

Robert W. Schoenlein

SLAC National Accelerator Laboratory (SLAC)
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Research and Professional Experience

Deputy Director for Science, Linac Coherent Light Source, SLAC 2015-present

Scientific Lead, Next Generation Light Source Initiative 2011-2013
Lawrence Berkeley National Laboratory (LBNL)

Deputy Director for Science, Advanced Light Source, LBNL 2009-2011

Senior Staff Scientist, Principal Investigator

Ultrafast X-ray Science Laboratory - LBNL Chemical Sciences Division 2005-2015

Ultrafast Materials Program Leader - LBNL Materials Sciences Division 2006-2013

Ultrafast laser and x-ray studies of atomic and electronic structural dynamics in condensed matter, correlated electron materials, nanocrystals, and molecular systems

Development of femtosecond x-ray science and novel ultrafast measurement techniques, generation of femtosecond x-rays from the Advanced Light Source via laser modulation of relativistic electron beam, development of femtosecond x-ray beamlines at the Advanced Light Source

Staff Scientist, Principal Investigator - LBNL Materials Sciences Division 1991-2006

Ultrafast x-ray diffraction studies of non-thermal melting in semiconductors; generation of femtosecond x-rays via Thomson scattering; photon-echo studies of electronic dephasing and coherent vibrational dynamics in semiconductor nanocrystals; reaction dynamics of visual pigment analog isorhodopsin

Postdoctoral Fellow - LBNL Materials Sciences Division 1989-1991

Ultrafast spectroscopy of the first step in vision (*cis-trans* isomerization in rhodopsin)

Education Ph.D., Electrical Engineering, Massachusetts Institute of Technology (1989)
S.M., E.E., Electrical Engineering, Massachusetts Institute of Technology (1987)
S.B., Electrical Engineering, Massachusetts Institute of Technology (1984)

Publications more than 140 peer-reviewed publications, *h*-index = 51 (Google Scholar)
more than 90 invited lectures and colloquia

Honors

American Physical Society Fellow

Citation: "for seminal contributions to ultrafast science using lasers and synchrotron radiation"

Klaus Halbach Award – Advanced Light Source, LBNL (2000)

Klaus Halbach Award – Advanced Light Source, LBNL (1996)

Adolph Lomb Medal – Optical Society of America (1994)

Honoring noteworthy contribution to optics before reaching the age of 30

Citation: "for development of elegant femtosecond spectroscopic methods and their application to fundamental studies of metals, semiconductors, and molecules"

Newport Research Award (1988)

NCAA Postgraduate Scholarship (1984-1985)

Hertz Foundation Scholarship (1980-1984)

Professional Service: International Review/Advisory Committees

European XFEL Scientific Advisory Committee – Hamburg	2021-present
Pohang Accel. Lab. International Advisory Committee – PAL Pohang	2016-present
FERMI@Elettra Proposal Review Committee – Trieste	2016-present
FLASH X-ray FEL Proposal Review Panel – DESY Hamburg	2014-present
Scientific Advisory Committee – FERMI X-ray FEL, Elettra Synchrotron Trieste	2011-present
Scientific Advisory Committee – Advanced Photon Source, Argonne	2014-2017
Laser Advisory Committee – European XFEL, Hamburg	2012-2017
Facility Advisory Committee – SLAC Linac Coherent Light Source II	2012-2014
Scientific Advisory Committee – Cornell University Energy Recovery Linac	2010-2014
Scientific Advisory Committee – SLAC Linac Coherent Light Source	2006-2011
Machine Advisory Committee – FERMI X-ray FEL, Elettra Synchrotron Trieste	2005-2011

Professional Service: Government Committees

DOE/BES Facilities Review Committee – Advanced Photon Source, Argonne	2014
DOE/BES Facilities Review Committee – NSLS-II, Brookhaven	2012
DOE/BES Facilities Review Committee – Advanced Photon Source, Argonne	2011
DOE/BES MSE Review Committee – Brookhaven National Lab, Condensed Matter Physics and Materials Science Program	2011
DOE/BES Facilities Review Committee – Advanced Photon Source, Argonne	2007
DOE/BES Lehman Review Committee – Linac Coherent Light Source, SLAC	2005
NIH Site Review Committee – University of Michigan, Center for Ultrafast Optical Sciences	2000

Professional Service: Professional Societies & Major Conference Committees

Program Committee – International Science@FELs Conference	2020
Chair – APS Physics Next Workshop: X-ray Laser Science - A New Frontier	2019
Chair – Gordon Res. Conference on Ultrafast Phenomena in Cooperative Systems	2018
Executive Committee – American Physical Society Division of Laser Science	2015-2018
Vice Chair – Gordon Res. Conference on Ultrafast Phenomena in Cooperative Systems	2016
Co-General Chair – XVII th International Conf. on Ultrafast Phenomena	2008-2010
Co-Chair, Program Committee – XVI th International Conf. on Ultrafast Phenomena	2006-2008
Program Committee – Quantum Electronics and Laser Science Conference	2007
Optical Society of America – Awards Committee for the Adolph Lomb Medal	2004-2006
Co-Organizer – Ultrafast X-ray Science Workshop, American Physical Society	2003
Program Committee - Workshop on the Generation and Uses of VUV and Soft X-Ray Coherent Radiation Pulses, Lund Sweden	2000-2001
Program Committee – Conference on Applications of High Field and Short Wavelength Sources IX	2000-2001
Program Committee – Quantum Electronics and Laser Science Conference	2003
Program Committee – XIII th International Conference on Ultrafast Phenomena	2001-2002
Program Committee – XII th International Conference on Ultrafast Phenomena	1999-2000
Program Committee – OSA Annual Meeting/ILS-XVI	2000
Program Committee – XI th International Conference on Ultrafast Phenomena	1997-1998

Program Committee – International Conference on Lasers and Electro-Optics 1995

Educational Activities

University of Pusan, Korea, Department of Chemistry, Doctoral Thesis Committee 2013

Aarhus University, Denmark, Department of Physics, Doctoral Thesis Committee 2008

Lund University, Sweden, Department of Physics,
Faculty Opponent for Doctoral Dissertation Defense 2005

LBNL Science Undergraduate Laboratory Internship Program – mentor 2005, 2010

LBNL High School Student Research Participation Program – mentor 2004

Society Memberships

American Physical Society, American Chemical Society, Optical Society of America, American Association for the Advancement of Science, IEEE, Sigma Xi, Eta Kappa Nu

Principal Publications:

R. W. Schoenlein, L. A. Peteanu, R. A. Mathies, and C. V. Shank, "The first step in vision: Femtosecond isomerization of rhodopsin," *Science*, **254**, 412 (1991).

Citations to date: 968

R. W. Schoenlein, W. Z. Lin, J. G. Fujimoto, and G. L. Eesley, "Femtosecond studies of nonequilibrium electronic processes in metals," *Phys. Rev. Lett.* **58**, 1680 (1987).

Citations to date: 858

R. W. Schoenlein, S. Chattopadhyay, H. H. W. Chong, T. E. Glover, P. A. Heimann, C. V. Shank, A. Zholents, and M. Zolotarev, "Generation of Femtosecond Pulses of Synchrotron Radiation," *Science*, **287**, 2237-2240 (2000).

Citations to date: 800

A. Cavalleri, Th. Dekorsy, H.W. Chong, J.C. Kieffer, and R.W. Schoenlein "Evidence for a structurally-driven insulator-to-metal transition in VO₂: A view from the ultrafast timescale," *Phys. Rev. B.*, **70**, 161102 (2004).

Citations to date: 743

Q. Wang, Q., R. W. Schoenlein, L. A. Peteanu, R. A. Mathies, and C. V. Shank, "Vibrationally coherent photochemistry in the femtosecond primary event of vision," *Science*, **266**, 422 (1994).

Citations to date: 717

R.W. Schoenlein, W.P. Leemans, A.H. Chin, P. Volfbeyn, T.E. Glover, P. Balling, M. Zolotarev, K.-J. Kim, S. Chattopadhyay, and C.V. Shank, "Femtosecond x-ray pulses at 0.4 Å by 90° Thomson Scattering: A new tool for probing structural dynamics of materials," *Science*, **274**, 236 (1996).

Citations to date: 665

M. Rini, R.I. Tobey, N. Dean, J. Itatani, Y. Tomioka, Y. Tokura, R.W.Schoenlein, and A. Cavalleri, "Control of the electronic phase of a manganite via mode-selective vibrational excitation," *Nature*, **449**, 72-74 (2007).

Citations to date: 578

R.W. Schoenlein, D. M. Mittleman, J. J. Shiang, A. P. Alivisatos, and C. V. Shank, "Investigation of femtosecond electronic dephasing in CdSe nanocrystals using quantum-beat-suppressed photon echoes," *Phys. Rev. Lett.*, **70**, 1014 (1993).

Citations to date: 238

R. W. Schoenlein, J.G. Fujimoto, G.L. Eesley, and T.W. Capehart, "Femtosecond studies of image-potential dynamics in metals," *Phys. Rev. Lett.* **61**, 2596 (1988).

Citations to date: 203

M. Khalil, M.A. Marcus, A.L. Smeigh, J.K. McCusker, H.H.W. Chong, and R.W. Schoenlein, "Picosecond x-ray absorption spectroscopy of a photoinduced iron(II) spin crossover reaction in solution," *J. Phys. Chem. A*, **110**, pp. 38-44 (2006).

