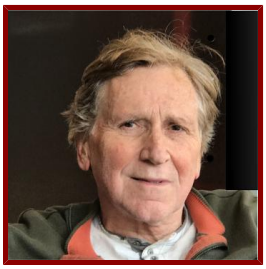
Stanford



Joachim Stöhr

Professor of Photon Science, Emeritus
SLAC National Accelerator Laboratory

Bio

BIO

Education:

1968 Vordiplom in Physics, Bonn University, Germany

1971 M.S. in Physics, Washington State University, USA

1974 Dr. rer. nat. in Physics, TU München, Germany

Professional History:

Scientist at Lawrence Berkeley Laboratory (1976-77)

Senior Research Associate at Stanford Synchrotron Radiation Laboratory (1977-81)

Senior Staff Physicist at Exxon Research and Engineering Company (1981-85)

Research Staff Member at IBM Almaden Research Center (1985-89)

Manager, Department of Condensed Matter Science, IBM ARC (1989-91)

Manager, Department of Magnetic Materials and Phenomena, IBM ARC (1991-94)

Manager, Synchrotron Radiation Project, IBM ARC (1994-95)

Research Staff Member at IBM ARC (1995-99)

Professor of Photon Science, Stanford University (2000 – 2017)

Deputy Director, Stanford Synchrotron Radiation Lightsource (SSRL) (2000-2005)

Director, SSRL (2005-2009)

Director, Linac Coherent Light Source (LCLS) (2009-2013)

Professor Emeritus (2017 – present)

Fellowships, Awards, Honors:

Fulbright Scholarship 1969-70

Postdoctoral Scholarship from Deutsche Forschungsgemeinschaft 1975-76

Fellow of the American Physical Society since 1988

Adjoint Professor in Physics at Uppsala University, Sweden (1993-2000)

Consulting Professor at Stanford Synchrotron Radiation Laboratory (1994-1999)

IBM Outstanding Technical Achievement Award 1997

Hofstadter Lecture, Stanford University, 2010

Davisson-Germer Prize 2011 in Surface Physics from American Physical Society

Ångstrom Lecture, Uppsala University, 2017

Summary of Scientific Work:

My early scientific research focused on the development of x-ray based surface techniques, especially surface EXAFS and NEXAFS, and their use for the determination of the geometric arrangement and bonding of atoms, molecules and thin organic films on surfaces. This work is summarized in my review article “SEXAFS: Everything you always wanted to know about SEXAFS but were afraid to ask” (in X-Ray Absorption: Principles, Applications, Techniques of EXAFS, SEXAFS and XANES, Edits. D. Koningsberger and R. Prins, Wiley, 1988) and my 1992 book “NEXAFS Spectroscopy” (Springer).

My later research focused on magnetic materials and phenomena, in particular the study of magnetic thin films, interfaces and nanostructures, and their ultrafast dynamics by use of forefront x-ray techniques. This work forms the foundation of my 2006 book (with H. Siegmann) entitled “Magnetism: From Fundamentals to Nanoscale Dynamics” (Springer).

With the advent of x-ray free electron lasers (XFELs) around 2010 my research increasingly focused on the description of x-rays and their interactions with matter within modern quantum optics, leading to my 2023 book “The Nature of X-Rays and their Interactions with Matter”.
In total I have written 3 books, 10 review articles in the form of book chapters and about 250 scientific Journal publications. I hold 5 patents and have given more than 150 invited talks at international scientific conferences, about 100 colloquia at Universities and Scientific Research Institutions, and 3 public lectures on the topic of magnetism and x-ray free electron lasers.

