Stanford



Siegfried Glenzer

Professor of Photon Science and, by courtesy, of Mechanical Engineering

Photon Science Directorate

Bio

BIO

Siegfried Glenzer, who is the recipient of the recent E. O. Lawrence award, is Professor and High-Energy-Density division director at SLAC National Accelerator Laboratory. He joined SLAC as a distinguished scientist in 2013 to build a new discovery-class program in exploring matter in extreme conditions using high-power lasers and the world-class Linac Coherent Light Source x-ray beam. Before joining SLAC, he held the plasma physics group leader position at the Lawrence Livermore National Laboratory for 12 years, where he led the first inertial confinement fusion experiments on the National Ignition Facility. He has also been visiting lecturer at the University of California, Berkeley. Siegfried is the individual recipient of the American Physical Society “Excellence in Plasma Physics” Award (2003). He also won two DOE Excellence in Publications Awards (2011 & 2014) and two Science and Technology Awards (2005 & 2012). In 2004, he received the Alexander-von-Humboldt senior research prize and spent a research and teaching year at the Universität Rostock and at the Deutsche Elektronen Synchrotron in Hamburg, Germany. Since then, he has been the host for two Alexander-von-Humboldt Lynen postdoctoral fellows, two Lawrence postdoctoral fellows, three Peter-Paul-Ewald fellows, and has supervised more than 30 postdoctoral scientists both at LLNL and SLAC.

Siegfried authored and co-authored more than 400 journal publications. Siegfried published the textbook “Plasma Scattering of Electromagnetic Radiation” by D. H. Froula, S. H. Glenzer, N. C. Luhamn, Jr., J. Sheffield, 2nd edition (Elsevier, 2010) and is a fellow of the American Physical Society.

ACADEMIC APPOINTMENTS

- Professor, Photon Science Directorate
- Professor (By courtesy), Mechanical Engineering
- Member, Bio-X
- Principal Investigator, Stanford PULSE Institute

HONORS AND AWARDS

- Dr. rer. nat. h. c., Rostock University (2019)
- E. O. Lawrence Award, US Department of Energy (2014)
- Humboldt Senior Research Prize, Alexander from Humboldt foundation (2004)
- Excellence in Plasma Physics Award, American Physical Society (2003)
- Fellow, American Physical Society (2001)

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Member, Advisory Committee of MIT's Center of Excellence HEDP Science (2018 - present)
- Member, National Ignition Facility Discovery Science Technical Review Committee (2016 - present)

- Member, INERTIAL CONFINEMENT FUSION IGNITION & HIGH YIELD (ICF) PROGRAM RED TEAM (ICF RED TEAM) (2017 - present)

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Please see our website for detailed information: https://heds.slac.stanford.edu

Teaching

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Victor Perez-Ramirez

Postdoctoral Faculty Sponsor

Armin Bergermann, Monika Salesh, Eric Sung

Doctoral Dissertation Advisor (AC)

Umang Agarwal, Danielle Brown, Jhonnatan Gama Vazquez, Kaden Loring, Willow Martin, Matthew Ricks, Isleydys Silva Torrecilla, Luke Weaver, Katie Wootten

Publications

PUBLICATIONS

- **Time-resolved X-ray imaging of the current filamentation instability in solid-density plasmas.** *Nature communications*
  Schoenwaelder, C., Marret, A., Assenbaum, S., Curry, C. B., Cunningham, E., Dyer, G., Funk, S., Glenn, G. D., Goede, S., Khaghani, D., Rehwald, M., Schramm, U., Treffert, et al
  2026

