, J. J. Santos,

T. Toncian, Y. Shi, T. Ditmire, H. Quevedo, and V. V. Ivanov, “Effects of KiloTesla-Level Magnetic Fields on Relativistic Laser–Plasma Interactions” (invited).

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C. J. Forrest, A. Crilly, B. Applebe, V. Yu. Glebov, J. P. Knauer, O. M. Mannion, Z. L. Mohamed, P. B. Radha, S. P. Regan, A. K. Schwemmlin, and C. Stoeckl, “Inferring Absolute Neutron Energy Spectra from Time-of-Flight Spectrometers Operating in Current Mode,” presented at the Neutron Detector Workshop, Knoxville, TN, 30 September–2 October 2021.