Citations to date: 189

N. Huse, T.-K. Kim, L. Jamula, J.K. McCusker, F.M.F. de Groot, and R.W. Schoenlein, "Photo-Induced Spin-State Conversion in Solvated Transition Metal Complexes Probed via Time-Resolved Soft X-ray Spectroscopy," *J. Am. Chem. Soc.*, **132**, 6809-6816 (2010)

Citations to date: 142

A. Cavalleri, S. Wall, C. Simpson, E. Statz, D.W. Ward, K.A. Nelson, M.Rini, and R.W. Schoenlein, "Tracking the motion of charges in a terahertz light field by femtosecond X-ray diffraction," *Nature*, **442**, 664-666 (2006).

Citations to date: 113

Complete Publication List (chronological)

1. R. W. Schoenlein, W. Z. Lin, J. G. Fujimoto, and G. L. Eesley, "Femtosecond studies of nonequilibrium electronic processes in metals," **Ultrafast Phenomena V**, G. R. Fleming and A. E. Siegman, Eds., Springer-Verlag, p.260 (1986).
2. R. W. Schoenlein, W. Z. Lin, J. G. Fujimoto, and G. L. Eesley, "Femtosecond studies of nonequilibrium electronic processes in metals," *Phys. Rev. Lett.* **58**, 1680 (1987).
3. R. Birngruber, C. A. Puliafito, A. Gawande, W. Z. Lin, R. W. Schoenlein, and J. G. Fujimoto, "Femtosecond laser tissue interactions: Retinal injury studies," *IEEE J. Quant. Electron.* **23**, 1836 (1987).
4. R. W. Schoenlein, W. Z. Lin, E. P. Ippen, and J. G. Fujimoto, "Femtosecond hot carrier energy relaxation in GaAs," *Appl. Phys. Lett.* **51**, 1442 (1987).
5. W. Z. Lin, R. W. Schoenlein, J. G. Fujimoto, and E. P. Ippen, "Femtosecond absorption saturation studies of hot carriers in GaAs and AlGaAs," invited paper, *IEEE J. Quant. Electron.* **24**, 267 (1988).
6. R. W. Schoenlein, W. Z. Lin, S. D. Brorson, E. P. Ippen, and J. G. Fujimoto, "Femtosecond hot carrier energy redistribution in GaAs and AlGaAs," *Sol. St. Electron.* **31**, 443 (1988).
7. R. W. Schoenlein, J.G. Fujimoto, G.L. Eesley, and T.W. Capehart, "Femtosecond studies of image-potential dynamics in metals," *Phys. Rev. Lett.* **61**, 2596 (1988).
8. W. Z. Lin, M. J. LaGasse, R. W. Schoenlein, B. Zysset, and J. G. Fujimoto, "Femtosecond studies of excited carrier energy relaxation and intervalley scattering in GaAs and AlGaAs," SPIE - Ultrafast Laser Probe Phenomena in Bulk and Microstructure Semiconductors II, **942**, p. 83 (1988).
9. W. Z. Lin, R. W. Schoenlein, M. J. LaGasse, B. Zysset, E. P. Ippen, and J. G. Fujimoto, "Ultrafast Scattering and Energy Relaxation of Optically Excited Carriers in GaAs and AlGaAs," **Ultrafast Phenomena VI**, T. Yajima, K. Yoshihara, C. B. Harris, and S. Shionoya, Eds., Springer-Verlag, p. 210 (1988).
10. R. W. Schoenlein, J. G. Fujimoto, G. L. Eesley, and W. Capehart, "Femtosecond image-potential dynamics in metals," **Ultrafast Phenomena VI**, T. Yajima, K. Yoshihara, C. B. Harris, and S. Shionoya, Eds., Springer-Verlag, p. 283 (1988).
11. D. Stern, R. W. Schoenlein, C. A. Puliafito, E. T. Dobi, R. Birngruber, and J. G. Fujimoto, "Corneal ablation by nanosecond, picosecond, and femtosecond lasers at 532 and 625 nm," *Archives of Ophthalmology* **107**, 587 (1989).
12. M. J. LaGasse, R. W. Schoenlein, J. G. Fujimoto and P. A. Schulz, "Amplification of Femtosecond Pulses in Ti:Al₂O₃ using an Injection Seeded Laser," *Opt. Lett.* **24**, 1347 (1989).
13. R. W. Schoenlein, J. G. Fujimoto, G. L. Eesley, and T. W. Capehart, "Femtosecond dynamics of the $n = 2$ image-potential state on Ag (100)," *Phys. Rev. B Rapid Commun.* **41**, 5436 (1990).
14. J. M. Huxley, P. Mataloni, R. W. Schoenlein, J. G. Fujimoto, E. P. Ippen, and G. M. Carter, "Femtosecond excited state dynamics of polydiacetylene," *Appl. Phys. Lett.* **56**, 1600 (1990).
15. R. W. Schoenlein, J. -Y. Bigot, M. T. Portella, and C. V. Shank, "Generation of blue-green 10 fs pulses using an excimer pumped dye amplifier," **Ultrafast Phenomena VII**, C. B. Harris, E. P. Ippen, G. A. Mourou, and A. H. Zewail, Eds., Springer-Verlag, p. 63 (1990).
16. J.-Y. Bigot, M. T. Portella, R. W. Schoenlein, C. V. Shank, and J. E. Cunningham, "Two-dimensional carrier-carrier screening studied with femtosecond photon echoes," **Ultrafast Phenomena VII**, C. B. Harris, E. P. Ippen, G. A. Mourou, and A. H. Zewail, Eds., Springer-Verlag, p. 239 (1990).

17. M. T. Portella, J. -Y. Bigot, R. W. Schoenlein, and C. V. Shank, "k-Space carrier dynamics in GaAs," **Ultrafast Phenomena VII**, C. B. Harris, E. P. Ippen, G. A. Mourou, and A. H. Zewail, Eds., Springer-Verlag, p. 285 (1990).
18. J. -Y. Bigot, M. T. Portella, R. W. Schoenlein, and C. V. Shank, "Resonant intervalley scattering in GaAs," *Phys. Rev. Lett.* **65**, 3429 (1990).
19. R. W. Schoenlein, J. G. Fujimoto, G. L. Eesley, and T. W. Capehart, "Femtosecond relaxation dynamics of image-potential states," *Phys. Rev. B II*. **43**, 4688 (1991).
20. R. W. Schoenlein, J. -Y. Bigot, M. T. Portella, and C. V. Shank, "Generation of blue-green 10 fs pulses using an excimer pumped dye amplifier," *Appl. Phys. Lett.* **58**, 801 (1991).
21. J. -Y. Bigot, M. T. Portella, R. W. Schoenlein, C. J. Bardeen, A. Migus, and C. V. Shank, "Non-Markovian dephasing of molecules in solution measured with three-pulse femtosecond photon echoes," *Phys. Rev. Lett.* **66**, 1138 (1991).
22. R. W. Schoenlein and J. G. Fujimoto, "Femtosecond photoemission studies of image-potential and electron dynamics in metals," **Laser Optics of Condensed Matter, Vol. 2**, E. Garmire, A. A. Maradudin, and K. K. Rabane, Eds., Plenum Publishing Corp., p. 71 (1991).
23. J.-Y. Bigot, M.T. Portella, R.W. Schoenlein, J.E. Cunningham, and C.V. Shank, "Two-dimensional carrier-carrier screening in a quantum well," *Phys. Rev. Lett.* **67**, 636 (1991).
24. R. W. Schoenlein, L. A. Peteanu, R. A. Mathies, and C. V. Shank, "The first step in vision: Femtosecond isomerization of rhodopsin," *Science*, **254**, 412 (1991).
25. R. W. Schoenlein, C. V. Shank, L. A. Peteanu, and R. A. Mathies, "Femtosecond photoisomerization of rhodopsin as the primary event in vision," **Ultrafast Processes in Spectroscopy 1991**, A. Laubereau and A. Seilmeier Eds., IOP Publishing Ltd., p. 583 (1992).
26. T. Portella, J. -Y. Bigot, R. W. Schoenlein, J. E. Cunningham, and C. V. Shank, "k-Space carrier dynamics in GaAs," *Appl. Phys. Lett.* **60**, 2123 (1992).
27. D.R. Yankelevich, A. Dienes, A. Knoesen, R.W. Schoenlein, and C.V. Shank, "Generation of 312 nm, femtosecond pulses using a poled copolymer film," *IEEE J. Quant. Electron.*, **28**, 2398 (1992).
28. R. W. Schoenlein, L.A. Peteanu, Q.W. Wang, R.A. Mathies, and C.V. Shank, "Investigation of the primary event in vision using 10 fs blue-green optical pulses," **Ultrafast Phenomena VIII**, J. L. Martin and A. Migus, Eds., Springer-Verlag, p 53 (1993).
29. S. L. Dexheimer, D. M. Mittleman, R. W. Schoenlein, W. Vareka, X.-D. Xiang, A. Zettl, and C.V. Shank, "Ultrafast dynamics of solid C₆₀," **Ultrafast Phenomena VIII**, J. L. Martin and A. Migus, Eds., Springer-Verlag, p 81 (1993).
30. C. V. Shank, R. W. Schoenlein, D.M. Mittleman, J.J. Shiang, and A.P. Alivisatos, "Femtosecond electronic dynamics of CdSe nanocrystals," **Ultrafast Phenomena VIII**, J. L. Martin and A. Migus, Eds., Springer-Verlag, p 438 (1993).
31. R.W. Schoenlein, D. M. Mittleman, J. J. Shiang, A. P. Alivisatos, and C. V. Shank, "Investigation of femtosecond electronic dephasing in CdSe nanocrystals using quantum-beat-suppressed photon echoes," *Phys. Rev. Lett.*, **70**, 1014 (1993).
32. R. W. Schoenlein, L. A. Peteanu, Q. Wang, R. A. Mathies, and C. V. Shank, "Femtosecond dynamics of the *cis-trans* isomerization in a visual pigment analog: Isorhodopsin," *J. Chem. Phys.*, **97**, 12087 (1993).
33. L. A. Peteanu, R. W. Schoenlein, Q. Wang, R. A. Mathies, and C. V. Shank, "Femtosecond red-probe dynamics of the *cis-trans* isomerization in rhodopsin," *Proc. Natl. Acad. Sci. USA*, **90**, 11762 (1993).

