

**Wolfgang Sturhahn**

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**Education**

University of Hamburg, Germany	Physics	Ph.D., 1992
University of Hamburg, Germany	Physics	Diploma thesis, 1985
University of Paderborn, Germany	Physics	Prediploma, 1981

**Professional Experience**

2008-present Visiting associate faculty, Division of Geophysical and Planetary Sciences, California Institute of Technology. Nuclear resonant and inelastic x-ray scattering methods in Earth science.

2012-2013 Scientific consultant, Max-Planck-Institut für Mikrostrukturphysik, Halle, Germany. Computation and evaluation of nuclear resonant spectra of magnetic nano-materials.

2010-2011 Senior Technologist (staff), Jet Propulsion Laboratory. Development and implementation of concepts for in-situ instruments on planetary surfaces in alignment with present and future NASA missions.

2009-2010 Senior Physicist (staff), Argonne National Laboratory. Development and application of nuclear resonant scattering techniques, inelastic x-ray scattering techniques, synchrotron instrumentation and methods. Mentor to junior scientific staff.

2004-2007 Group Leader, Argonne National Laboratory. Head of Inelastic X-ray and Nuclear Resonant Scattering group at the Advanced Photon Source.

2003-2010 Adjunct Professor, Department of Geology, University of Illinois at Urbana-Champaign.

1999-2009 Physicist (staff), Argonne National Laboratory. Development and application of nuclear resonant scattering techniques, inelastic x-ray scattering techniques, synchrotron instrumentation and methods.

1994-1999 Assistant Physicist (staff), Argonne National Laboratory. Development and application of nuclear resonant scattering techniques, synchrotron instrumentation, and methods.

1993-1994 Visiting Scientist, Argonne National Laboratory. Development of nuclear resonant scattering techniques. Development and implementation of synchrotron instrumentation and methods.

1992 Visiting Scientist, European Synchrotron Radiation Facility. Implementation of my evaluation software for nuclear resonant scattering data.

1992 Visiting Scientist, Argonne National Laboratory. Development of nuclear resonant scattering techniques.

1985-1993 Research Associate, University of Hamburg. Research on nuclear resonant scattering.

**Synergetic Activities**

- Develop novel nuclear resonant scattering (NRS) and inelastic x-ray scattering (IXS) techniques.
- Promote NRS and IXS through community outreach in conferences and workshops.
- Initiate and support novel applications of NRS and IXS, e.g., in biology, geology, nanoscience.
- Train young scientists in use and benefits of synchrotron techniques.
- Supervise operation of public NRS and IXS beam lines at the Advanced Photon Source.
- Committee member of the Department of Energy's Lehman review of the NSLS-II project, Brookhaven National Laboratory, 2009-2015.
- Committee member of the Department of Energy's Lehman review of the NEXT project, Brookhaven National Laboratory, in September 2010-2013.
- Representative of Argonne National Laboratory for the "Consortium for Materials Properties Research in Earth Sciences (COMPRES)" from 2003 until 2010.
- Chair of the Technical Advisory Committee for the High-pressure beam line (HP-CAT) at the Advanced Photon Source from 2006-2017.

**Awards**

- Pacesetter Award, 1997, Argonne National Laboratory.
- Director's Award, 1998, Argonne National Laboratory.
- Medal for Distinguished Performance, 2004, The University of Chicago.
- IBAME Science Award, 2021, International Board on the Applications of the Mössbauer Effect.