- **Unveiling structural effects on the DC conductivity of warm dense matter via terahertz spectroscopy and ultrafast electron diffraction.** *Nature communications*
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- **Replenishing liquid sheet targets to enable high-intensity high-repetition-rate laser-plasma interactions for ion-beam technology.** *The Review of scientific instruments*
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- **Synthesis of Gold Hydride at High Pressure and High Temperature.** *Angewandte Chemie (International ed. in English)*
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- **Structural evolution of liquid silicates under conditions in Super-Earth interiors.** *Nature communications*
  Morard, G., Hernandez, J. A., Pege, C., Nagy, C., Libon, L., Lacquement, A., Sokaras, D., Lee, H. J., Galtier, E., Heimann, P., Cunningham, E., Glenzer, S. H., Vinci, et al
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- **X-ray diffraction of metastable structures from supercooled liquid hydrogen.** *Scientific reports*
  Fletcher, L. B., Levitan, A. L., McBride, E. E., Kim, J. B., Alves, E. P., Aquila, A., Frost, M., Goede, S., King, G., Lane, T. J., Liang, M., MacDonald, M. J., Ofori-Okai, et al
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- **Release dynamics of nanodiamonds created by laser-driven shock-compression of polyethylene terephthalate.** *Scientific reports*

Heuser, B., Bergermann, A., Stevenson, M. G., Ranjan, D., He, Z., Lütgert, J., Schumacher, S., Bethkenhagen, M., Descamps, A., Galtier, E., Gleason, A. E., Khaghani, D., Glenn, et al
2024; 14 (1): 12239

- **Dynamically assisted nuclear fusion in the strong-field regime** *PHYSICAL REVIEW C*
  Lindsey, M., Bekx, J., Schlesinger, K., Glenzer, S.
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- **Evidence for phonon hardening in laser-excited gold using x-ray diffraction at a hard x-ray free electron laser.** *Science advances*
  Descamps, A., Ofori-Okai, B. K., Bistoni, O., Chen, Z., Cunningham, E., Fletcher, L. B., Hartley, N. J., Hastings, J. B., Khaghani, D., Mo, M., Nagler, B., Recoules, V., Redmer, et al
  2024; 10 (6): eadh5272
- **Ultrafast x-ray detection of low-spin iron in molten silicate under deep planetary interior conditions.** *Science advances*
  Shim, S. H., Ko, B., Sokaras, D., Nagler, B., Lee, H. J., Galtier, E., Glenzer, S., Granados, E., Vinci, T., Fiquet, G., Dolinschi, J., Tappan, J., Kulka, et al
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- **On the control of electron heating for optimal laser radiation pressure ion acceleration** *JOURNAL OF PLASMA PHYSICS*
  Chou, H., Grassi, A., Glenzer, S. H., Fiuza, F.
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- **Diamond formation kinetics in shock-compressed C–H–O samples recorded by small-angle x-ray scattering and x-ray diffraction.** *Science advances*
  He, Z., Rodel, M., Lutgert, J., Bergermann, A., Bethkenhagen, M., Chekrygina, D., Cowan, T. E., Descamps, A., French, M., Galtier, E., Gleason, A. E., Glenn, G. D., Glenzer, et al
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- **The high-pressure lithium-palladium and lithium-palladium-hydrogen systems.** *Scientific reports*
  Frost, M., McBride, E. E., Smith, J. S., Glenzer, S. H.
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- **Applicability of semiclassical methods for modeling laser-enhanced fusion rates in a realistic setting** *PHYSICAL REVIEW C*
  Bekx, J., Lindsey, M., Glenzer, S., Schlesinger, K.
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- **Sub-micron thick liquid sheets produced by isotropically etched glass nozzles.** *Lab on a chip*
  Crissman, C. J., Mo, M., Chen, Z., Yang, J., Huyke, D. A., Glenzer, S. H., Ledbetter, K., F Nunes, J. P., Ng, M. L., Wang, H., Shen, X., Wang, X., DePonte, et al
  2022
- **Ultrafast visualization of incipient plasticity in dynamically compressed matter.** *Nature communications*
  Mo, M., Tang, M., Chen, Z., Peterson, J. R., Shen, X., Baldwin, J. K., Frost, M., Kozina, M., Reid, A., Wang, Y., E, J., Descamps, A., Ofori-Okai, et al
  2022; 13 (1): 1055
- **Ultrafast structural response of shock-compressed plagioclase** *METEORITICS & PLANETARY SCIENCE*
  Gleason, A. E., Park, S., Rittman, D. R., Ravasio, A., Langenhorst, F., Bolis, R. M., Granados, E., Hok, S., Kroll, T., Sikorski, M., Weng, T., Lee, H., Nagler, et al
  2022
- **High Pressure Brillouin Spectroscopy and X-ray Diffraction of Cerium Dioxide** *MATERIALS*
  Frost, M., Lazarz, J. D., Levitan, A. L., Prakapenka, V. B., Sun, P., Tkachev, S. N., Yang, H., Glenzer, S. H., Gleason, A. E.
  2021; 14 (13)
- **Structure retrieval in liquid-phase electron scattering.** *Physical chemistry chemical physics : PCCP*
  Yang, J., Nunes, J. P., Ledbetter, K., Biasin, E., Centurion, M., Chen, Z., Cordones, A. A., Crissman, C., Deponte, D. P., Glenzer, S. H., Lin, M., Mo, M., Rankine, et al
  2020
- **Cryogenic Liquid Jets for High Repetition Rate Discovery Science.** *Journal of visualized experiments : JoVE*
  Curry, C. B., Schoenwaelder, C., Goede, S., Kim, J. B., Rehwald, M., Treffert, F., Zeil, K., Glenzer, S. H., Gauthier, M.

