Stanford

Eric C. Galtier

Lead Scientist, SLAC National Accelerator Laboratory

Curriculum Vitae available Online

Bio

BIO

I am interested in the study of High Energy Density systems, more precisely the creation, control and diagnosis of plasmas found in astrophysical bodies (e.g. the Sun), when a high-intensity laser interacts with matter, and in magnetic and laser-driven fusion processes. While I have implemented spectroscopic methods to explore the detailed atomic physics of these exciting state of matter, I have also been pursuing the development of high resolution X-ray imaging methods as a new type of diagnostic to study the dynamics of these plasmas on femtosecond time-scale and few hundred nanometer spatial-scale.

At the Sorbonne University Pierre and Marie Curie, I have been introduced to the fusion sciences, being part of such first dedicated masters program in France. I learned about magnetic fusion (e.g. tokamak), laser-driven fusion through inertial confinement (e.g. direct and indirect drive) and all the relevant existing and to-be-developed technology dedicated to fusion and its control for future design of power plants. During my PhD, I joined an international effort to perform the first fundamental research on the soft X-ray free-electron laser (FEL) FLASH, in Hamburg. I participated in the first spectroscopic studies of high-intensity FEL interaction with solid aluminum, revealing complex atomic physics pattern, not seen in typical optical laser/ matter interaction. The novelty of such interaction lead my to join the Linac Coherent Light Source at SLAC, to continue this research with harder X-rays, and further explore its connection with fusion sciences.

CURRENT ROLE AT STANFORD

Matter in Extreme Conditions, Instrument Lead, Linac Coherent Light Source.

EDUCATION AND CERTIFICATIONS

- B.S., Sorbonne University Pierre and Marie Curie , Fusion Sciences (2007)
- Ph.D., Sorbonne University Pierre and Marie Curie , Physics (2010)

LINKS

- My Lab Website: https://lcls.slac.stanford.edu/instruments/mec
- My Google Scholar: https://scholar.google.com/citations?user=5pd36hMAAAAJ&hl=en

Publications

PUBLICATIONS

- **Combined speckle- and propagation-based single shot two-dimensional phase retrieval method** *OPTICS EXPRESS*
  Leong, A., Hodge, D. A., Kelinkurzer-ogul, K., Marchesini, S., Pandolfi, S., Liu, Y., Barber, J., Li, K., Sakdinawat, A., Galtier, E., Nagler, B., Lee, H., Cunningham, et al

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- **Structural evolution of liquid silicates under conditions in Super-Earth interiors.** *Nature communications*
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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
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- **Shock compression experiments using the DiPOLE 100-X laser on the high energy density instrument at the European x-ray free electron laser: Quantitative structural analysis of liquid Sn** *JOURNAL OF APPLIED PHYSICS*
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- **Radiation and heat transport in divergent shock-bubble interactions** *PHYSICS OF PLASMAS*
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- **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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- **Simultaneous bright- and dark-field X-ray microscopy at X-ray free electron lasers.** *Scientific reports*
  Dresselhaus-Marais, L. E., Kozioziemski, B., Holstad, T. S., Ræder, T. M., Seaberg, M., Nam, D., Kim, S., Breckling, S., Choi, S., Chollet, M., Cook, P. K., Folsom, E., Galtier, et al
  2023; 13 (1): 17573

- **Probing shock dynamics inside micro-wire targets after high-intensity laser irradiation using small angle x-ray scattering of a free-electron laser** *NEW JOURNAL OF PHYSICS*
  Kluge, T., Bussmann, M., Galtier, E., Glenzer, S., Grenzer, J., Gutt, C., Hartley, N. J., Huang, L., Garcia, A., Lee, H., Mcbride, E. E., Metzkes-Ng, J., Nakatsutsumi, et al
  2023; 25 (10)

- **Multi-frame, ultrafast, x-ray microscope for imaging shockwave dynamics.** *Optics express*
  Hodge, D. S., Leong, A. F., Pandolfi, S., Kurzer-Ogul, K., Montgomery, D. S., Aluie, H., Bolme, C., Carver, T., Cunningham, E., Curry, C. B., Dayton, M., Decker, F., Galtier, et al
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- **Novel fabrication tools for dynamic compression targets with engineered voids using photolithography methods.** *The Review of scientific instruments*
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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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- **Femtosecond Visualization of hcp-Iron Strength and Plasticity under Shock Compression.** *Physical review letters*
  Merkel, S., Hok, S., Bolme, C., Rittman, D., Ramos, K. J., Morrow, B., Lee, H. J., Nagler, B., Galtier, E., Granados, E., Hashim, A., Mao, W. L., Gleason, et al
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- **Ultrafast X-ray Diffraction Study of a Shock-Compressed Iron Meteorite above 100 GPa** *MINERALS*
  Tecklenburg, S., Colina-Ruiz, R., Hok, S., Bolme, C., Galtier, E., Granados, E., Hashim, A., Lee, H., Merkel, S., Morrow, B., Nagler, B., Ramos, K., Rittman, et al
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- **Ronchi shearing interferometry for wavefronts with circular symmetry** *JOURNAL OF SYNCHROTRON RADIATION*
  Nagler, B., Galtier, E. C., Brown, S. B., Heimann, P., Dyer, G., Lee, H.
  2020; 27: 1461–69

- **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
  2020

- **Focal Spot and Wavefront Sensing of an X-Ray Free Electron laser using Ronchi shearing interferometry** *SCIENTIFIC REPORTS*
  Nagler, B., Aquila, A., Boutet, S., Galtier, E. C., Hashim, A., Hunter, M. S., Liang, M., Sakdinawat, A. E., Schroer, C. G., Schropp, A., Seaberg, M. H., Seiboth, F., van Driel, et al
  2017; 7: 13698

- **Shock drive capabilities of a 30-Joule laser at the matter in extreme conditions hutch of the Linac Coherent Light Source** *REVIEW OF SCIENTIFIC INSTRUMENTS*
  Brown, S., Hashim, A., Gleason, A., Galtier, E., Nam, I., Xing, Z., Fry, A., MacKinnon, A., Nagler, B., Granados, E., Lee, H.
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- **The phase-contrast imaging instrument at the matter in extreme conditions endstation at LCLS** *REVIEW OF SCIENTIFIC INSTRUMENTS*
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- **Bent crystal spectrometer for both frequency and wavenumber resolved x-ray scattering at a seeded free-electron laser** *REVIEW OF SCIENTIFIC INSTRUMENTS*
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