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Matthias C. Hoffmann

Lead Scientist, SLAC National Accelerator Laboratory

CONTACT INFORMATION

- **Alternate Contact**

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Bio

BIO

Education

Physik Diplom 2001, University of Freiburg,Germany,

Studies in Physics, Technical University of Denmark, Lyngby, Denmark,

Dr. rer. Nat. in Physics 2006, University of Freiburg, Germany

Appointments

2006-2009, Massachussetts Institute of Technology, Cambridge, MA, Postdoctoral Associate

2009-2011 Research Scientist, Center for Free Electron Laser Science, Hamburg, Germany

2011-present SLAC National Accelerator Lab, Staff Scientist, LCLS,

CURRENT ROLE AT STANFORD

Lead scientist in the LCLS Laser Science Department.

Group lead for Mid-infrared and THz sources.

Develops and supports THz pump-X-ray probe experiments at LCLS and in-house research on ultrafast spectroscopy with intense THz pulses.

Professional

PROFESSIONAL AFFILIATIONS AND ACTIVITIES

- Senior Member, Optical Society of America (2016 - present)

Publications

PUBLICATIONS

- **Strong ultrafast nonlinear optical response from megaelectronvolt electrons in semiconductors** *NATURE PHOTONICS*
  Jeong, D., Hopper, T. R., Kim, Y., Shen, X., Kramer, P. L., Hoffmann, M. C., Coffee, R., Fejer, M., Lindenberg, A. M., Levin, C. S.
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- **Attosecond X-Ray Core-Level Chronoscopy of Aromatic Molecules** *PHYSICAL REVIEW X*
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- **Tuning chirality amplitude at ultrafast timescales in chiral CsCuCl3** *PHYSICAL REVIEW RESEARCH*
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- **Structural dynamics of laser-ionized cis-stilbene studied by ultrafast electron diffraction** *JOURNAL OF PHYSICS B-ATOMIC MOLECULAR AND OPTICAL PHYSICS*
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- **Three-dimensional reconstruction of THz near-fields from a LiNbO3 optical rectification source** *OPTICS EXPRESS*
  Gabriel, A. E., Othman, M. A. K., Kramer, P. L., Miura, H., Hoffmann, M. C., Nanni, E. A.
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- **Observation of polarization density waves in SrTiO₃ (Apr, 10.1038/s41567-025-02874-0, 2025)** *NATURE PHYSICS*
  Orenstein, G., Krapivin, V., Huang, Y., Zhang, Z., Munoz, G., Duncan, R. A., Nguyen, Q., Stanton, J., Teitelbaum, S., Yavas, H., Sato, T., Hoffmann, M. C., Kramer, et al
  2025

- **Dynamics of nanoscale phase decomposition in laser ablation** *COMMUNICATIONS MATERIALS*
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- **Element-specific ultrafast lattice dynamics in FePt nanoparticles.** *Structural dynamics (Melville, N.Y.)*
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- **Femtosecond Electronic and Hydrogen Structural Dynamics in Ammonia Imaged with Ultrafast Electron Diffraction.** *Physical review letters*
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- **Ultrafast X-Ray Scattering Reveals Composite Amplitude Collective Mode in the Weyl Charge Density Wave Material (TaSe_{4})_{2}I.** *Physical review letters*
  Nguyen, Q. L., Duncan, R. A., Orenstein, G., Huang, Y., Krapivin, V., de la Peña, G., Ornelas-Skarin, C., Reis, D. A., Abbamonte, P., Bettler, S., Chollet, M., Hoffmann, M. C., Hurley, et al
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- **The 2023 terahertz science and technology roadmap** *JOURNAL OF PHYSICS D-APPLIED PHYSICS*
  Leitenstorfer, A., Moskalenko, A. S., Kampfrath, T., Kono, J., Castro-Camus, E., Peng, K., Qureshi, N., Turchinovich, D., Tanaka, K., Markelz, A. G., Havenith, M., Hough, C., Joyce, et al
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- **Ultrafast electron dynamics in platinum and gold thin films driven by optical and terahertz fields** *APPLIED PHYSICS LETTERS*
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- **Spatiotemporal Measurement of THz Near-Fields Using Electro-Optic Sampling**
  Gabriel, A. E., Othman, M. A. K., Hoffmann, M. C., Nanni, E. A., IEEE
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- **Subterahertz collective dynamics of polar vortices.** *Nature*
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- **THz-driven bunch compression for varying electron beam energy**
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  IEEE.2020

- **Generation of high-field single-cycle terahertz pulses at 100 kHz**
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  IEEE.2020

- **Nonlinear Magnetization Dynamics Driven by Strong Terahertz Fields.** *Physical review letters*
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- **THz-driven bunch compression and timing stabilization of a relativistic electron beam**
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- **Single-Shot Electro-Optic Measurement of Mid-Infrared Pulses**
  Kozina, M. E., Hoffmann, M. C., IEEE
  IEEE.2018

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