2020

- **Femtosecond electronic structure response to high intensity XFEL pulses probed by iron X-ray emission spectroscopy.** *Scientific reports*
  Alonso-Mori, R. n., Sokaras, D. n., Cammarata, M. n., Ding, Y. n., Feng, Y. n., Fritz, D. n., Gaffney, K. J., Hastings, J. n., Kao, C. C., Lemke, H. T., Maxwell, T. n., Robert, A. n., Schropp, et al
  2020; 10 (1): 16837

- **In situ X-ray diffraction of silicate liquids and glasses under dynamic and static compression to megabar pressures.** *Proceedings of the National Academy of Sciences of the United States of America*
  Morard, G. n., Hernandez, J. A., Guarguaglini, M. n., Bolis, R. n., Benuzzi-Mounaix, A. n., Vinci, T. n., Fiquet, G. n., Baron, M. A., Shim, S. H., Ko, B. n., Gleason, A. E., Mao, W. L., Alonso-Mori, et al
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- **High-Pressure Melt Curve and Phase Diagram of Lithium.** *Physical review letters*
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- **High-Pressure Melt Curve and Phase Diagram of Lithium** *PHYSICAL REVIEW LETTERS*
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- **Author Correction: Generation and characterization of ultrathin free-flowing liquid sheets.** *Nature communications*
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  Sun, P., Wang, Y., Frost, M., Schoenwaelder, C., Levitan, A. L., Mo, M., Chen, Z., Hastings, J. B., Tynan, G. R., Glenzer, S. H., Heimann, P.
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- **Author Correction: Generation and characterization of ultrathin free-flowing liquid sheets.** *Nature communications*
  Koralek, J. D., Kim, J. B., Bruza, P., Curry, C. B., Chen, Z., Bechtel, H. A., Cordones, A. A., Sperling, P., Toleikis, S., Kern, J. F., Moeller, S. P., Glenzer, S. H., DePonte, et al
  2018; 9 (1): 2860

- **Heterogeneous to homogeneous melting transition visualized with ultrafast electron diffraction.** *Science (New York, N.Y.)*
  Mo, M. Z., Chen, Z., Li, R. K., Dunning, M., Witte, B. B., Baldwin, J. K., Fletcher, L. B., Kim, J. B., Ng, A., Redmer, R., Reid, A. H., Shekhar, P., Shen, et al
  2018; 360 (6396): 1451–55

- **Generation and characterization of ultrathin free-flowing liquid sheets** *NATURE COMMUNICATIONS*
  Koralek, J. D., Kim, J. B., Bruza, P., Curry, C. B., Chen, Z., Bechtel, H. A., Cordones, A. A., Sperling, P., Toleikis, S., Kern, J. F., Moeller, S. P., Glenzer, S. H., DePonte, et al
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- **Call for papers: special issue on correlations in light-matter interactions** *JOURNAL OF PHYSICS B-ATOMIC MOLECULAR AND OPTICAL PHYSICS*
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  2017; 50 (9)