More information on my career, research, students and postdocs is given on my Stanford website: https://stohr.sites.stanford.edu/

ACADEMIC APPOINTMENTS

- Emeritus Faculty, Acad Council, SLAC National Accelerator Laboratory

HONORS AND AWARDS

- Fulbright Foreign Student Scholarship, German-American Fulbright Commission (1969)
- Fellow, American Physical Society (1988)
- Adjoint Professor in Physics, Uppsala University, Sweden (1993 - 2000)
- Outstanding Technical Achievement Award, IBM (1997)
- Davisson-Germer Prize in Atomic and Surface Physics, American Physical Society (2011)

LINKS

- My Stanford website: https://stohr.sites.stanford.edu/
- My SLAC website: https://www-ssrl.slac.stanford.edu/stohr

Research & Scholarship

PROJECTS

- A Modern View of the Nature of X-rays & Implications for XFEL Science: A lecture-series by Joachim Stöhr - SLAC National Accelerator Laboratory (June 3, 2019 - 7/8/2019)

Publications

PUBLICATIONS

- **PetaVolts per meter Plasmonics: introducing extreme nanoscience as a route towards scientific frontiers** *JOURNAL OF INSTRUMENTATION*
  Sahai, A. A., Golkowski, M., Gedney, S., Katsouleas, T., Andonian, G., White, G., Stohr, J., Muggli, P., Filippetto, D., Zimmermann, F., Tajima, T., Mourou, G., Resta-Lopez, et al
  2023; 18 (7)

- **Approaching PetaVolts per Meter Plasmonics Using Structured Semiconductors** *IEEE ACCESS*
  Sahai, A., Golkowski, M., Katsouleas, T., Andonian, G., White, G., Joshi, C., Taborek, P., Harid, V., Stohr, J.
  2023; 11: 476-493

- **Stimulated resonant inelastic X-ray scattering in a solid** *COMMUNICATIONS PHYSICS*
  Higley, D. J., Chen, Z., Beye, M., Hantschmann, M., Reid, A. H., Mehta, V., Hellwig, O., Dakovski, G. L., Mitra, A., Engel, R. Y., Maxwell, T., Ding, Y., Bonetti, et al
  2022; 5 (1)

- **State-resolved ultrafast charge and spin dynamics in [Co/Pd] multilayers** *APPLIED PHYSICS LETTERS*
  Le Guyader, L., Higley, D. J., Pancaldi, M., Liu, T., Chen, Z., Chase, T., Granitzka, P. W., Coslovich, G., Lutman, A. A., Dakovski, G. L., Schlotter, W. F., Shafer, P., Arenholz, et al
  2022; 120 (3)

- **Femtosecond X-ray induced changes of the electronic and magnetic response of solids from electron redistribution.** *Nature communications*
  Higley, D. J., Reid, A. H., Chen, Z., Guyader, L. L., Hellwig, O., Lutman, A. A., Liu, T., Shafer, P., Chase, T., Dakovski, G. L., Mitra, A., Yuan, E., Schlappa, et al
  2019; 10 (1): 5289

- **Spin-current-mediated rapid magnon localisation and coalescence after ultrafast optical pumping of ferrimagnetic alloys** *NATURE COMMUNICATIONS*
  Iacocca, E., Liu, T., Reid, A. H., Fu, Z., Ruta, S., Granitzka, P. W., Jai, E., Bonetti, S., Gray, A. X., Graves, C. E., Kukreja, R., Chen, Z., Higley, et al
  2019; 10: 1756

- **Overcoming the diffraction limit by multi-photon interference: a tutorial** *ADVANCES IN OPTICS AND PHOTONICS*
  Stohr, J.
  2019; 11 (1): 215–313

- **Ultrafast Self-Induced X-Ray Transparency and Loss of Magnetic Diffraction** *PHYSICAL REVIEW LETTERS*
  Chen, Z., Higley, D. J., Beye, M., Hantschmann, M., Mehta, Hellwig, O., Mitra, A., Bonetti, S., Bucher, M., Carron, S., Chase, T., Jal, E., Kukreja, R., et al
  2018; 121 (13): 137403

- **Beyond a phenomenological description of magnetostriction (vol 9, 388, 2018)** *NATURE COMMUNICATIONS*
  Reid, A. H., Shen, X., Maldonado, P., Chase, T., Jal, E., Granitzka, P. W., Carva, K., Li, R. K., Li, J., Wu, L., Vecchione, T., Liu, T., Chen, et al
  2018; 9: 1035

