Uwe Weierstall

Research Professor

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Arizona State University
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Professional Preparation

1994 - 1998	Postdoctoral Research Fellow, Department of Physics and Astronomy, Arizona State University
1994	Ph.D. in Applied Physics, Eberhard Karls Universität Tübingen (Germany)
1989	Diplom in Applied Physics, Eberhard Karls Universität Tübingen (Germany)

Professional Appointments

2008 - present	Research Professor, Department of Physics, Arizona State University (ASU)
2004 - 2008	Associate Research Scientist, ASU
1998 - 2004	Assistant Research Scientist, ASU

Honors and Awards

2006 Arizona Technology Enterprise and ASU award: “Innovator of Tomorrow”
1995 Research Scholarship Deutsche Forschungsgemeinschaft
1989 Dr. Friedrich Förster Award for Diplom thesis, University of Tübingen, Germany

Synergistic activities

Development of new instrumentation at ASU in the areas of Scanning tunneling microscopy, diffraction microscopy and electron imaging.
Software development to solve the phase problem for non-periodic objects.
Referee for Ultramicroscopy, Optics Express, Optics Communications, Physical Review Letters, Nature, Nature Physics, Journal of Structural Biology and Micron.

Collaborators and other affiliations

Senior Personnel: M. R. Howells (*Lawrence Berkeley National Laboratory*), A. Barty, (*Lawrence Livermore National Laboratory*), M. Bogan (*Stanford Linear Accelerator*), D. Shapiro (Lawrence Berkeley National Laboratory), H.N. Chapman (*CFEL, DESY, Hamburg, Germany*), R.M. Glaeser (*Lawrence Berkeley National Laboratory*), K.H. Downing (*Lawrence Berkeley National Laboratory*), Ch. Koch (*Max Planck Institut für Metallforschung, Stuttgart, Germany*), S. Marchesini (*Lawrence Berkeley National Laboratory*), J.C.H. Spence (*Arizona State University*), G.G. Hembree (*Arizona State University*), R.B. Doak (*Arizona State University*), P. Fromme (*Arizona State University*), K. Schmidt (*Arizona State University*), J.M. Zuo (*University of Illinois, Urbana-Champaign*), Ilme Schlichting (*Max Plank Institute for Medical Research, Heidelberg, Germany), S. Boutet (LCLS/SLAC)*
PhD Students and Postdoctorals: D. DePonte (*ASU*), M. Hunter (*ASU*), R. Kirian (*ASU*)

Patent activity

Multiple Beam Diffraction to Eliminate Need for Target Alignment:

ASU Invention Disclosure dated Feb-29-2008, "Simultaneous Diffraction of Multiple Independent Probe Beams to Eliminate the Need for Target Alignment in Protein Structure Determination," R. Bruce Doak, John C.H. Spence, Kevin E. Schmidt, U. Weierstall, Daniel P. DePonte, Xiaoyu Wang, and Petra Fromme, ASU Case M8-083.

Gas Dynamic Virtual Nozzles (GDVN):

International Patent Application (PCT), in progress, to be filed by Jun-22-2008, "Gas Dynamic Virtual Nozzle for Generation of Microscopic Droplet Streams," Bruce Doak, John Spence, Uwe Weierstall, Daniel DePonte, Dmitri Starodub, and Jared Warner," AzTE M7-110.

US Patent Application 60/945809 dated Jun-22-2007, "Gas Dynamic Virtual Nozzle for Generation of Microscopic Droplet Streams," Bruce Doak, John Spence, Uwe Weierstall, Dmitri Starodub, and Daniel Deponte; ASU Case M7-110.

ASU Invention Disclosure dated Apr-12-2007, "Gas Dynamic Virtual Nozzle (GDVN) for Generation of Micrometer and Nanometer Droplet Streams," R. Bruce Doak, John C.H. Spence, Uwe Weierstall, Dmitri Starodub, and Daniel Deponte; ASU Case M7-110.

Protein Structure Determination via Serial Diffraction:

PCT International Application Number 11/908,319 filed Sep-11-2007, "Methods and Devices for Rapidly Forming Vitreous Ice-Jacketed Particle Droplets," Bruce Doak, John Spence, and Uwe Weierstall.