34. D. M. Mittleman, R. W. Schoenlein, J. J. Shiang, V. L. Colvin, A. P. Alivisatos, and C. V. Shank, "Quantum size dependence of femtosecond electronic dephasing and vibrational dynamics in CdSe nanocrystals," *Phys. Rev. B*, **49**, 14435 (1994).
35. Q. Wang, Q., R. W. Schoenlein, L. A. Peteanu, R. A. Mathies, and C. V. Shank, "Vibrationally coherent photochemistry in the femtosecond primary event of vision," *Science*, **266**, 422 (1994).
36. D. M. Mittleman, S. J. Rosenthal, R. W. Schoenlein, A. T. Yeh, C. V. Shank, J.J. Shiang, V. L. Colvin, R. A. Grubbs, and A.P. Alivisatos, "Ultrafast dynamics in CdSe nanocrystals," **Ultrafast Phenomena IX**, P. F. Barbara, W. H. Knox, G. A. Mourou, A. H. Zewail, Eds., Springer-Verlag, p 351 (1994).
37. Q. Wang, R. W. Schoenlein, L. A. Peteanu, S. J. Rosenthal, R. A. Mathies, and C. V. Shank, "Femtosecond vibrationally coherent photochemistry in the primary event in vision," **Ultrafast Phenomena IX**, P. F. Barbara, W. H. Knox, G. A. Mourou, A. H. Zewail, Eds., Springer-Verlag, p 425 (1994).
38. T. E. Glover, R. W. Schoenlein, A. H. Chin, and C.V. Shank, "Observation of laser assisted photoelectric effect and femtosecond high-order harmonic radiation," *Phys. Rev. Lett.*, **76**, 2468 (1996).
39. R.W. Schoenlein, W.P. Leemans, A.H. Chin, P. Volfbeyn, T.E. Glover, P. Balling, M. Zolotarev, K.-J. Kim, S. Chattopadhyay, and C.V. Shank, "Femtosecond x-ray pulses at 0.4 Å by 90° Thomson Scattering: A new tool for probing structural dynamics of materials," *Science*, **274**, 236 (1996).
40. Q. Wang, G.G. Kochendoerfer, R.W. Schoenlein, P.J.E. Verdegm, J. Lugtenburg, R.A. Mathies, and C.V. Shank, "Femtosecond spectroscopy of a 13-demethylrhodopsin visual pigment analogue - the role of nonbonded interactions in the isomerization process," *J. Phys. Chem.*, **100**, 17388 (1996).
41. W.P. Leemans, R.W. Schoenlein, P. Volfbeyn, A.H. Chin, T.E. Glover, P. Balling, M. Zolotarev, K.-J. Kim, S. Chattopadhyay, and C.V. Shank, "X-ray based sub-picosecond electron bunch characterization using 90 degrees Thomson scattering," *Phys. Rev. Lett.*, **77**, 4182 (1996).
42. T. E. Glover, R. W. Schoenlein, A. H. Chin, and C.V. Shank, "Measurement of high harmonic pulse durations via laser assisted x-ray photoionization," **Ultrafast Phenomena X**, P.F. Barbara, J.G. Fujimoto, W.H. Knox, W. Zinth, Eds., Springer-Verlag, p 111 (1996).
43. R.W. Schoenlein, W.P. Leemans, A.H. Chin, P. Volfbeyn, T.E. Glover, P. Balling, M. Zolotarev, K.-J. Kim, S. Chattopadhyay, and C.V. Shank, "Femtosecond x-rays generated via 90° Thomson scattering," **Ultrafast Phenomena X**, P.F. Barbara, J.G. Fujimoto, W.H. Knox, W. Zinth, Eds., Springer-Verlag, p 122 (1996).
44. G. Cerullo, U. Banin, A.A. Guzelian, C.J. Bardeen, R.W. Schoenlein, A.P. Alivisatos, and C.V. Shank, "Ultrafast dephasing dynamics and multi-level electronic structure of InP nanocrystals," **Ultrafast Phenomena X**, P.F. Barbara, J.G. Fujimoto, W.H. Knox, W. Zinth, Eds., Springer-Verlag, p 429 (1996).
45. W.P. Leemans, R.W. Schoenlein, P. Volfbeyn, A.H. Chin, T.E. Glover, P. Balling, M. Zolotarev, K.-J. Kim, S. Chattopadhyay, and C.V. Shank, "Interaction of relativistic electrons with ultrashort laser pulses: Generation of femtosecond x-rays and microprobing of electron beams," *IEEE J. Quant. Electron.*, **11**, 1925 (1997).
46. T.E. Glover, A.H. Chin, R.W. Schoenlein, and C.V. Shank, "Temporal broadening of femtosecond high harmonic radiation," **Ultrafast Phenomena XI**, T. Elsaesser, J.G. Fujimoto, D.A. Wiersma, and W. Zinth, Eds., Springer-Verlag, p 381 (1998).

47. R.W. Schoenlein, P. Balling, H.H.W. Chong, T.E. Glover, P.A. Heimann, C.V. Shank, A. Zholents, and M. Zolotarev "Generation of 'dark' femtosecond synchrotron pulses from the Advanced Light Source," **Ultrafast Phenomena XI**, T. Elsaesser, J.G. Fujimoto, D.A. Wiersma, and W. Zinth, Eds., Springer-Verlag, p 390 (1998).
48. A.H. Chin, R. W. Schoenlein, T.E. Glover, P. Balling, W.P. Leemans, and C.V. Shank, "Ultrafast structural dynamics in InSb probed by time-resolved x-ray diffraction," **Ultrafast Phenomena XI**, T. Elsaesser, J.G. Fujimoto, D.A. Wiersma, and W. Zinth, Eds., Springer-Verlag, p 401 (1998).
49. A.H. Chin, R. W. Schoenlein, T.E. Glover, P. Balling, W.P. Leemans, and C.V. Shank, "Ultrafast structural dynamics in InSb probed by time-resolved x-ray diffraction," *Phys. Rev. Lett.*, **83**, pp. 336-339 (1999).
50. R. W. Schoenlein, S. Chattopadhyay, H. H. W. Chong, T. E. Glover, P. A. Heimann, C. V. Shank, A. Zholents, and M. Zolotarev, "Generation of femtosecond pulses of synchrotron radiation," *Science*, **287**, 2237-2240 (2000).
51. W. Leemans, S. Chattopadhyay, E. Esarey, A. Zholents, M. Zolotarev, A.H. Chin, R.W. Schoenlein, and C.V. Shank; "Femtosecond x-ray generation through relativistic electron beam-laser interaction," *Comptes Rendus de l'Académie des Sciences IV Physique Astrophysique*, **1**, 279 (2000).
52. R. W. Schoenlein, S. Chattopadhyay, H. H. W. Chong, T. E. Glover, P. A. Heimann, W.P. Leemans, C. V. Shank, A. Zholents, and M. Zolotarev, "Generation of x-ray pulses via laser-electron beam interaction," *Appl. Phys. B*, **71**, 1-10 (2000).
53. R. W. Schoenlein, H.H.W. Chong, T.E. Glover, P.A. Heimann, C.V. Shank, A.A. Zholents, and M.S. Zolotarev, "Femtosecond x-ray pulses from a synchrotron," **Ultrafast Phenomena XII**, T. Elsaesser, S. Mukamel, M.M. Murnane, N.F. Scherer, Eds., Springer-Verlag, p 271 (2000).
54. T.E. Glover, A.H. Chin, and R.W. Schoenlein, "High-order harmonic pulse broadening in an ionizing medium," *Phys. Rev. A*, **63**, pp.1-9 (2001).
55. T.E. Glover, G.D. Ackermann, A. Belkacem, B. Feinberg, P.A. Heimann, Z. Hussain, H.A. Padmore, C. Ray, R.W. Schoenlein, and W.F. Steele, "Measurement of synchrotron pulse durations using surface photovoltage transients," *Nuclear Inst. and Methods A*, **467**, 1438-1440 (2001).
56. P.A. Heimann, A.M. Lindenberg, I. Kang, S. Johnson, T. Missalla, Z. Chang, R.W. Falcone, R.W. Schoenlein, T.E. Glover, and H.A. Padmore, "Ultrafast x-ray diffraction of laser-irradiated crystals," *Nuclear Inst. and Methods A*, **467**, 986-989 (2001).
57. R.W. Schoenlein, H.H.W. Chong, T.E. Glover, P.A. Heimann, W.P. Leemans, H.A. Padmore, C.V. Shank, A. Zholents, M. Zolotarev, and J.S. Corlett, "Femtosecond x-rays from relativistic electrons: New tools for probing structural dynamics," *Comptes Rendus de l'Académie des Sciences IV Physique Astrophysique*, **2**, 1373 (2001).
58. A. Staudte, C.L. Cocke, M.H. Prior, A. Belkacem, C. Ray, H.H.W. Chong, T.E. Glover, R.W. Schoenlein, and U. Saalman, "Observation of a nearly isotropic, high-energy Coulomb explosion group in the fragmentation of D₂ by short laser pulses," *Phys. Rev. A*, **65** (2002).
59. T.E. Glover, G.D. Ackermann, A. Belkacem, P.A. Heimann, Z. Hussain, H.A. Padmore, C. Ray, R.W. Schoenlein, and W.F. Steele, "Kinetics of cluster formation during femtosecond laser ablation," **Ultrafast Phenomena XIII**, R.D. Miller, M.M. Murnane, N.F. Scherer, A.M. Weiner, Eds., Springer-Verlag, p 42 (2002).
60. T.E. Glover, G.D. Ackerman, A. Belkacem, P.A. Heimann, Z. Hussain, R.W. Lee, H.A. Padmore, C. Ray, R.W. Schoenlein, W.F. Steele, and D.A. Young, "Metal-insulator transitions in an expanding metallic fluid: particle formation kinetics," *Phys. Rev. Lett.*, **90**, pp.236102/1-4 (2003) (LBNL-53203).