**Selected Publications (total number of publications: 231)**

- W. Sturhahn, E. Gerdau, R. Hollatz, R. Ruffer, H.D. Rüter, and W. Tolksdorf, *Nuclear Bragg diffraction of synchrotron radiation at the 8.41 keV resonance of thulium*, Europhys.Lett. **14**, 821 (1991)
- W. Sturhahn, E. Gerdau, R. Hollatz, R. Ruffer, H.D. Rüter, and W. Tolksdorf, *Nuclear Bragg diffraction of synchrotron radiation at the 8.41 keV resonance of thulium*, Europhys.Lett. **14**, 821 (1991)
- W. Sturhahn and E. Gerdau, *Evaluation of time-differential measurements of nuclear-resonance scattering of x-rays*, Phys.Rev. B **49**, 9285 (1994)
- W. Sturhahn, T.S. Toellner, E.E. Alp, X. Zhang, M. Ando, Y. Yoda, S. Kikuta, M. Seto, C.W. Kimball, and B. Dabrowski, *Phonon Density of States Measured by Inelastic Nuclear Resonant Scattering*, Phys.Rev.Lett. **74**, 3832 (1995)
- W. Sturhahn, *CONUSS and PHOENIX: Evaluation of nuclear resonant scattering data*, Hyperfine Interact. **125**, 149 (2000)
- W. Sturhahn and T.S. Toellner, *Quantification of contaminants to incoherent nuclear resonant scattering*, Phys.Rev. B **65**, 134305 (2002)
- W. Sturhahn, *Nuclear resonant spectroscopy*, J.Phys.: Condens. Matter **16**, S497 (2004)
- W. Sturhahn, C. L'abbé, and T.S. Toellner, *Exo-interferometric phase determination in nuclear resonant scattering*, Europhys.Lett. **66**, 506 (2004)
- W. Sturhahn, J.M. Jackson, and J.-F. Lin, *The spin state of iron in minerals of Earth's lower mantle*, Geophys.Res.Lett. **32**, L12307 (2005)
- W. Sturhahn and J.M. Jackson, *Geophysical applications of nuclear resonant spectroscopy*, Advances in High-Pressure Mineralogy, E.Ohtani, ed., Special Paper 421, 157-174 (2007)
- E.E. Alp, T.M. Mooney, T.S. Toellner, W. Sturhahn, E. Witthoff, R. Röhlberger, E. Gerdau, H. Homma, and H. Kentjana, *Time resolved nuclear resonant scattering from  $^{119}\text{Sn}$  nuclei using synchrotron radiation*, Phys.Rev.Lett. **70**, 3351 (1993)
- H.K. Mao, J. Xu, V.V. Struzhkin, J. Shu, R.J. Hemley, W. Sturhahn, M.Y. Hu, E.E. Alp, L. Vocadlo, D. Alfè, G.D. Price, M.J. Gillan, M. Schwoerer-Böhning, D. Häusermann, P. Eng, G. Shen, H. Giefers, R. Lübbers, G. Wortmann, *Phonon Density of States of Iron up to 153 Gigapascals*, Science **292**, 914 (2001)
- J.T. Sage, S.M. Durbin, W. Sturhahn, D.C. Wharton, P.M. Champion, P. Hession, J. Sutter, E.E. Alp, *Long-Range Reactive Dynamics in Myoglobin*, Phys.Rev.Lett. **86**, 4966 (2001)
- R. Röhlberger, K.W. Quast, T.S. Toellner, P.L. Lee, W. Sturhahn, E.E. Alp, and E. Burkel, *Observation of the 22.5-keV Resonance in  $^{149}\text{Sm}$  by the Nuclear Lighthouse Effect*, Phys.Rev.Lett. **87**, 047601 (2001)
- J.S. Tse, D.D. Klug, J.Y. Zhao, W. Sturhahn, E.E. Alp, J. Baumert, C. Gutt, M.R. Johnson, W. Press, *Anharmonic motions of Kr in the clathrate hydrate*, Nature Materials **4**, 917 (2005)
- J.-F. Lin, W. Sturhahn, J. Zhao, G. Shen, H.K. Mao, R.J. Hemley, *Sound Velocities of Hot Dense Iron: Birch's Law Revisited*, Science **308**, 1894 (2005)
- H. Giefers, E.A. Tanis, S.P. Rudin, C. Greeff, X. Ke, C. Chen, M.F. Nicol, M. Pravica, W. Pravica, J. Zhao, A. Alatas, M. Lerche, W. Sturhahn, E. Alp, *Phonon Density of States of Metallic Sn at High Pressure*, Phys.Rev.Lett. **98**, 245502 (2007)
- S.M. Dubiel, J. Cieslak, W. Sturhahn, M. Sternik, P. Piekarczyk, S. Stankov, and K. Parlinski, *Vibrational Properties of  $\alpha$ - and  $\sigma$ -Phase Fe-Cr Alloy*, Phys.Rev.Lett. **104**, 155503 (2010)
- J.K. Wicks, J.M. Jackson, and W. Sturhahn, *Very low sound velocities in iron-rich (Mg,Fe)O: Implications for the core-mantle boundary region*, Geophys.Res.Lett. **37**, L15304 (2010)
- J.M. Jackson, W. Sturhahn, M. Lerche, J. Zhao, T.S. Toellner, E.E. Alp, S.V. Sinogeikin, J.D. Bass, C.A. Murphy, and J.K. Wicks, *Melting of compressed iron by monitoring atomic dynamics*, Earth Planet.Sci.Lett. **362**, 143-150 (2013)
- D. Zhang, J.M. Jackson, J. Zhao, W. Sturhahn, E.E. Alp, M.Y. Hu, T.S. Toellner, C.A. Murphy, V.B. Prakapenka, *Temperature of Earth's core constrained from melting of Fe and  $\text{Fe}_{0.9}\text{Ni}_{0.1}$  at high pressures*, Earth Planet.Sci.Lett. **447**, 72-83 (2016)
- W. Keune, Sampyo Hong, M.Y. Hu, J. Zhao, T.S. Toellner, E.E. Alp, W. Sturhahn, T.S. Rahman, and B. Roldan Cuenya, *Influence of interfaces on the phonon density of states of nanoscale metallic multilayers: Phonon confinement and localization*, Phys.Rev. B **98** 024308 (2018)
- R.A. Morrison, J.M. Jackson, W. Sturhahn, J. Zhao, T.S. Toellner, *High pressure thermoelasticity and sound velocities of Fe-Ni-Si alloys*, Phys.Earth Planet.Inter. **294** (2019)
- B. Eggert, M.E. Gruner, K. Ollefs, E. Schuster, N. Rothenbach, M.Y. Hu, J. Zhao, T.S. Toellner, E.E. Alp, W. Sturhahn, R. Pentcheva, B. Roldan Cuenya, E.E. Alp, H. Wende, and W. Keune, *Interface-related magnetic and vibrational properties in Fe/MgO heterostructures from nuclear resonant spectroscopy and first-principles calculations*, Phys. Rev. Mat. **4**, 044402 (2020)