European Patent Application 06748375.0-1234-US2006009045 dated Mar-14-2006, "Methods and Devices for Rapidly Forming Vitreous Ice-Jacketed Particle Droplets," Bruce Doak, John Spence, and Uwe Weierstall.

US Patent Application 20060262317 dated Nov-23-2006, "Methods and devices for molecular structure determination," Bruce Doak, John Spence, and Uwe Weierstall; filed Feb-21-2006.

ASU Invention Disclosure dated Dec-11-2003, "Methods and Devices for Forming Vitreous Ice-Jacketed Particle Droplets," Bruce Doak, John Spence, and Uwe Weierstall, ASU Case M4-060.

Triboelectric Charging of Liquid Capillary Jets:

ASU Invention Disclosure dated Aug-04-2005, "Process and Apparatus for Triboelectric Charging and Ionization of a Microscopic Liquid Droplet Stream," R. Bruce Doak, Uwe Weierstall, Dmitri Starodub, and Pallas Kennedy; ASU Case M6-011.

Grant activity (present and past)

PI on NSF-EAGER "Femtosecond Virus Structure"
Co-PI's: J.C.H. Spence, R.B. Doak, K. E. Schmidt, B. Hogue
Requested amount: $ 299,084
Requested starting date: 07/01/2009
Proposed duration: 2 years
Status: pending

Co-PI on NSF-IDBR "Femtosecond Protein Injector"
Other PI's: J.C.H. Spence, R.B. Doak, K. E. Schmidt, P. Fromme
Requested amount: $ 1,003,309
Requested starting date: 10/09/2009
Proposed duration: 4 years
Status: pending

Co-PI on NIH-EUREKA "Membrane Protein Structure: A New Approach"
Other PI's: J.C.H. Spence, R.B. Doak, K. E. Schmidt, P. Fromme
Requested amount: $ 1,361,306
Requested starting date: 07/01/2009
Proposed duration: 4 years
Status: pending

Project-personnel on NSF-STC preproposal "Center for Femtosecond Biomolecular Structure and Dynamics"
PI's: A. Ourmazd, P. Coppens, J.K. Moffat, G. Phillips, J.C.H. Spence
Requested amount: $ 24,999,754
Requested starting date: 06/01/2010
Proposed duration: 5 years
Status: pending

PI on DOE-SISGR preproposal "Femtosecond Crystallography"
Co-PI's: J.C.H. Spence, R.B. Doak, K. E. Schmidt, P. Fromme
Status: pending

CO-PI on NSF IDBR grant “Protein Beam diffraction”.
Other PI’s: J.C.H. Spence (lead PI) , R.B. Doak, G.G. Hembree, K. E. Schmidt
Requested amount: $770,059
Total Award Period Covered: 10/01/06 - 09/30/09
Duration: 3 years
Status: funded

CO-PI on NSF grant DMR-0245702 “Ordering/Lithography in Glasses/Alloys”.
Other PI’s: J.C.H. Spence (lead PI), N. Jaing
Award amount: $332,450
Total award period: 05/01/2003 - 04/30/2007
Status: funded and expired

Co-PI on DOE Laboratory Directed Research and Development Grant at Lawrence Berkeley National Laboratory "Coherent x-ray diffraction imaging (CXDI)"
Other PI's: M. R. Howells (LBNL), H. Chapman (LLNL), C. Jacobsen (SUNY), J. Kirz (SUNY), H. Padmore (LBNL), J. Spence (ASU)
Award amount: $124,836
Total award period: 1/1/2004 - 1/1/2006
Status: funded and expired

CO-PI on NSF SGER (Small Grant for Exploratory Research) DBI-0429814 with the title: “Serial Crystallography”
Other PI’s: J.C.H. Spence (lead PI), R.B. Doak, P. Fromme, K. E. Schmidt
Award amount: $ 200,000
Total award period: 08/01/2004 - 07/31/2006
Status: funded and expired

Co-PI on CBST (NSF Center for Biophotonics Science and Technology) grant: “Serial crystallography: a method for protein structure determination without the need for crystals”
Other PI’s: H.N. Chapman (LLNL, lead PI), J.C.H. Spence, M.R. Howells (LBNL), B. Doak
Award amount: $100,000 / year
Duration: 6 years
Starting date: 01/01/2005
Status: funded