- **Magnetic Switching in Granular FePt Layers Promoted by Near-Field Laser Enhancement** *NANO LETTERS*
  Granitzka, P. W., Jal, E., Le Guyader, L., Savoini, M., Higley, D. J., Liu, T., Chen, Z., Chase, T., Ohldag, H., Dakovski, G. L., Schlotter, W. F., Carron, S., Hoffman, et al
  2017; 17 (4): 2426-2432

- **Two-Photon X-Ray Diffraction** *PHYSICAL REVIEW LETTERS*
  Stohr, J.
  2017; 118 (2)

- **Elimination of X-Ray Diffraction through Stimulated X-Ray Transmission** *PHYSICAL REVIEW LETTERS*
  Wu, B., Wang, T., Graves, C. E., Zhu, D., Schlotter, W. F., Turner, J. J., Hellwig, O., Chen, Z., Duerr, H. A., Scherz, A., Stohr, J.
  2016; 117 (2)

- **Femtosecond X-ray magnetic circular dichroism absorption spectroscopy at an X-ray free electron laser** *REVIEW OF SCIENTIFIC INSTRUMENTS*
  Higley, D. J., Hirsch, K., Dakovski, G. L., Jal, E., Yuan, E., Liu, T., Lutman, A. A., MacArthur, J. P., Arenholz, E., Chen, Z., Coslovich, G., Denes, P., Granitzka, et al
  2016; 87 (3)

- **Direct observation and imaging of a spin-wave soliton with p-like symmetry** *NATURE COMMUNICATIONS*
  Bonetti, S., Kukreja, R., Chen, Z., Macia, F., Hernandez, J. M., Eklund, A., Backes, D., Frisch, J., Katine, J., Malm, G., Urazhdin, S., Kent, A. D., Stoehr, et al
  2015; 6: 8889

- **Nanoscale Confinement of All-Optical Magnetic Switching in TbFeCo - Competition with Nanoscale Heterogeneity** *NANO LETTERS*
  Liu, T., Wang, T., Reid, A. H., Savoini, M., Wu, X., Koene, B., Granitzka, P., Graves, C. E., Higley, D. J., Chen, Z., Razinskas, G., Hantschmann, M., Scherz, et al
  2015; 15 (10): 6862-6868

- **Creation of X-Ray Transparency of Matter by Stimulated Elastic Forward Scattering** *PHYSICAL REVIEW LETTERS*
  Stoer, J., Scherz, A.
  2015; 115 (10)

- **Microwave soft x-ray microscopy for nanoscale magnetization dynamics in the 5-10 GHz frequency range** *REVIEW OF SCIENTIFIC INSTRUMENTS*
  Bonetti, S., Kukreja, R., Chen, Z., Spoddig, D., Ollefs, K., Schoeppner, C., Meckenstock, R., Ney, A., Pinto, J., Houanche, R., Frisch, J., Stoehr, J., Duerr, et al
  2015; 86 (9)

- **X-ray Detection of Transient Magnetic Moments Induced by a Spin Current in Cu** *PHYSICAL REVIEW LETTERS*
  Kukreja, R., Bonetti, S., Chen, Z., Backes, D., Acremann, Y., Katine, J. A., Kent, A. D., Duerr, H. A., Ohldag, H., Stoehr, J.
  2015; 115 (9): 096601

- **Extracting magnetic cluster size and its distributions in advanced perpendicular recording media with shrinking grain size using small angle x-ray scattering** *APPLIED PHYSICS LETTERS*
  Mehta, V., Wang, T., Ikeda, Y., Takano, K., Terris, B. D., Wu, B., Graves, C., Duerr, H. A., Scherz, A., Stoehr, J., Hellwig, O.
  2015; 106 (20)

- **Magnetic design evolution in perpendicular magnetic recording media as revealed by resonant small angle x-ray scattering** *APPLIED PHYSICS LETTERS*
  Wang, T., Mehta, V., Ikeda, Y., Do, H., Takano, K., Florez, S., Terris, B. D., Wu, B., Graves, C., Shu, M., Rick, R., Scherz, A., Stoehr, et al
  2013; 103 (11)