- **Relativistic Electron Streaming Instabilities Modulate Proton Beams Accelerated in Laser-Plasma Interactions** *PHYSICAL REVIEW LETTERS*
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  2017; 118 (19)

- **Relativistic Electron Streaming Instabilities Modulate Proton Beams Accelerated in Laser-Plasma Interactions** *PHYSICAL REVIEW ACCELERATORS AND BEAMS*
  Goede, S., Roedel, C., Zeil, K., Mishra, R., Gauthier, M., Brack, F., Kluge, T., MacDonald, M. J., Metzkes, J., OBST, L., Rehwald, M., RUYER, C., Schlenvoigt, et al
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- **Ab initio simulations of the dynamic ion structure factor of warm dense lithium** *PHYSICAL REVIEW B*
  Witte, B. B., Shihab, M., Glenzer, S. H., Redmer, R.
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- **Calibration and characterization of a highly efficient spectrometer in von Hamos geometry for 7-10 keV x-rays** *REVIEW OF SCIENTIFIC INSTRUMENTS*
  Jarrott, L. C., Wei, M. S., McGuffey, C., Beg, F. N., Nilson, P. M., Sorce, C., Stoeckl, C., Theoboald, W., Sawada, H., Stephens, R. B., Patel, P. K., McLean, H. S., Landen, et al
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- **Observation of Betatron X-Ray Radiation in a Self-Modulated Laser Wakefield Accelerator Driven with Picosecond Laser Pulses** *PHYSICAL REVIEW LETTERS*
  Albert, F., Lemos, N., Shaw, J. L., Pollock, B. B., Goyon, C., Schumaker, W., Saunders, A. M., Marsh, K. A., Pak, A., Ralph, J. E., Martins, J. L., Amorim, L. D., Falcone, et al
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- **A strong diffusive ion mode in dense ionized matter predicted by Langevin dynamics** *NATURE COMMUNICATIONS*
  Mabey, P., Richardson, S., WHITE, T. G., Fletcher, L. B., Glenzer, S. H., HARTLEY, N. J., Vorberger, J., Gericke, D. O., Gregori, G.
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- **Using neutrons to measure keV temperatures in highly compressed plastic at multi-Gbar pressures** *HIGH ENERGY DENSITY PHYSICS*
  Nilsen, J., Bachmann, B., Zimmerman, G. B., Hatarik, R., Doppner, T., Swift, D., Hawreliak, J., Collins, G. W., Falcone, R. W., Glenzer, S. H., Kraus, D., Landen, O. L., Kritcher, et al
  2016; 21: 20-26
- **Experimental room temperature hohlraum performance study on the National Ignition Facility** *PHYSICS OF PLASMAS*
  Ralph, J. E., Strozzi, D., Ma, T., Moody, J. D., Hinkel, D. E., Callahan, D. A., MacGowan, B. J., Michel, P., Kline, J. L., Glenzer, S. H., ALBERT, F., Benedetti, L. R., Divol, et al
  2016; 23 (12)
- **A single-shot spatial chirp method for measuring initial AC conductivity evolution of femtosecond laser pulse excited warm dense matter** *REVIEW OF SCIENTIFIC INSTRUMENTS*
  Chen, Z., Hering, P., Brown, S. B., Curry, C., Tsui, Y. Y., Glenzer, S. H.
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- **The design of the optical Thomson scattering diagnostic for the National Ignition Facility** *REVIEW OF SCIENTIFIC INSTRUMENTS*
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- **Simulated performance of the optical Thomson scattering diagnostic designed for the National Ignition Facility** *REVIEW OF SCIENTIFIC INSTRUMENTS*
  Ross, J. S., Datte, P., Divol, L., Galbraith, J., Froula, D. H., Glenzer, S. H., Hatch, B., Katz, J., Kilkenny, J., Landen, O., Manuel, A. M., Molander, W., Montgomery, et al
  2016; 87 (11)
- **High resolution x-ray Thomson scattering measurements from cryogenic hydrogen jets using the linac coherent light source** *REVIEW OF SCIENTIFIC INSTRUMENTS*
  Fletcher, L. B., Zastrau, U., Galtier, E., Gamboa, E. J., Goede, S., Schumaker, W., Ravasio, A., Gauthier, M., MacDonald, M. J., Chen, Z., Granados, E., Lee, H. J., FRY, et al
  2016; 87 (11)
- **Measurement of high-dynamic range x-ray Thomson scattering spectra for the characterization of nano-plasmas at LCLS** *REVIEW OF SCIENTIFIC INSTRUMENTS*
  MacDonald, M. J., Gorkhover, T., Bachmann, B., Bucher, M., Carron, S., Coffee, R. N., Drake, R. P., Ferguson, K. R., Fletcher, L. B., Gamboa, E. J., Glenzer, S. H., Gode, S., Hau-Riege, et al
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- **Development of a cryogenic hydrogen microjet for high-intensity, high-repetition rate experiments** *REVIEW OF SCIENTIFIC INSTRUMENTS*
  Kim, J. B., Gode, S., Glenzer, S. H.
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- **High-intensity laser-accelerated ion beam produced from cryogenic micro-jet target** *REVIEW OF SCIENTIFIC INSTRUMENTS*
  Gauthier, M., Kim, J. B., Curry, C. B., Aurand, B., Gamboa, E. J., Gode, S., Goyon, C., Hazi, A., Kerr, S., Pak, A., PROPP, A., Ramakrishna, B., Ruby, et al
  2016; 87 (11)