CO-PI on NSF grant DMR-9814055 "Kinks and Surface Potentials".
Other PI's: J.C.H. Spence (lead PI), Jian-Min Zuo
Award amount: $299,503
Total award period: 12/01/1998 - 11/30/2002
Status: funded and expired

Publications

Peer reviewed journals:

/1/ W.D.Rau, H.Lichte, E.Voelkl, and U. Weierstall, *Real-Time reconstruction of electron-off-axis holograms recorded with a high pixel ccd-camera*, Journal of Computer-Assisted Microscopy 3 (1991) 51-63

/2/ U. Weierstall and H. Lichte, *Electron Holography with a superconducting electron lens, Ultramicroscopy* 65 (1996) 13 - 22

/3/ J. Spence, U. Weierstall and W. Lo, *Atomic species identification in scanning tunneling microscopy by time of flight spectroscopy*, J. Vac. Sci. Tech. B14(3), (1996) 1587-1590

/4/ U. Weierstall and J.C.H. Spence, *Atom species identification in STM using an Imaging Atom-Probe technique*, Surface Science 398 (1998) 267-279

/5/ X. Zhang, U. Weierstall, J.C.H. Spence, *Reflection shadow imaging of crystal surface by low-voltage point-reflection electron microscopy*, Ultramicroscopy, 72 (1998) 67-81.

/6/ J. Spence, X. Huang, U. Weierstall, D. Taylor, K. Taylor, *Is molecular imaging possible*, in "Topics in Electron Diffraction and Microscopy of Materials", editor P.B. Hirsch (Oxford Univ. Press) 1999, p.108-125

/7/ J.C.H. Spence, X. Zhang, U. Weierstall, J.M. Zuo, E. Munro and J. Rouse, *Low energy point reflection electron microscopy*, Surface Review and Letters, Vol. 4, No.3 (1997) 577-587

/8/ U. Weierstall, J.C.H.Spence, M. Stevens, K.H.Downing, *Point-projection electron imaging of Tobacco Mosaic Virus at 40eV electron energy*, Micron Vol. 30, Issue 4, (1999) 335-338

/9/ U. Weierstall, J.M. Zuo, T. Kjørsvik, J.C.H. Spence, *Convergent-Beam RHEED in a Dedicated UHV Diffraction Camera and Applications to Si Reconstructed Surfaces*, Surface Science 442 (1999) 239-250

/10/ J.M. Zuo, U. Weierstall, L.M. Peng, J.C.H. Spence, *Surface Structural sensitivity of Convergent-Beam RHEED: Si(001) 2x1 models compared with dynamical simulations*, Ultramicroscopy 81 (2000) 235-244

/11/ M.R. Stevens, Q.Chen, U. Weierstall, and J.C.H. Spence, *Transmission Electron Diffraction at 200eV and Damage Thresholds below the Carbon K Edge,* Microscopy and Microanalysis 6, 368-379, 2000

/12/ M.R. Howells, C. J. Jacobsen, S. Marchesini, S. Miller, J. C. H. Spence, U. Weierstall, *Toward a practical x-ray Fourier holography at high resolution,* Nucl. Instr. Methods A 467-468 (2001) 864-867

/13/ U. Weierstall, Q. Chen, J.C.H.Spence, M.R.Howells and R.R.Panepucci, *Image reconstruction from electron and X-ray diffraction patterns using iterative algorithms: experiment and simulation.* Ultramicroscopy 90 (2002) 171-195.

/14/ U. Weierstall, G.G. Hembree, J.C.H. Spence, *New appoaches to the imaging of surface potentials,* Journal of Physics: Condensed Matter 13 (2001) 10665-10675

/15/ J.C.H.Spence and U. Weierstall, *Phase recovery and lensless imaging by iterative methods in optical and electron diffraction*. Philosophical Transactions: Mathematical, Physical and Engineering Sciences Volume 360, Number 1794 (2002) 875-895

/16/ J.C.H. Spence, N. Jaing, U. Weierstall, *Ordering energies and occupancies in doped TiAl and dedicated Alchemi instrumentation,* Microscopy and Microanalysis 8 (2002), p.241-246

/17/ H. He, S. Marchesini, M. Howells, U. Weierstall, G. Hembree, J.C.H. Spence, *Experimental lensless soft-X-ray imaging using iterative algorithms: phasing diffuse scattering,* Acta Cryst. A 59 (2003) 143-152.