- **Nanoscale spin reversal by non-local angular momentum transfer following ultrafast laser excitation in ferrimagnetic GdFeCo** *NATURE MATERIALS*
  Graves, C. E., Reid, A. H., Wang, T., Wu, B., de Jong, S., Vahaplar, K., Radu, I., Bernstein, D. P., Messerschmidt, M., Mueller, L., Coffee, R., Bionta, M., Epp, et al
  2013; 12 (4): 293-298

- **Femtosecond Single-Shot Imaging of Nanoscale Ferromagnetic Order in Co/Pd Multilayers Using Resonant X-Ray Holography** *PHYSICAL REVIEW LETTERS*
  Wang, T., Zhu, D., Wu, B., Graves, C., Schaffert, S., Rander, T., Mueller, L., Vodungbo, B., Baumier, C., Bernstein, D. P., Braeuer, B., Cros, V., de Jong, et al
  2012; 108 (26)

- **Nonuniform switching of the perpendicular magnetization in a spin-torque-driven magnetic nanopillar** *PHYSICAL REVIEW B*
  Bernstein, D. P., Braeuer, B., Kukreja, R., Stoehr, J., Hauet, T., Cucchiara, J., Mangin, S., Katine, J. A., Tyliszczak, T., Chou, K. W., Acremann, Y.
  2011; 83 (18)

- **High-Resolution X-Ray Lensless Imaging by Differential Holographic Encoding** *PHYSICAL REVIEW LETTERS*
  Zhu, D., Guizar-Sicairos, M., Wu, B., Scherz, A., Acremann, Y., Tyliszczak, T., Fischer, P., Friedenberger, N., Ollefs, K., Farle, M., Fienup, J. R., Stoehr, J.
  2010; 105 (4)

- **Holographic x-ray image reconstruction through the application of differential and integral operators** *OPTICS LETTERS*
  Guizar-Sicairos, M., Zhu, D., Fienup, J. R., Wu, B., Scherz, A., Stoehr, J.
  2010; 35 (7): 928–30
- **Phase retrieval in x-ray lensless holography by reference beam tuning** *OPTICS LETTERS*
  Zhu, D., Wu, B., Rick, R., Stoehr, J., Scherz, A.
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- **Magnetization switching without charge or spin currents** *APPLIED PHYSICS LETTERS*
  Stohr, J., Siegmann, H. C., Kashuba, A., Gamble, S. J.
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- **An amplifier concept for spintronics** *APPLIED PHYSICS LETTERS*
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- **Phase imaging of magnetic nanostructures using resonant soft x-ray holography** *PHYSICAL REVIEW B*
  Scherz, A., Schlotter, W. F., Chen, K., Rick, R., Stohr, J., Luning, J., Mcnulty, I., Guenther, C., Radu, F., Eberhardt, W., Hellwig, O., Eisebitt, S.
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- **Software defined photon counting system for time resolved x-ray experiments** *REVIEW OF SCIENTIFIC INSTRUMENTS*
  Acremann, Y., Chembrolu, V., Strachan, J. P., Tyliszczak, T., Stohr, J.
  2007; 78 (1)
- **Extended field of view soft x-ray Fourier transform holography: toward imaging ultrafast evolution in a single shot.** *Optics letters*
  Schlotter, W. F., Lüning, J. n., Rick, R. n., Chen, K. n., Scherz, A. n., Eisebitt, S. n., Günther, C. M., Eberhardt, W. n., Hellwig, O. n., Stöhr, J. n.
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- **Time-resolved imaging of spin transfer switching: Beyond the macrospin concept** *PHYSICAL REVIEW LETTERS*
  Acremann, Y., Strachan, J. P., Chembrolu, V., Andrews, S. D., Tyliszczak, T., Katine, J. A., Carey, M. J., Clemens, B. M., Siegmann, H. C., Stohr, J.
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- **Parallel versus antiparallel interfacial coupling in exchange biased Co/FeF2** *PHYSICAL REVIEW LETTERS*
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- **Dissipation of spin angular momentum in magnetic switching** *PHYSICAL REVIEW LETTERS*
  Stamm, C., Tudosa, I., Siegmann, H. C., Stohr, J., Dobin, A. Y., Woltersdorf, G., Heinrich, B., Vaterlaus, A.
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- **An x-ray photoemission electron microscope using an electron mirror aberration corrector for the study of complex materials** *4th International Conference on LEEM/PEEM*
  Feng, J., Forest, E., MacDowell, A. A., Marcus, M., Padmore, H., Raoux, S., Robin, D., Scholl, A., Schlueter, R., Schmid, P., Stohr, J., Wan, W., Wei, et al
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- **Lensless imaging of magnetic nanostructures by X-ray spectro-holography** *NATURE*
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- **Domain-size-dependent exchange bias in Co/LaFeO3** *APPLIED PHYSICS LETTERS*
  Scholl, A., Nolting, F., Seo, J. W., Ohldag, H., Stohr, J., Raoux, S., Locquet, J. P., Fompeyrine, J.
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- **Creation of an antiferromagnetic exchange spring** *PHYSICAL REVIEW LETTERS*
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- **Scalable approach for lensless imaging at x-ray wavelengths** *APPLIED PHYSICS LETTERS*
  Eisebitt, S., Lorgen, M., Eberhardt, W., Luning, J., Andrews, S., Stohr, J.
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- **The ultimate speed of magnetic switching in granular recording media** *NATURE*
  Tudosa, I., Stamm, C., Kashuba, A. B., King, F., Siegmann, H. C., Stohr, J., Ju, G., Lu, B., Weller, D.
  2004; 428 (6985): 831-833