- **Single-shot mega-electronvolt ultrafast electron diffraction for structure dynamic studies of warm dense matter** *REVIEW OF SCIENTIFIC INSTRUMENTS*
  Mo, M. Z., Shen, X., Chen, Z., Li, R. K., Dunning, M., Sokolowski-Tinten, K., Zheng, Q., WEATHERSBY, S. P., Reid, A. H., Coffee, R., Makasyuk, I., Edstrom, S., McCormick, et al
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- **Single-shot measurements of plasmons in compressed diamond with an x-ray laser (vol 22, 056319, 2015)** *PHYSICS OF PLASMAS*
  Gamboa, E. J., Fletcher, L. B., Lee, H. J., Zastrau, U., Galtier, E., MacDonald, M. J., Gauthier, M., Vorberger, J., Gericke, D. O., Granados, E., Hastings, J. B., Glenzer, S. H.
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- **Dual crystal x-ray spectrometer at 1.8 keV for high repetition-rate single-photon counting spectroscopy experiments** *JOURNAL OF INSTRUMENTATION*
  Gamboa, E. J., Bachmann, B., Kraus, D., MacDonald, M. J., Bucher, M., Carron, S., Coffee, R. N., Drake, R. P., Emig, J., Ferguson, K. R., Fletcher, L. B., Glenzer, S. H., Gorkhover, et al
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  Kraus, D., Chapman, D. A., Kritcher, A. L., Baggott, R. A., Bachmann, B., Collins, G. W., Glenzer, S. H., Hawreliak, J. A., Kalantar, D. H., Landen, O. L., Ma, T., Le Pape, S., Nilsen, et al
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  2016; 87 (7): 073301-?

- **Calculation of Debye-Scherrer diffraction patterns from highly stressed polycrystalline materials** *JOURNAL OF APPLIED PHYSICS*
  MacDonald, M. J., Vorberger, J., Gamboa, E. J., Drake, R. P., Glenzer, S. H., Fletcher, L. B.
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- **Matter under extreme conditions experiments at the Linac Coherent Light Source** *JOURNAL OF PHYSICS B-ATOMIC MOLECULAR AND OPTICAL PHYSICS*
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  2016; 49 (9)