/18/ H. He, S. Marchesini, M. Howells, U. Weierstall, H. Chapman, S. Hau-Riege, A.Noy, J.C.H.Spence, *Inversion of X-ray diffuse scattering to images using prepared objects,* Phys. Rev. B 67 (2003) 174114.

/19/ J. C. H. Spence, U. Weierstall, T. T. Fricke, R. M. Glaeser and K. H. Downing, Three-*dimensional diffractive imaging for crystalline monolayers with one-dimensional compact support.* Journal of Structural Biology 144 (2003) 209-218.

/20/ *U. Weierstall, J.C.H. Spence, G. Hembree, Tomographic diffractive imaging of monolayer crystals at atomic resolution with one-dimensional compact support.* Optics Express, Vol.11, No. 19 (2003) 2335-2343.

/21/ S. Marchesini, H. N. Chapman, S. P. Hau-Riege, R. A. London, A. Szoke, H. He, M. R. Howells, H. Padmore, R. Rosen, J. C. H. Spence and U. Weierstall, *Coherent X-ray diffractive imaging: applications and limitations*, Optics Express Vol.11, No.19 (2003) 2344-2353.

/22/ Howells MR, Chapman H, Hau-Riege S, He H, Marchesini S, Spence J, Weierstall U, *X-ray microscopy by phase-retrieval methods at the Advanced Light Source,* Seventh International Conference on X-ray Microscopy, Journal de Physique IV, 104 (2003) 557-561.

/23/ Marchesini S, He H, Chapman HN, Hau-Riege SP, Noy A, Howells MR, Weierstall U, Spence JCH, *X-ray image reconstruction from a diffraction pattern alone*, Phys. Rev. B 68 (2003) 140101.

/24/ J.C.H. Spence, U. Weierstall, M. Howells, *Coherence and sampling requirements for diffractive imaging*, Ultramicroscopy 101 (2004) 149-152.

/25/ H. He, U. Weierstall, J.C.H. Spence, M. Howells, H.A. Padmore, S. Marchesini, H.N. Chapman, *Use of extended and prepared reference objects in experimental Fourier transform x-ray holography*, Applied Physics Letters 85 (13) (2004) 2454-2456.

/26/ S.P. Hau-Riege, H. Szoke, H.N. Chapman, A. Szoke, S. Marchesini, A. Noy, H.F. He, M. Howells, U. Weierstall, J.C.H. Spence, *SPEDEN: reconstructing single particles from their diffraction patterns*, Acta Crystallographica A 60 (2004) 294-305.

/27/ B. Carrozzini, G.L. Cascarano, L. De Caro, C. Giacovazzo, S. Marchesini, H. Chapman, H. He, M. Howells, J.S. Wu, U. Weierstall, J.C.H. Spence, *Phasing diffuse scattering. Application of the SIR2002 algorithm to the non-crystallographic phase problem*, Acta Crystallographica A 60 (2004) 331-338.

/28/ J.S. Wu, U. Weierstall, J.C.H. Spence, C. Koch, *Iterative phase retrieval without support*, Optics Letters 29 (2004) 2737.

/29/ J.C.H.Spence, K. Schmidt, J. Wu, G. Hembree, U. Weierstall, B. Doak, and P. Fromme, *Diffraction from a beam of laser-aligned proteins: resolution limits.* Acta Crystallographica A 61 (2005) 237-245.

/30/ J.S. Wu, U. Weierstall, J.C.H. Spence, *Diffractive electron imaging of nanoparticles on a substrate.* Nature Materials 4 (12) (2005) 912-916.

/31/ D. Starodub, R.B. Doak, K. Schmidt, U. Weierstall, J.S. Wu, J.C.H. Spence, *Damped and thermal motion of laser-aligned hydrated macromolecule beams for diffraction,* Journal of Chemical Physics 123 (24): Art. No. 244304 (2005)

/32/ H. N. Chapman, A. Barty, S. Marchesini, A. Noy, S. Hau-Riege, C.C. Cui, M.R. Howells, R. Rosen, H.He, J.C.H. Spence, U. Weierstall, T. Beets, C. Jacobsen, D. Shapiro, *High-resolution ab initio three-dimensional x-ray diffraction microscopy,* Journal of the Optical Society of America A, Vol.23, 5 (2006) 1179 - 1200.

