

Alexander von Hoegen, Ph.D.

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The Ohio State University | Department of Physics | 191 West Woodruff Ave | Columbus, OH 43210

Research Experience and Appointments

The Ohio State University *Assistant Professor | Columbus, OH, USA*

Jan 2026 – Present

Massachusetts Institute of Technology *Feodor Lynen Postdoctoral Research Fellow*

Oct 2021 – Dec 2025

Nuh Gedik | Cambridge, MA, USA

- Focus: Investigation of non-equilibrium phenomena in quasi-2D quantum materials.
- Methods: tr-ARPES, linear and nonlinear tr-THz spectroscopy, high-field THz excitation, FEL beamtimes
- Achievements:
 - Time-domain classification of the microscopic interaction that stabilizes the charge order on a kagome lattice.
 - Photo-engineering of the exchange interactions in a layered antiferromagnet.
 - Measurement of the THz light-matter coupling of micrometer-sized quasi-2D quantum materials.
- Development: Novel THz micro-spectroscopy and field-resolved PHz spectroscopy methods

Max-Planck-Institute for the Structure and Dynamics of Matter *Postdoctoral Research Associate*

Apr 2021 – Oct 2025

Andrea Cavalleri | Hamburg, Germany

- Focus: Method development in ultrafast spectroscopy
- Methods: 2D-THz spectroscopy, nonlinear optical spectroscopy, FEL beamtimes
- Development: Nonlinear 2D-THz spectroscopy and time-resolved nonlinear second harmonic spectroscopy setup

Max-Planck-Institute for the Structure and Dynamics of Matter *Graduate Research Assistant*

Dec 2015 – Apr 2021

Andrea Cavalleri | Hamburg, Germany

- Focus: Nonlinear dynamics in strongly driven quantum materials
- Methods: High-field MIR excitation, time-resolved second harmonic spectroscopy, FEL beamtimes
- Achievements:
 - Time-resolved tomographic measurements of the interatomic forcefield in a solid.
 - Parametric-amplification of phase fluctuations in cuprate superconductors.
 - Ultrafast reversal of the ferroelectric polarization through light driven phonons.
- Development: Time-, amplitude- and phase-resolved nonlinear second harmonic spectroscopy.

RWTH Aachen University *Undergraduate Research Assistant*

Oct 2014 – Oct 2015

Matthias Wuttig | Aachen, Germany

- Focus: Metavalent bonding in thin-film phase change materials.
- Methods: X-Ray diffraction, electrical measurements, MIR spectroscopy, sputter deposition
- Achievements: Demonstration of the break-down of metavalent bonding in phase change materials.

Education

Ph.D. in Physics | *summa cum laude*

Dec 2015 – Apr 2021

University of Hamburg | Advisor: Andrea Cavalleri | Hamburg, Germany

M.Sc. in Physics | *1.1 cum laude*

Oct 2013 – Oct 2015

RWTH Aachen University | Advisor: Matthias Wuttig | Aachen, Germany

B.Sc. in Physics | *1.4 cum laude*

Oct 2010 – Oct 2013

RWTH Aachen University | Advisor: Matthias Wuttig | Aachen, Germany

Honors, Awards and Third Party Funding

Emmy Noether Research Group (declined) German Research Foundation Germany	Sep 2025
MIT-Israel Zuckerman STEM Fund Zuckerman STEM Leadership Program USA	Apr 2025
Feodor-Lynen Research Fellowship Alexander von Humboldt Foundation Germany	July 2022
Bildungsfond Scholarship RWTH Aachen Germany	Oct 2014
PROMOS-Scholarship Deutscher Akademischer Austauschdienst (DAAD) Germany	July 2014

Selected Publications

Total Publications: 21, including Nature, Nature Physics, Nature Materials, PRL, Advanced Materials, PRX

Total Citations: 1560, h-index: 15 (according to Google Scholar)

1. **A. von Hoegen**, T. Tai, C. J. Allington, M. Yeung, J. Pettine, M. H. Michael, E. Viñas Boström, X. Cui, K. Torres, A. E. Kossak, B. Lee, G. S. D. Beach, G. D. Gu, A. Rubio, P. Kim, N. Gedik
Imaging a terahertz superfluid plasmon in a two-dimensional superconductor
Nature 650, 869–874 (2026) (2026)
2. B. Ilyas*, T. Luo*, **A. von Hoegen***, E. V. Boström*, Z. Zhang, J. Park, J. Kim, J.-G. Park, K. A. Nelson, A. Rubio and N. Gedik
Terahertz field-induced metastable magnetization near criticality in FePS₃
Nature 636, 609-614 (2024) *contributed equally
3. D. Azoury*, **A. von Hoegen***, Y. Su, K. H. Oh, T. Holder, H. Tan, B. R. Ortiz, A. Capa Salinas, S. D. Wilson, B. Yan and N. Gedik
Direct Observation of the Collective Modes of the Charge Density Wave in the Kagome Metal CsV₃Sb₅
PNAS 120, 40 (2023) *contributed equally
4. **A. von Hoegen**, M. Fechner, M. Först, N. Taherian, E. Rowe, A. Ribak, J. Porras, B. Keimer, M. Michael, E. Demler and A. Cavalleri
Amplification of Superconducting Fluctuations in Driven YBa₂Cu₃O_{6+x}
Physical Review X 12 (3), 031008 (2022)
5. L. Guarneri*, S. Jakobs*, **A. von Hoegen***, S. Maier, O. Cojocaru-Mirédin, M. Raghuvanshi, M. Drögeler, C. Stampfer, R. P. S. M. Lobo, A. Piarristeguy, A. Pradel, M. Xu and M. Wuttig
Metavalent bonding in crystalline solids: how does it collapse?
Advanced Materials 2102356 (2021). *contributed equally
6. **A. von Hoegen**, R. Mankowsky, M. Fechner, M. Först and A. Cavalleri
Probing the interatomic potential of solids with strong-field nonlinear phononics
Nature 555, 79-82 (2018)
7. R. Mankowsky, **A. von Hoegen**, M. Först and A. Cavalleri
Ultrafast reversal of the ferroelectric polarization
Physical Review Letters 118, 197601 (2017) [Editors suggestion]

Research Interest

I am an experimental condensed matter physicist interested in investigating the fundamental properties of low-dimensional quantum materials. I aim to discover novel, emergent phenomena by exciting the characteristic low-energy resonances of these materials with intense laser pulses in the THz range of the electromagnetic spectrum. To achieve these goals, I develop new space-, time-, and field-resolved ultrafast optical methods across a wide energy range (meV-eV) with femtosecond time- and μm -spatial resolution.