- **Vortex core-driven magnetization dynamics** *SCIENCE*
  Choe, S. B., Acremann, Y., Scholl, A., Bauer, A., Doran, A., Stohr, J., Padmore, H. A.
  2004; 304 (5669): 420-422

- **Polarization effects in coherent scattering from magnetic specimen: Implications for x-ray holography, lensless imaging, and correlation spectroscopy** *PHYSICAL REVIEW B*
  Eisebitt, S., Lorgen, M., Eberhardt, W., Luning, J., Stohr, J., Rettner, C. T., Hellwig, O., Fullerton, E. E., Denbeaux, G.
  2003; 68 (10)

- **Correlation between exchange bias and pinned interfacial spins** *PHYSICAL REVIEW LETTERS*
  Ohldag, H., Scholl, A., Nolting, F., Arenholz, E., Maat, S., Young, A. T., Carey, M., Stohr, J.
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- **Determination of the antiferromagnetic spin axis in epitaxial LaFeO3 films by x-ray magnetic linear dichroism spectroscopy** *PHYSICAL REVIEW B*
  Luning, J., Nolting, F., Scholl, A., Ohldag, H., Seo, J. W., Fompeyrine, J., Locquet, J. P., Stohr, J.
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- **X-ray photoemission electron microscopy, a tool for the investigation of complex magnetic structures (invited)** *12th National Synchrotron Radiation Instrumentation Conference*
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- **Spectroscopic identification and direct imaging of interfacial magnetic spins** *PHYSICAL REVIEW LETTERS*
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- **Liquid crystal alignment on carbonaceous surfaces with orientational order** *SCIENCE*
  Stohr, J., Samant, M. G., Luning, J., Callegari, A. C., Chaudhari, P., Doyle, J. P., Lacey, J. A., Lien, S. A., Purushothaman, S., Speidell, J. L.
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- **Exploring the microscopic origin of exchange bias with photoelectron emission microscopy (invited)** *8th Joint MMM/Intermag Conference*
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- **Correlation of surface and bulk order in low surface energy polymers** *MACROMOLECULES*
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- **X-ray spectro-microscopy of complex materials and surfaces** *IBM JOURNAL OF RESEARCH AND DEVELOPMENT*
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- **Images of the antiferromaguetic structure of a NiO(100) surface by means of X-ray magnetic linear dichroism spectromicroscopy** *PHYSICAL REVIEW LETTERS*
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- **X-ray photoemission electron microscopy for the study of semiconductor materials** *International Conference on Characterization and Metrology for ULSI Technology*
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- **X-ray magnetic circular dichroism study of the induced spin polarization of Cu in Co/Cu and Fe/Cu multilayers** *ZEITSCHRIFT FUR PHYSIK B-CONDENSED MATTER*
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PRESENTATIONS

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