/33/ S. Marchesini, H.N. Chapman, A. Barty, C. Cui, M.R. Howells, J.C.H. Spence, U. Weierstall, A.M. Minor, *Phase Aberrations in Diffraction Micrsocopy*, (2005) online publication at arXiv.org: http://arxiv.org/abs/physics/0510033.

/34/ S. Marchesini, H. N. Chapman, A. Barty, A. Noy, S. P. Hau-Riege, J. M. Kinney, C. Cui, M. R. Howells, R. Rosen, J. C. H. Spence, U. Weierstall, D. Shapiro, T. Beetz, C. Jacobsen, E. Lima, A. M. Minor, H. He, *Progress in Three-Dimensional Coherent X-Ray Diffraction Imaging,* (2006) online publication at arXiv.org: http://arxiv.org/abs/physics/0510032

/35/ D. Shapiro, R.B. Doak, J. Spence, D. Starodub, U. Weierstall and H. Chapman, *A new apparatus for serial crystallography at the Advanced Light Source*, Proc. SPIE, Vol. 6318, 63180L (2006)

/36/ U. Weierstall, R B Doak, J C H Spence, D Starodub, D Shapiro, P Kennedy, J Warner, G G Hembree, P Fromme and H Chapman, *Droplet streams for serial crystallography of proteins*, Exp Fluids (2008) 44: 675–689

/37/ Anton Barty, Stefano Marchesini, Henry N. Chapman, Malcolm R. Howells, Congwu Cui, Andrew Minor, John C.H.Spence, Uwe Weierstall, Alex Noy, Alex B. Artyukhin, Ted Baumann, Trevor Willey, Tony van Buuren, James Stolken and John H. Kinney, *Three-dimensional coherent X-ray diffraction imaging of a ceramic nanofoam: determination of structural deformation mechanisms,* Phys. Rev. Lett. 101, 055501 (2008)

/38/ D. Starodub, P. Rez, G. Hembree, M. Howells, D. Shapiro, H. N. Chapman, P. Fromme, K. Schmidt, U. Weierstall, R. B. Doak and J. C. H. Spence, *Dose, exposure time and resolution in serial X-ray Crystallography*, J. Synchrotron Rad. (2008). 15, 62–73

/39/ D.A. Shapiro, D. DePonte, R.B. Doak, P. Fromme, G. Hembree, M. Hunter, S. Marchesini, K. Schmidt, D. Starodub, J. Spence, *Powder Diffraction from a Continuous Micro-Jet of sub-micron Protein Crystals,* J. Synchrotron Rad. (2008). 15, 593-599

/40/ K. E. Schmidt, J. C. H. Spence, U. Weierstall, R. Kirian, X. Wang,

D. Starodub, H. N. Chapman, M. R. Howells, and R. B. Doak , *Tomographic femtosecond X-ray diffractive imaging*, Phys. Rev. Let. 101, 115507 (2008)

/41/ D. DePonte, U. Weierstall, D. Starodub, J. Warner, J.C.H. Spence, and R.B. Doak, *Gas Dynamic Virtual Nozzle for Generation of Microscopic Droplet Streams,* J. Phys. D: Appl. Phys. **41** (2008) 195505

Book chapter:

U. Weierstall, "*Low Temperature Scanning Tunneling Microscopy and Spectroscopy*" in "*Science of Microscopy*", edited by P. Hawkes and J.C.H. Spence, p. 1070-1138, Springer Academic Publishers, 2007.

Invited talks:

/1/ U. Weierstall and J.C.H. Spence and G.D.W. Smith, *Atom species identification in STM with a time-of-flight technique,* Proc. 44th International Field Emission Symposium July, 1997 in Tsukuba, Japan.

/2/ U. Weierstall, J.C.H. Spence, *An STM with a time-of-flight analyzer for atomic species identification.* 15th International Congress on Electron Microscopy (2002), Durban, South Africa, Volume 3 p.77.