- **X-ray scattering measurements of dissociation-induced metallization of dynamically compressed deuterium** *NATURE COMMUNICATIONS*
  Davis, P., Doppner, T., Rygg, J. R., FORTMANN, C., Divol, L., Pak, A., Fletcher, L., Becker, A., Holst, B., Sperling, P., Redmer, R., Desjarlais, M. P., Celliers, et al
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- **A direct-drive exploding-pusher implosion as the first step in development of a monoenergetic charged-particle backlighting platform at the National Ignition Facility** *HIGH ENERGY DENSITY PHYSICS*
  Rosenberg, M. J., Zylstra, A. B., Seguin, F. H., Rinderknecht, H. G., Frenje, J. A., Johnson, M. G., SIO, H., WAUGH, C. J., Sinenian, N., Li, C. K., Petrasso, R. D., Lepape, S., Ma, et al
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- **Nanosecond formation of diamond and lonsdaleite by shock compression of graphite** *NATURE COMMUNICATIONS*
  Kraus, D., Ravasio, A., Gauthier, M., Gericke, D. O., Vorberger, J., Frydrych, S., Helfrich, J., Fletcher, L. B., Schaumann, G., Nagler, B., Barbrel, B., Bachmann, B., Gamboa, et al

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- **Resonance between heat-carrying electrons and Langmuir waves in inertial confinement fusion plasmas** *PHYSICS OF PLASMAS*
  Rozmus, W., Chapman, T., Brantov, A., Winjum, B. J., Berger, R. L., Brunner, S., Bychenkov, V. Y., Tableman, A., Tzoufras, M., Glenzer, S.
  2016; 23 (1)
- **Development of a WDM platform for charged-particle stopping experiments** *9TH INTERNATIONAL CONFERENCE ON INERTIAL FUSION SCIENCES AND APPLICATIONS (IFSA 2015)*
  Zylstra, A. B., Frenje, J. A., Grabowski, P. E., Li, C. K., Collins, G. W., Fitzsimmons, P., Glenzer, S., Graziani, F., Hansen, S. B., Hu, S. X., Johnson, M. G., Keiter, P., Reynolds, et al
  2016; 717
- **High-Energy Density science at the Linac Coherent Light Source** *8TH INTERNATIONAL CONFERENCE ON INERTIAL FUSION SCIENCES AND APPLICATIONS (IFSA 2013)*
  Glenzer, S. H., Fletcher, L. B., Hastings, J. B.
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- **Hydrodynamic instabilities and mix studies on NIF: predictions, observations, and a path forward** *8TH INTERNATIONAL CONFERENCE ON INERTIAL FUSION SCIENCES AND APPLICATIONS (IFSA 2013)*
  Remington, B. A., Atherton, L. J., Benedetti, L. R., Berzak-Hopkins, L., Bradley, D. K., Callahan, D. A., Casey, D. T., Celliers, P. M., Cerjan, C. J., Clark, D. S., Dewald, E. L., Dittrich, T. R., Dixit, et al
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- **Shock Hugoniot measurements of CH at Gbar pressures at the NIF** *8TH INTERNATIONAL CONFERENCE ON INERTIAL FUSION SCIENCES AND APPLICATIONS (IFSA 2013)*
  Kritcher, A. L., Doeppner, T., Swift, D., Hawreliak, J., Nilsen, J., Hammer, J., Bachmann, B., Collins, G., Landen, O., Keane, C., Glenzer, S., Rothman, S., Chapman, et al
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- **The preliminary design of the optical Thomson scattering diagnostic for the National Ignition Facility** *9TH INTERNATIONAL CONFERENCE ON INERTIAL FUSION SCIENCES AND APPLICATIONS (IFSA 2015)*
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- **Platform for spectrally resolved x-ray scattering from imploding capsules at the National Ignition Facility** *9TH INTERNATIONAL CONFERENCE ON INERTIAL FUSION SCIENCES AND APPLICATIONS (IFSA 2015)*
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- **Ultrafast electron kinetics in short pulse laser-driven dense hydrogen** *JOURNAL OF PHYSICS B-ATOMIC MOLECULAR AND OPTICAL PHYSICS*
  Zastrau, U., Sperling, P., Fortmann-Grote, C., Becker, A., Bornath, T., Bredow, R., Doeppner, T., Fennel, T., Fletcher, L. B., Foerster, E., Goede, S., Gregori, G., Harmand, et al
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