61. A.Cavalleri and R.W. Schoenlein, "Femtosecond x-ray studies of lattice dynamics in solids," in **Ultrafast Dynamical Processes in Semiconductors**, ed. by K.T. Tsen, *Topics in Applied Physics* Series No. 92, Springer Verlag (2004).
62. M. Saes, C. Bressler, F. van Mourik, W. Gawelda, M. Kaiser, M. Chergui, D. Grolimund, R. Abela, T.E. Glover, P.A. Heimann, R.W. Schoenlein, S.L. Johnson, A.M. Lindenberg, and R.W. Falcone, "A setup for ultrafast time-resolved x-ray absorption spectroscopy," *Rev. Sci. Inst.*, **75**, pp. 24-30 (2004) (LBNL-55297).
63. P. A. Heimann, H. A. Padmore, and R. W. Schoenlein, "ALS Beamline 6.0 For Ultrafast X-ray Absorption Spectroscopy," in **Synchrotron Radiation Instrumentation**, T. Warwick, J. Author, H.A. Padmore, and J. Stohr Eds., AIP Conf. Proc. 705, 1407 (2004).
64. R. W. Schoenlein, A. Cavalleri, H. H. W. Chong, T. E. Glover, P. A. Heimann, A. A. Zholents, and M. S. Zolotorev, "Generation of Femtosecond Synchrotron Pulses: Performance and Characterization," in **Synchrotron Radiation Instrumentation**, T. Warwick, J. Author, H.A. Padmore, and J. Stohr Eds., AIP Conf. Proc. 705, 1403 (2004). (LBNL-53674).
65. A. Cavalleri, H.H.W. Chong, S. Fourmaux, T.E. Glover, P.A. Heimann, J.C. Kieffer, B.S. Mun, H.A. Padmore, and R.W. Schoenlein, "Picosecond soft x-ray absorption measurement of the photo-induced insulator-to-metal transition in VO₂," *Phys. Rev. B*, **69**, 153106 (2004). (LBNL-54765).
66. A. Cavalleri, Th. Dekorsy, H.W. Chong, J.C. Kieffer, and R.W. Schoenlein "Evidence for a structurally-driven insulator-to-metal transition in VO₂: A view from the ultrafast timescale," *Phys. Rev. B*, **70**, 161102 (2004). (LBNL-58460).
67. A. Cavalleri, Th. Dekorsy, H.H. Chong, J.C. Kieffer, R.W. Schoenlein, "Phase Transition in strongly-correlated VO₂: Time-domain Assignment of Cause and Effect," in **Ultrafast Phenomena XIV**, Springer Series in Chemical Physics **79**, T. Kobayashi, T. Okada, T. Kobayashi, K.A. Nelson, S. De Silvestri, Eds., Springer-Verlag, p. 346 (2004). (LBNL-58461)
68. A. Cavalleri, H.H.W. Chong, S. Fourmaux, T.E. Glover, P.A.Heimann, J.C. Kieffer, H.A. Padmore, R.W. Schoenlein, "Femtosecond Near Edge X-ray Absorption Measurement of the VO₂ Phase Transition," in **Ultrafast Phenomena XIV**, Springer Series in Chemical Physics **79**, T. Kobayashi, T. Okada, T. Kobayashi, K.A. Nelson, S. De Silvestri, Eds., Springer-Verlag, p. 343 (2004). (LBNL-58462).
69. M. Rini, A. Cavalleri, R. López, L.A. Boatner, R.F. Haglund Jr., T.E. Haynes, L.C. Feldman, R.W. Schoenlein, "Ultrafast Control of a Surface Plasmon Resonance via the Insulator to Metal Transition in VO₂ Nanoparticles," in **Ultrafast Phenomena XIV**, Springer Series in Chemical Physics **79**, T. Kobayashi, T. Okada, T. Kobayashi, K.A. Nelson, S. De Silvestri, Eds., Springer-Verlag, p. 792 (2004). (LBNL-58619).
70. M. Rini, A. Cavalleri, R.W. Schoenlein, R. López, L.C. Feldman, R.F. Haglund Jr., L.A. Boatner, T.E. Haynes, "Photoinduced phase transition in VO₂ nanocrystals: ultrafast control of surface-plasmon resonance," *Opt. Lett.*, **30**, p. 558 (2005). (LBNL-58575).
71. A.Cavalleri, M. Rini, H.H.W. Chong, S. Fourmaux, T.E. Glover, P.A. Heimann, J.C. Kieffer, R.W. Schoenlein, "Band-Selective Measurements of Electron Dynamics in VO₂ Using Femtosecond Near-Edge X-Ray Absorption," *Phys. Rev. Lett.*, **95**, 067405 (2005). (LBNL-58463).
72. M. Zolotorev, A.A. Zholents, R.W. Schoenlein, "Beam slicing by femtosecond laser" in **Femtosecond Beam Science**, M. Uesaka Ed., Imperial College Press, p. 202 (2005).
73. M. Khalil, M.A. Marcus, A.L. Smeigh, J.K. McCusker, H.H.W. Chong, and R.W. Schoenlein, "Picosecond x-ray absorption spectroscopy of a photoinduced iron(II) spin crossover reaction in solution," *J. Phys. Chem. A*, **110**, pp. 38-44 (2006). (LBNL-58982).