/3/ U. Weierstall, J.C.H. Spence, H. Chapman, M. Howells, *Coherent X-ray diffractive imaging at the Advanced Light Source*, Workshop on Frontier Science using Soft X-rays at the APS. August 5-6, 2004 , APS, Illinois.

/4/ U. Weierstall, J.C.H. Spence, H. Chapman, M. Howells, *Coherent X-ray diffractive imaging at the Advanced Light Source,* Frontiers in Soft X-ray, VUV, and Infrared Research (Workshop), September 16-18, 2004, SRC Madison, Wisconsin.

/5/ U. Weierstall, J.C.H. Spence, B. Doak, K. Schmidt, *Serial Crystallography with X-rays and Electrons,* Ultrafast Science and LCLS Experiments Workshop, October 25-26, 2004, SSRL Stanford, California.

/6/ U. Weierstall, J.C.H. Spence, H. Chapman, M. Howells, *Coherent X-ray diffractive imaging,* Structure of Nanocrystals (Workshop), December 5-8, 2004, Tempe, Arizona.

/7/ U. Weierstall, D. Starodub, J.C.H. Spence, B. Doak, J.S. Wu, J. Kennedy, P. Fromme, K. Schmidt, *Electron Diffraction from a Beam of Laser-aligned Proteins: Progress Report,* XX Congress of the International Union of Crystallography, August 23-31, 2005, Florence, Italy.

/8/ U. Weierstall, J.C.H. Spence, D. Starodub, K. Schmidt, B. Doak, D. Shapiro, H. Chapman, S. Marchesini, *Diffractive imaging and serial crystallography,* XXI Congress of the International Union of Crystallography, August 23-31, 2008, Osaka, Japan

/9/ U. Weierstall, *X-ray diffraction from Proteins in liquid jets,* HASYLAB Seminar July 2008, Hamburg DESY, Hamburg, Germany

/10/ U. Weierstall, *X-ray diffraction from proteins in liquid jets*, International Workshop on Science with and Instrumentation for Ultra-fast Coherent Diffraction Imaging of Single Particles, Clusters and Bio-Molecules at the European XFEL, November 2008, Uppsala, Sweden.

Other Presentations:

/1/ H. Lichte and U. Weierstall, *Can electron holography improve EM imaging of biological objects?*, Inst. Phys. Conf. Ser. No.93, Vol.3, p.325, European congress on electron micr. EUREM 1988, York

/2/ U. Weierstall und H. Lichte, *Kann die Elektronenholographie neue Wege fuer die Abbildung schwacher Objekte, z.b. biologischer Objekte im Elektronenmokroskop weisen?*, Optik Supplement 4 (Vol. 63) 1989, p.104 (Beitrag zur Dreilaendertagung fuer Elektronenmikroskopie, Salzburg 1989)

/3/ W.D. Rau, H. Lichte, E. Voelkl and U. Weierstall, *Real Time reconstruction of electron-off-axis holograms recorded by means of a high pixel CCD camera,* Proceedings of the 49th Annual Meeting of the Electron Microscopy Society of America 1991

/4/ U. Weierstall und H. Lichte, *Ein Spezial-Elektronenmikroskop mit supraleitender Objektivlinse fuer die Elektronenholographie schwacher Phasenobjekte*, Optik Supplements 4 (Vol. 88) 1991, p. 95 (Dreilaendertagung Salzburg 1991)

/5/ W.D. Rau, H. Lichte, E. Voelkl und U. Weierstall, *Echt-Zeit Rekonstruktion von Elektronenhologrammen,* Optik Supplements 4 (Vol.88) 1991, p. 95 (Tagung der DGE, Darmstadt 1991)

/6/ U. Weierstall and H. Lichte, *Off-axis electron holographie with a superconducting objective lens,* Proc. 10.European congress on El. Mic. EUREM, Granada, Spain 1992, Supplements 5 (Vol.94) 1993, p.80

/7/ U. Weierstall und H. Lichte, *Off-axis Elektronenholographie mit einer supraleitenden Objectivlinse*, Optik Supplement 5 (Vol. 94) 1993, S. 80 (Dreilaendertagung fuer Elektronenmikroskopie. Zuerich 1993)