74. A.Cavalleri, M.Rini, R.W. Schoenlein, “Ultra-broadband femtosecond measurements of the photo-induced phase transition in VO₂: From the mid-IR to the hard x-rays” *J. Phys. Soc. Jap.*, **75**, p. 011004, (2006). (LBNL-60949).
75. J.M. Byrd, Z. Hao, M.C. Martin, D.S. Robin, F. Sannibale, R.W. Schoenlein, A.A. Zholents, and M.S. Zolotarev, “Tailored Terahertz Pulses from a Laser-Modulated Electron Beam,” *Phys. Rev. Lett.*, **96**, 164801, (2006). (LBNL-58991)
76. A. Cavalleri, S. Wall, C. Simpson, E. Statz, D.W. Ward, K.A. Nelson, M.Rini, and R.W. Schoenlein, “Tracking the motion of charges in a terahertz light field by femtosecond X-ray diffraction,” *Nature*, **442**, 664-666 (2006). (LBNL-60948).
77. J. M. Byrd, Z. Hao, M. C. Martin, D.S. Robin, F. Sannibale, R.W. Schoenlein, A. A. Zholents, M.S. Zolotarev, “Laser seeding of the storage ring microbunching instability for high-power coherent terahertz radiation,” *Phys. Rev. Lett.*, **97**, 074802, (2006) (LBNL-60002).
78. M. Khalil, M.A. Marcus, A.L. Smeigh, J.K. McCusker, H.H.W. Chong, and R.W. Schoenlein, “Picosecond x-ray absorption spectroscopy of photochemical transient species in solution,” in **Ultrafast Phenomena XV**, Springer Series in Chemical Physics , **88**, 722, P. Corkum, D. Jonas, D. Miller, A.M. Weiner, Eds., Springer-Verlag, (2007) (LBNL-93E).
79. M. Rini, J. Itatani, Y. Tomioka, Y. Tokura, R.W. Schoenlein, and A. Cavalleri, “Insulator-to-metal transition induced by mid-IR vibrational excitation in a magnetoresistive manganite,” in **Ultrafast Phenomena XV**, Springer Series in Chemical Physics , **88**, 588 P. Corkum, D. Jonas, D. Miller, A.M. Weiner, Eds., Springer-Verlag, (2007) (LBNL-74E).
80. J. Itatani, M. Rini, A. Cavalleri, K. Onda, T. Ishikawa, S.-Y. Koshihara, X. Shao, H. Yamochi, G. Saito, and R.W. Schoenlein, “Ultrafast gigantic photo-response in (EDO-TTF)₂PF₆ initiated by 10-fs laser pulses,” in **Ultrafast Phenomena XV**, Springer Series in Chemical Physics , **88**, 621, P. Corkum, D. Jonas, D. Miller, A.M. Weiner, Eds., Springer-Verlag, (2007) (LBNL-68E).
81. A. Cavalleri, S. Wall, C. Simpson, E. Statz, D.W. Ward, K.A. Nelson, M.Rini, and R.W. Schoenlein, “Lattice motions from THz phonon polaritons measured with femtosecond x-ray diffraction,” in **Ultrafast Phenomena XV**, Springer Series in Chemical Physics, **88**, 716, P. Corkum, D. Jonas, D. Miller, A.M. Weiner, Eds., Springer-Verlag, (2007) (LBNL-67E).
82. D. Polli, M. Rini, S. Wall, R.W. Schoenlein, Y. Tomioka, Y. Tokura, G. Cerullo, A. Cavalleri, “Coherent orbital waves in the photo-induced insulator–metal dynamics of a magnetoresistive manganite,” *Nature Mat.*, **6**, 643-647 (2007) (LBNL-94E).
83. M. Rini, R.I. Tobey, N. Dean, J. Itatani, Y. Tomioka, Y. Tokura, R.W.Schoenlein, and A. Cavalleri, “Control of the electronic phase of a manganite via mode-selective vibrational excitation,” *Nature*, **449**, 72-74 (2007). (LBNL-63433).
84. A. Belkacem, J.M. Byrd, J. Corlett, W. Fawley, J. Kirz, S. Lidia, W. McCurdy, H. Padmore, G. Penn, I. Pogorelov, J. Qiang, D. Robin, F. Sannibale, R. Schoenlein, J. Staples, C. Steier, M. Venturini, W. Wan, R. Wilcox, A. Zholents, R. Falcone, G. Fleming and K. E. Robinson, “Design Studies for a High-Repetition-Rate FEL Facility at LBNL,” *Synch. Rad. News*, **20**, 20-27 (2007) (LBNL-1621E).
85. M. Rini, Z. Hao, R.W. Schoenlein, C. Giannetti, F. Parmigiani, S. Fourmaux, J.C. Kieffer, A. Fujimori, M. Onoda, S. Wall, and A. Cavalleri, “Optical switching in VO₂ films by below-gap excitation,” *Appl. Phys. Lett.*, **92**, 181904 (2008) (LBNL-279E).
86. N. Huse, H. Wen, D. Nordlund, E. Szilagyi, D. Daranciang, T.A. Miller, A. Nilsson, R.W. Schoenlein, and A.M. Lindenberg, “Probing the hydrogen-bond network of water via time-resolved soft x ray spectroscopy,” *Phys. Chem. Chem. Phys.*, **11**, 3951–3957 (2009). (LBNL-1817E) – cover article.

87. N. Huse, M. Khalil, T.-K. Kim, A.L. Smeigh, L. Jamula, J.K. McCusker, and R.W. Schoenlein, "Probing reaction dynamics of transition-metal complexes in solution via time-resolved x-ray spectroscopy," *J. Phys. Conf.*, **148**, 012043 (2009) (LBNL-1818E).
88. M. Rini, R. Tobey, N. Dean, S. Wall, H. Erke, Y. Zhu, Y. Tomioka, Y. Tokura, R.W. Schoenlein and A. Cavalleri, "Time-resolved Studies of Phase Transition Dynamics in Strongly Correlated Manganites," *J. Phys. Conf.*, **148**, 012013 (2009) (LBNL-3667E).
89. J. Itatani, M. Rini, A. Cavalleri, K. Onda, T. Ishikawa, S. Ogihara, S. Koshihara, X. Shao, Y. Nakano, H. Yamochi, G. Saito, and R.W. Schoenlein, "Ultrafast gigantic photo-response in charge-ordered organic salt (EDO-TTF)₂PF₆ on 10-fs time scales," in **Ultrafast Phenomena XVI**, Springer Series in Chemical Physics, **92**, 185-187, P. Corkum, S. De Silvestri, K.A. Nelson, E. Riedle, R.W. Schoenlein, Eds., Springer-Verlag, (2009) (LBNL-3666E).
90. N. Huse, T.-K. Kim, M. Khalil, L. Jamula, J.K. McCusker, and R.W. Schoenlein, "Probing reaction dynamics of transition-metal complexes in solution via time-resolved soft x-ray spectroscopy," in **Ultrafast Phenomena XVI**, Springer Series in Chemical Physics, **92**, 125-127, P. Corkum, S. De Silvestri, K.A. Nelson, E. Riedle, R.W. Schoenlein, Eds., Springer-Verlag, (2009) (LBNL-4264E).
91. M. Rini, R. Tobey, S. Wall, Y. Zhu, Y. Tomioka, Y. Tokura, A. Cavalleri, and R.W. Schoenlein, "Time-resolved x-ray absorption spectroscopy of photoinduced insulator-metal transition in a colossal magnetoresistive manganite," in **Ultrafast Phenomena XVI**, Springer Series in Chemical Physics, **92**, 191-193, P. Corkum, S. De Silvestri, K.A. Nelson, E. Riedle, R.W. Schoenlein, Eds., Springer-Verlag, (2009) (LBNL-3665E).
92. S. Wall, D. Polli, M. Rini, P. Dharmalingam, A.T. Boothroyd, Y. Tomioka, Y. Tokura, R.W. Schoenlein, G. Cerullo, A. Cavalleri, "Coherent Orbital Waves in Manganites," in **Ultrafast Phenomena XVI**, Springer Series in Chemical Physics, **92**, 170-172, P. Corkum, S. De Silvestri, K.A. Nelson, E. Riedle, R.W. Schoenlein, Eds., Springer-Verlag, (2009).
93. M. Rini, Y. Zhu, S. Wall, R. I. Tobey, H. Ehrke, T. Garl, J. W. Freeland, Y. Tomioka, Y. Tokura, A. Cavalleri, and R. W. Schoenlein, "Transient electronic structure of the photoinduced phase of Pr_{0.7}Ca_{0.3}MnO₃ probed with soft x-ray pulses," *Phys. Rev. B*, **80**, 155113 (2009) (LBNL-3664E).
94. H. Wen, N. Huse, R.W. Schoenlein, and A.M. Lindenberg, "Ultrafast conversions between hydrogen bonded structures in liquid water observed by femtosecond x-ray spectroscopy," *J. Chem. Phys.*, **131**, 234505 (2009) (LBNL-3365E).
95. J. Corlett, K. Baptiste, J. M. Byrd, P. Denes, R. Falcone, J. Kirz, W. McCurdy, H. Padmore, G. Penn, J. Qiang, D. Robin, F. Sannibale, R. Schoenlein, J. Staples, C. Steier, M. Venturini, W. Wan, R. Wells, R. Wilcox & A. Zholents, "Design Studies for a VUV-Soft X-ray Free-Electron Laser Array," *Synch. Rad. News*, **22**, 25-31 (2009) (LBNL-2544E).
96. N. Huse, T.-K. Kim, L. Jamula, J.K. McCusker, F.M.F. de Groot, and R.W. Schoenlein, "Photo-Induced Spin-State Conversion in Solvated Transition Metal Complexes Probed via Time-Resolved Soft X-ray Spectroscopy," *J. Am. Chem. Soc.*, **132**, 6809-6816 (2010) (LBNL-3343E).
97. N. Huse, H. Cho, T.K. Kim, L. Jamula, J.K. McCusker, F.M.F. de Groot, and R.W. Schoenlein, "Ultrafast spin-state conversion in solvated transition metal complexes probed with femtosecond soft x-ray spectroscopy," in **Ultrafast Phenomena XVII**, M. Chergui, D.M. Jonas, E. Riedle, R.W. Schoenlein, A.J. Taylor, Eds., Oxford University Press, New York, p. 370-372, (2011)
98. N. Huse, H. Wen, H. Cho, T.K. Kim, R.W. Schoenlein, and A.M. Lindenberg, "Ultrafast conversions of hydrogen-bonded structures in liquid water observed via femtosecond soft x-ray spectroscopy," in **Ultrafast Phenomena XVII**, M. Chergui, D.M. Jonas, E. Riedle, R.W. Schoenlein, A.J. Taylor, Eds., Oxford University Press, New York, p. 460-462, (2011)

99. N. Huse, H. Cho, K. Hong, L. Jamula, F.M.F. de Groot, T.K. Kim, J.K. McCusker, and R.W. Schoenlein, "Femtosecond soft x-ray spectroscopy of solvated transition metal complexes: Deciphering the interplay of electronic and structural dynamics," *J. Phys. Chem. Lett.*, **2**, 880–884 (2011) (LBNL-6649E).
100. S.Y. Zhou, Y. Zhu, M.C. Langner, Y.-D. Chuang, P. Yu, W.L. Yang, A.G. Cruz Gonzalez, N. Tahir, M. Rini, Y.-H. Chu, R. Ramesh, D.-H. Lee, Y. Tomioka, Y. Tokura, Z. Hussain, and R.W. Schoenlein, "Ferromagnetic enhancement of CE-type spin ordering in (Pr,Ca)MnO₃," *Phys. Rev. Lett.* **106**, 186404 (2011) (LBNL-4715E).
101. S. Wall, M. Rini, S. S. Dhesi, R.W. Schoenlein, and A. Cavalleri, "Advances in ultrafast control and probing of correlated-electron materials," *IEEE J. Sel. Top. Quant. Electron.*, **18**, pp. 81-91, invited paper (2012) (LBNL-6648E).
102. W.S. Lee, Y.D. Chuang, R.G. Moore, Y. Zhu, L. Patthey, M. Trigo, D.H. Lu, P.S. Kirchmann, O. Krupin, M. Yi, M. Langner, N. Huse, J.S. Robinson, Y. Chen, S.Y. Zhou, G. Coslovich, B. Huber, D.A. Reis, R.A. Kaindl, R.W. Schoenlein, D. Doering, P. Denes, W.F. Schlotter, J.J. Turner, S.L. Johnson, M. Först, T. Sasagawa, Y.F. Kung, A.P. Sorini, A.F. Kemper, B. Moritz, T.P. Devereaux, D.-H. Lee, Z.X. Shen, and Z. Hussain, "Phase fluctuations and the absence of topological defects in a photo-excited charge ordered nickelate," *Nature Comm*, **3**, 838, (2012) (LBNL-6647E).
103. H. Cho, M.L. Strader, K. Hong, L. Jamula, E.M. Gullikson, T.K. Kim, F.M.F. de Groot, J.K. McCusker, R.W. Schoenlein, and N. Huse, "Ligand-field symmetry effects in Fe(II) polypyridyl compounds probed by transient X-ray absorption spectroscopy," *Faraday Discuss.* **157**, 463-474 (2012) (LBNL-6644E).
104. B.E. Van Kuiken, N. Huse, H. Cho, M.L. Strader, M.S. Lynch, R.W. Schoenlein, and M. Khalil, "Probing the electronic structure of a photoexcited solar cell dye with transient X-ray absorption spectroscopy," *J. Phys. Chem. Lett.*, **3**, 1695-1700 (2012) (LBNL-6646E).
105. J.D. Koralek, D. Meier, J.P. Hinton, A. Bauer, S.A. Paramswaran, A. Vishwanath, R. Ramesh, R.W. Schoenlein, C. Pfleiderer, and J. Orenstein, "Observation of coherent helimagnons and Gilbert damping in an itinerant magnet," *Phys. Rev. Lett.*, **109**, 247204, (2012) (LBNL-6643E).
106. Y. D. Chuang, W. S. Lee, Y. F. Kung, A. P. Sorini, B. Moritz, R. G. Moore, L. Patthey, M. Trigo, D. H. Lu, P. S. Kirchmann, M. Yi, O. Krupin, M. Langner, Y. Zhu, S.Y. Zhou, D. A. Reis, N. Huse, J. S. Robinson, R. A. Kaindl, R.W. Schoenlein, S. L. Johnson, M. Först, D. Doering, P. Denes, W. F. Schlotter, J. J. Turner, T. Sasagawa, Z. Hussain, Z. X. Shen, and T. P. Devereaux, "Real-time manifestation of strongly coupled spin and charge order parameters in stripe-ordered La_{1.75}Sr_{0.25}NiO₄ nickelate crystals using time-resolved resonant x-ray diffraction," *Phys. Rev. Lett.* **110**, 127404 (2013).
107. B. Van Kuiken, M. Valiev, S. Daifuku, C. Bannan, M. Strader, H. Cho, N. Huse, R. Schoenlein, N. Govind, M. Khalil, "Simulating Ru L₃-edge X-ray Absorption Spectroscopy with Time-Dependent Density Functional Theory: Model Complexes and Electron Localization in Mixed-Valence Metal Dimers," *J. Phys. Chem. A*, **117**, 4444–4454 (2013). (LBNL-6657E)
108. C. Bostedt, J.D. Bozek, P.H. Bucksbaum, R.N. Coffee, J.B. Hastings, Z. Huang, R.W. Lee, S. Schorb, J.N. Corlett, P. Denes, P. Emma, R.W. Falcone, R.W. Schoenlein, G. Doumy, E.P. Kanter, B. Kraessig, S. Southworth, L. Young, L. Fang, M. Hoener, N. Berrah, C. Roedig, and L.F. DiMauro, "Ultra-fast and ultra-intense x-ray sciences: first results from the Linac Coherent Light Source free-electron laser", *J. Phys. B: At. Mol. Opt. Phys.* **46**, 164003 (2013).
109. G. Coslovich, B. Huber, W.-S. Lee, Y.-D. Chuang, Y. Zhu, T. Sasagawa, Z. Hussain, H. A. Bechtel, M.C. Martin, Z.-X. Shen, R.W. Schoenlein, and R.A. Kaindl, "Ultrafast charge localization in a stripe-phase nickelate" *Nature Commun.*, **4**, 2643 (2013) (LBNL-6396E).

110. S.Y. Zhou, M.C. Langner, Y. Zhu, Y.-D. Chuang, M. Rini, T.E. Glover, M.P. Hertlein, A.G. Cruz Gonzalez, N. Tahir, Y. Tomioka, Y. Tokura, Z. Hussain, and R.W. Schoenlein, "Glass-like recovery of antiferromagnetic spin ordering in a photo-excited manganite $\text{Pr}_{0.7}\text{Ca}_{0.3}\text{MnO}_3$," *Sci. Rep.*, **4**, 4050 (2014) (LBNL-6656E).
111. M.C. Langner, S. Roy, S.K. Mishra, J.C.T. Lee, X.W. Shi, M.A. Hossain, Y.-D. Chuang, S. Seki, Y. Tokura, S.D. Kevan, and R. W. Schoenlein, "Coupled skyrmion sublattices in Cu_2OSeO_3 ," *Phys. Rev. Lett.*, **112**, 167202 (2014) (LBNL-6600E).
112. K.R. Siefertmann, C.D. Pemmaraju, S. Nepl, A. Shavorskiy, A.A. Cordones, J. Vura-Weis, D.S. Slaughter, F.P. Sturm, F. Weise, H. Bluhm, M.L. Strader, H. Cho, M.-F. Lin, C. Bacellar, C. Khurmi, J. Guo, G. Coslovich, J.S. Robinson, R.A. Kaindl, R.W. Schoenlein, A. Belkacem, D.M. Neumark, S.R. Leone, D. Nordlund, H. Ogasawara, O. Krupin, J.J. Turner, W.F. Schlotter, M.R. Holmes, M. Messerschmidt, M.P. Minitti, S. Gul, J.Z. Zhang, N. Huse, D. Prendergast, and O. Gessner, "Atomic-Scale Perspective of Ultrafast Charge Transfer at a Dye–Semiconductor Interface," *J. Phys. Chem. Lett.*, **5**, 2753-2759 (2014).
113. A. Shavorskiy, S. Nepl, D. Slaughter, J. Cryan, K. Siefertmann, F. Weise, M.-F. Lin, C. Bacellar, M. Ziemkiewicz, I. Zegkinoglou, M. Fraund, C. Khurmi, M. Hertlein, T. Wright, N. Huse, R. Schoenlein, T. Tyliczszak, G. Coslovich, J. Robinson, R. Kaindl, B. Rude, A. Oelsner, S. Maehl, H. Bluhm, and O. Gessner, "Sub-Nanosecond Time-Resolved Ambient-Pressure X-ray Photoelectron Spectroscopy Setup for Pulsed and Constant Wave X-ray Light Sources," *Rev. Sci. Inst.*, **85**, 093102 (2014).
114. M.C. Langner, S. Zhou, G. Coslovich, Y.D. Chuang, Y. Zhu, J. S. Robinson, W.F. Schlotter, J.J. Turner, M.P. Minitti, R.G. Moore, W.S. Lee, D.H. Lu, D. Doering, P. Denes, Y. Tomioka, Y. Tokura, R.A. Kaindl, and R.W. Schoenlein, "Ultrafast x-ray and optical signatures of phase competition and separation underlying the photoinduced metallic phase in $\text{Pr}_{1-x}\text{Ca}_x\text{MnO}_3$," *Phys. Rev. B* **92**, 155148 (2015).
115. S.W. Huang, L.A. Wray, H.-T. Jeng, V.T. Tra, J.M. Lee, M.C. Langner, J.M. Chen, S. Roy, Y.H. Chu, R.W. Schoenlein, Y.-D. Chuang, and J.-Y. Lin, "Selective interlayer ferromagnetic coupling between the Cu spins in $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$ grown on top of $\text{La}_{0.7}\text{Ca}_{0.3}\text{MnO}_3$," *Sci. Rep.*, **5**, 16690, (2015).
116. K. Hong, H. Cho, R.W. Schoenlein, T.-K. Kim, and N. Huse, "Element-Specific Characterization of Transient Electronic Structure of Solvated Fe(II) Complexes with Time-Resolved Soft X-ray Absorption Spectroscopy," *Acc. Chem. Res.*, **48**, 2957-2966 (2015)
117. M.C. Langner, S. Roy, A.F. Kemper, Y.-D. Chuang, S.K. Mishra, R.B. Versteeg, Y. Zhu, M.P. Hertlein, T.E. Glover, K. Dumesnil, and R.W. Schoenlein, "Scattering bottleneck for spin dynamics in metallic helical antiferromagnetic dysprosium," *Phys. Rev. B*, **92**, 184423 (2015).
118. J. Kim, K.H. Kim, K.Y. Oang, J.H. Lee, K. Hong, H. Cho, N. Huse, R.W. Schoenlein, T.K. Kim, H. Ihee, "Tracking Reaction Dynamics in Solution by Pump-Probe X-ray Absorption Spectroscopy and X-ray Liquidography (Solution Scattering)," *Chem. Comm.*, **52**, 3734-3749 (2016)
119. B.E. Van Kuiken, H. Cho, K. Hong, M. Khalil, R.W. Schoenlein, T.K. Kim, and N. Huse, "Time-Resolved X-ray Spectroscopy in the Water Window: Elucidating Transient Valence Charge Distributions in an Aqueous Fe(II) Complex," *J. Phys. Chem. Lett.*, **7**, 465-470 (2016)
120. H. Cho, K. Hong, M.L. Strader, J.H. Lee, R.W. Schoenlein, N. Huse, T.K. Kim, "Electronic and Molecular Structure of the Transient Radical Photocatalyst $\text{Mn}(\text{CO})_5$ and Its Parent Compound $\text{Mn}_2(\text{CO})_{10}$," *Inorg. Chem.*, **55**, 5895-5903 (2016).
121. S.W. Huang, J.M. Lee, H.-T. Jeng, Y.C. Shao, L.A. Wray, J.M. Chen, R. Qiao, W.L. Yang, Y. Cao, J.-Y. Lin, R.W. Schoenlein, and Y.-D. Chuang, "Prominent role of oxygen in the multiferroicity of