/8/ J.C.H. Spence, U. Weierstall, W. Lo, *Development of a scanning tunneling atom probe*, Proc. MSA 1995, p. 728

/9/ J.C.H. Spence, U. Weierstall, W. Lo, *Development of a scanning tunneling atom probe*, Proc. 8th International Conference on scanning tunneling microscopy/spectroscopy 1995

/10/ U. Weierstall, J.C.H. Spence and W. Lo, *The Scanning Tunneling Atom Probe*, Proc. 42nd International Field Emission Symposium 1995 in Madison

/11/ J.C.H. Spence, X. Zhang, J.M. Zuo and U. Weierstall, *Low- energy point-reflection electron microscopy*,Proc. MSA 1995, p. 610

/12/ J. Spence, U. Weierstall, W.Lo, *The Scanning Tunneling Atom Probe*, Spring Meeting of the Materials Research Society 1996, San Francisco

/13/ U.Weierstall, Z.Huang and J.C.H.Spence, Twin Image Suppression and Field Inhomogeneity in In-Line Electron Holography, Proceedings MSA 1997, p. 1143

/14/ U. Weierstall, J.C.H. Spence and U. Knipping, *The Scanning Tunneling Atom Probe*, Proc. 44th National Symposium of the Am. Vac. Society 1997

/15/U. Weierstall, J.C.H. Spence, M. Stevens, *Low voltage point projection microscopy of organic films*, Proc.14th INTERNATIONAL CONGRESS ON ELECTRON MICROSCOPY, ICEM 14, 1998 Cancun, Mexico.

/16/ U. Weierstall, J.C.H. Spence, *Atom species identification in STM using an atom-probe technique*, TARA 98 Port Ludlow, Washington

/17/ U. Weierstall, J.M. Zuo, T. Kjorsvik and J.C.H. Spence, *A UHV Diffraction camera with energy filter for Convergent Beam RHEED and TED*, MSA 1999 Portland proceedings Vol. 5, suppl. 2, p. 206

/18/ Q. Chen, J. Spence, M. Stevens, U. Weierstall, *Inner-shell damage thresholds below 1kV in Cu-Phtalocyanine,*MSA 1999 Portland proceedings Vol. 5, suppl. 2, p. 716

/19/ Q.Chen, U. Weierstall and J.C.H.Spence, *Image reconstruction from TEM diffraction patterns using Fienup Algorithm*, MSA 2000, Philadelphia, Microscopy and Microanalysis Vol. 6, Supplement 2, p. 34

/20/ U. Weierstall, J.C.H. Spence, *An STM with time-of-flight analyzer for atomic species identification*, MSA 2000, Philadelphia, Microscopy and Microanalysis Vol. 6, Supplement 2, p. 718

/21/ U. Weierstall, J.C.H. Spence, *Retrieval of Amplitude and Phase Contrast Images from Coherent Visible-Light Diffracted Intensities,* Workshop on New Approaches to the Phase Problem for Non-Periodic Objects, May 17-19, 2001 LBNL Berkeley

/22/ J.C.H. Spence, U. Weierstall, J. Friis, *On lensless imaging of organics with Neutrons, X-rays, Helium atoms and low energy electrons: Damage and iterative phase retrieval,* MSA 2001

/23/ U. Weierstall, J.C.H. Spence, R.B. Doak, D. Starodub, Protein-doped droplet beams for laser-aligned serial crystallography, Microscopy and Microanalysis 12 (Supp.2) (2006), 244-245 CD

/24/ U.Weierstall, D.Starodub, D.Deponte, J.C.H.Spence, B.Doak, P. Rez, G.Hembree, P.Fromme, K.Schmidt, D.Shapiro, M.Howells, H.Chapman, Serial Crystallography of Proteins, Coherence 2007, Assilomar, June 25-28, 2007.

Coauthor on Presentations with substantial Contributions:

/1/ M. R. Howells, H. Chapman, R. M. Glaeser, S. Hau-Riege, H. He, J. Kirz, S. Marchesini, H. A. Padmore, J. C. H. Spence, U. Weierstall, *3D X-ray microscopy by phasing diffraction patterns: prospects and limitations,* International Workshop on Noncrystallographic Phase Retrieval, Cairns Australia, 2003.

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