- DyMnO₃ and TbMnO₃: A resonant soft x-ray scattering spectroscopy study,” *Phys. Rev. B*, **94**, 035145 (2016).
122. D. Hayes, R. G. Hadt, J. D. Emery, A. A. Cordones, A. B. F. Martinson, M. L. Shelby, K. A. Fransted, P. D. Dahlberg, J. Hong, X. Zhang, Q. Kong, R. W. Schoenlein, and L. X. Chen, "Electronic and nuclear contributions to time-resolved optical and X-ray absorption spectra of hematite and insights into photoelectrochemical performance", *Energy & Environmental Science*, **9**, 3754 (2016).
 123. M. Ochmann, I. von Ahnen, A.A. Cordones, A. Hussain, J.H. Lee, K. Hong, K. Adamczyk, O. Vendrell, T.K. Kim, R.W. Schoenlein, and N. Huse, "Light-Induced Radical Formation and Isomerization of an Aromatic Thiol in Solution Followed by Time-Resolved X-ray Absorption Spectroscopy at the Sulfur K-Edge”, *J. Amer. Chem. Soc.*, **139**, 4797-4804, (2017).
 124. B.E. Van Kuiken, M.R. Ross, M.L. Strader, A.A. Cordones, H. Cho, J.H. Lee, R.W. Schoenlein, and M. Khalil., "Picosecond sulfur K-edge X-ray absorption spectroscopy with applications to excited state proton transfer," *Structural Dynamics*, **4**, 044021, (2017).
 125. R. W. Schoenlein, A. Aquila, D. Cocco, G. L. Dakovski, D. M. Fritz, J. B. Hastings, P. A. Heimann, M. P. Minitti, T. Osipov, and W. F. Schlotter, "Chapter 23 New Science Opportunities and Experimental Approaches Enabled by High Repetition Rate Soft X-ray Lasers," in *X-Ray Free Electron Lasers: Applications in Materials, Chemistry and Biology* (The Royal Society of Chemistry, 2017), pp. 434. SLAC-PUB-17132
 126. R. Schoenlein, S. Boutet, M. Minitti, and A. M. Dunne, "The Linac Coherent Light Source: Recent Developments and Future Plans", *Applied Sciences*, **7**, 850 (2017). SLAC-PUB-17133
 127. M.C. Langner, S. Roy, S-H. Huang, J.D. Koralek, Y.-D. Chuang, G.L. Dakovski, J.J. Turner, J.S. Robinson, R.N. Coffee, M.P. Minitti, S. Seki, Y. Tokura, and R.W. Schoenlein, "Nonlinear Ultrafast Spin Scattering in the Skyrmion Phase of Cu₂OSeO₃", *Phys. Rev. Lett.*, **119**, 107204 (2017).
 128. A.A. Cordones, J.H. Lee, K. Hong, H. Cho, K. Garg, M. Boggio-Pasqua, J.J. Rack, N. Huse, R.W. Schoenlein, and T.K. Kim, "Transient Metal-Centered States Mediate Isomerization of a Photochromic Ruthenium-Sulfoxide Complex”, *Nature Communications*, **9**, 1989 (2018). SLAC-PUB-17236
 129. M. Ross, A. Andersen, Z.W. Fox, Y. Zhang, K. Hong, J.-H. Lee, A. Cordones, A.M. March, G. Doumy, S.H. Southworth, M.A. Marcus, R.W. Schoenlein, S. Mukamel, N. Govind, M. Khalil, "Comprehensive Experimental and Computational Spectroscopic Study of Hexacyanoferrate Complexes in Water: From Infrared to X-ray Wavelengths”, *J. Phys. Chem. B*, **122**, 5075-5086 (2018).
 130. M. Ochmann, A. Hussain, I. von Ahnen, A.A. Cordones, K. Hong, J.H. Lee, R. Ma, K. Adamczyk, T.K. Kim, R.W. Schoenlein, O. Vendrell, and N. Huse, "UV-photochemistry of the disulfide bond: Evolution of early photoproducts from picosecond X-ray absorption spectroscopy at the sulfur K-Edge”, *J. Am. Chem. Soc.*, **140**, 6554-6561, (2018).
 131. M. Dunne, and R. W. Schoenlein, "Future Directions of High Repetition Rate X-Ray Free Electron Lasers," in *X-ray Free Electron Lasers: A Revolution in Structural Biology*, S. Boutet, P. Fromme, and M. S. Hunter, eds. (Springer International Publishing, Cham, 2018), pp. 441.
 132. S.-W. Huang, Y.-T. Liu, J.-M. Lee, J. Chen, J. Lee, R. Schoenlein, Y.-D. Chuang, J.-Y. Lin, "Polaronic Effect in the X-Ray Absorption Spectra of La_{1-x}Ca_xMnO₃ Manganite”, *J. Phys. Cond. Mat.*, **31**, 195601, (2019).
 133. R. Schoenlein, T. Elsaesser, K. Holldack, Z. Huang, H. Kapteyn, M. Murnane, M. Woerner, "Recent advances in ultrafast X-ray sources”, *Phil. Trans. Royal Soc. A*, **377**, 20180384, (2019).

134. A. Britz, W. Gawelda, T. A. Assefa, L. L. Jamula, J. T. Yarranton, A. Galler, D. Khakhulin, M. Diez, M. Harder, G. Doumy, A. M. March, É. Bajnóczi, Z. Németh, M. Pápai, E. Rozsályi, D. Sárosiné Szemes, H. Cho, S. Mukherjee, C. Liu, T. K. Kim, R. W. Schoenlein, S. H. Southworth, L. Young, E. Jakubikova, N. Huse, G. Vankó, C. Bressler, and J. K. McCusker, "Using Ultrafast X-ray Spectroscopy To Address Questions in Ligand-Field Theory: The Excited State Spin and Structure of $[\text{Fe}(\text{dcp})_2]^{2+}$ ", *Inorg. Chem.*, **58**, 9341 (2019).
135. Y. Zhang, U. Bergmann, R. Schoenlein, M. Khalil, and N. Govind, "Double core hole valence-to-core x-ray emission spectroscopy: A theoretical exploration using time-dependent density functional theory," *J. Chem. Phys.*, **151**, 144114, (2019).
136. E. Hemsing, G. Marcus, W.M. Fawley, R.W. Schoenlein, R. Coffee, G. Dakovski, J. Hastings, Z. Huang, D. Ratner, and T. Raubenheimer, "Soft X-ray Seeding Studies for the SLAC Linac Coherent Light Source II," *Phys. Rev. Accel. Beams*, **22**, 110701 (2019)
137. Z. Zhang, A.S. Fisher, M.C. Hoffmann, B. Jacobson, P.S. Kirchmann, W.-S. Lee, A. Lindenberg, A. Marinelli, E. Nanni, R. Schoenlein, M. Qian, S. Sasaki, J. Xu, and Z. Huang, "A high-power, high-repetition-rate THz source for pump-probe experiments at Linac Coherent Light Source II", *J Synchrotron Radiat* **27**, 890 (2020).
138. J.M. Lee, S.-W. Huang, Horng-Tay Jeng, Yu-Cheng Shao, L. Andrew Wray, J.M. Chen, R. Qiao, W.L. Yang, J.-Y. Lin, R.W. Schoenlein, and Y.-D. Chuang, "The magnetic order in multiferroic DyMnO_3 ", *J. Elect. Spec.*, **246**, 147013 (2021).
139. U. Bergmann, J. Kern, R.W. Schoenlein, P. Wernet, V.K. Yachandra, J. Yano, "Using X-ray free-electron lasers for spectroscopy of molecular catalysts and metalloenzymes", *Nature Rev. Phys.*, **3**, 264 (2021)
140. E. Biasin, Z.W. Fox, A. Andersen, K. Ledbetter, K.S. Kjær, R. Alonso-Mori, J. Carlstad, M. Chollet, J.D. Gaynor, J.M. Glowia, K. Hong, T. Kroll, J.H. Lee, C. Liekhus-Schmaltz, M. Reinhard, D. Sokaras, Y. Zhang, G. Doumy, A.M. March, S.H. Southworth, S. Mukamel, K.J. Gaffney, R.W. Schoenlein, N. Govind, A.A. Cordones, and M. Khalil, "Direct observation of coherent femtosecond solvent reorganization coupled to intramolecular electron transfer", *Nature Chem.*, **13**, 343 (2021).
141. E. Biasin, D.R. Nascimento, B.I. Poulter, B. Abraham, K. Kunnus, A.T. Garcia-Esparza, S.H. Nowak, T. Kroll, R.W. Schoenlein, R. Alonso-Mori, M. Khalil, N. Govind, and D. Sokaras, "Revealing the bonding of solvated Ru complexes with valence-to-core resonant inelastic X-ray scattering", *Chem. Sci.*, **12**, 3713 (2021).
142. A.A. Cordones, C.D. Pemmaraju, J.H. Lee, I. Zegkinoglou, M.-E. Ragoussi, F.J. Himpsel, G. de la Torre, R.W. Schoenlein, "Excited State Charge Distribution of a Donor- π -Acceptor Zn Porphyrin Probed by N K-Edge Transient Absorption Spectroscopy", *J. Phys. Chem. Lett.*, **12**, 1182 (2021).
143. C.E. Liekhus-Schmaltz, P.J. Ho, R.B. Weakly, A. Aquila, R.W. Schoenlein, M. Khalil, and N. Govind, "Ultrafast x-ray pump x-ray probe transient absorption spectroscopy: A computational study and proposed experiment probing core-valence electronic correlations in solvated complexes", *J. Chem. Phys.*, **154**, 214107 (2021).
144. Jay, Raphael; Eckert, Sebastian; Van Kuiken, Benjamin; Ochmann, Miguel; Hantschmann, Markus; Cordones, Amy; Cho, Hana; Hong, Kiryong; Ma, Rory; Lee, Jae Hyuk; Turner, Joshua; Miniti, Michael; Quevedo, Wilson; Pietzsch, Annette; Beye, Martin; Kim, Tae Kyu; Schoenlein, Robert; Wernet, Philippe; Föhlisch, Alexander; Huse, Nils, "Following Metal-to-Ligand Charge-Transfer Dynamics with Ligand and Spin Specificity using Femtosecond Resonant Inelastic X-ray Scattering at the Nitrogen K-Edge", *J. Phys. Chem. Lett.*, **12**, 6676 (2021).

Invited Conference Presentations and Colloquia

1. "Femtosecond transient electron heating in metals," Technical Digest of the XV International Quantum Electronics Conference, IQEC'87, Baltimore, MD, April 1987, invited paper TuDD4, p. 38.
2. "Femtosecond studies of image-potential dynamics in metals," Technical Digest of the Conference on Quantum Electronics and Laser Science, QELS'89, Baltimore, Maryland, April 24-28, 1989, invited paper ThNN1, p. 184.
3. "Femtosecond photoemission studies of image-potential and electron dynamics in metals," invited paper presented at the 36th National Symposium of the American Vacuum Society, Boston, MA, October 23-27, 1989.
4. "Ultrafast carrier scattering in GaAs," invited paper presented at the High Speed/High Frequency Optoelectronics Conference, Palm Coast, Florida, March 1991
5. "Femtosecond photoisomerization of rhodopsin as the primary event in vision," Technical Digest of the VIIth International Symposium on Ultrafast Processes in Spectroscopy, UPS'91, University of Bayreuth, Bayreuth, Germany, October 1991, invited paper Tu5-1.
6. "Generation of 10-fs laser pulses in the blue-green and their use to determine the time scale for the first step in vision," Program of the 1992 Annual Meeting of the Division of Atomic, Molecular, and Optical Physics, **37**, 1121, May 1992, (DAMOPS invited paper G1-2).
7. "Investigation of the primary event in vision using 10 fs blue-green optical pulses," Program of the Eighth International Conference on Ultrafast Phenomena, Antibes - Juan-les-Pins, France, June 1992 invited paper TuD4.
8. "Generation of femtosecond x-ray pulses via 90° Thomson scattering," SPIE OE/LASE'94, January 1994, invited paper 2116-34.
9. "Femtosecond dynamics of the cis-trans isomerization in a visual pigment analog: isorhodopsin," Technical Digest of the International Quantum Electronics Conference, Anaheim, May 1994, invited paper QMA3
10. "Generation of femtosecond x-ray pulses via 90° Thomson scattering," IQEC'96, Sydney, Australia, July 1996, invited paper ThD2.
11. "Generation of femtosecond x-ray pulses via 90° Thomson scattering," Physics of Quantum Electronics Conference - Snowbird UT, January 1997.
12. "Laser Techniques for Generating Femtosecond X-rays at the ALS," Satellite Meeting on Crystallographic Applications of Synchrotron Radiation: Time Resolved X-ray Experiments, Tsukuba, Ibaraki, Japan, August 1997.
13. "Femtosecond X-ray Spectroscopy: Ultrafast Diffraction," Photonics West Conference San Jose, CA, January 1998.
14. "Progress on femtosecond x-ray generation at the Advanced Light Source," International Symposium on Optical Science, Engineering, and Instrumentation, San Diego, CA, July 1998.
15. "Generation of 'dark' femtosecond pulses from the Advanced Light Source," Advanced Light Source Users' Meeting, Berkeley, CA, October 1998.
16. "Femtosecond x-ray spectroscopy at the Advanced Light Source," 11th Annual Meeting of the IEEE Lasers and Electro-Optics Society, Orlando FL, December 1998.
17. "Femtosecond x-ray science at the ALS: Recent results and future plans," ICFA 17th Advanced Beam Dynamics Workshop on Future Light Sources, Argonne, IL, April 1999.

18. "Generation of femtosecond x-rays via laser-electron beam interaction," Gordon Conference on Nonlinear Optics, New London, NH, July 1999.
19. "Femtosecond x-ray science at the ALS: Recent results and future plans," VI International Conference on X-ray Microscopy, Berkeley, CA, August 1999.
20. "Femtosecond synchrotron pulses from the Advanced Light Source: Recent results and future plans," 2nd International Swiss Light Source Workshop on Synchrotron Radiation, Brunnen, Switzerland, October 1999.
21. "Femtosecond x-ray science at the Advanced Light Source: Recent results and future plans," Workshop on the Science and Instrumentation for the Linac Coherent Light Source, October, 1999.
22. "Ultrafast x-ray science at the Advanced Light Source," Conference on Lasers and Electro-optics/Quantum Electronics and Laser Science (CLEO/QELS) San Francisco, CA, May 2000.
23. "Ultrafast X-ray Science at the Advanced Light Source," at the VIIIth International Conference on Electronic Spectroscopy and Structure, Berkeley, CA, Aug. 8-12, 2000.
24. "Generation of femtosecond pulses of synchrotron radiation: A new tool for ultrafast x-ray science," at the 7th International Conference on Synchrotron Radiation Instrumentation, Berlin, Germany, Aug. 21-25, 2000.
25. "Scientific applications for femtosecond X-ray pulses," at the workshop on Lasers and Short Wavelength Applications – LSWAVE2000, Berlin, Germany, Aug. 26, 2000.
26. "Generation and application of femtosecond x-rays from the Advanced Light Source," at the 25th Annual Meeting of the Quantum Electronics and Atomic Physics Division of the Netherlands Physics Society, Lunteren, Netherlands, Nov. 16-17, 2000.
27. "Generation and Applications of Femtosecond X-rays from the Advanced Light Source," at the 31st Winter Colloquium on the Physics of Quantum Electronics PQEXXXI, Snowbird, Utah, Jan. 7-11, 2001.
28. "Ultrafast science with femtosecond x-ray pulses," at the BES Workshop on Scientific Applications of Ultrafast, Intense, Coherent X-Rays, Washington, D.C., May 4-5, 2001.
29. "Ultrafast X-ray Science at the Advanced Light Source: Recent Results and Future Plans," at Synchrotrone Trieste - Elettra, Trieste, Italy, May 7, 2001.
30. "Generation and application of femtosecond x-rays from the Advanced Light Source," at the International Conference on Synchrotron Radiation: Perspectives and New Technologies, Rome, Italy, May 8-9, 2001.
31. "Generation and Application of Femtosecond X-rays from the Advanced Light Source," at the 21st ICFA Beam Dynamics Workshop on Laser-Beam Interactions, Stony Brook, NY, June 11-15, 2001. (LBNL-48207 Abs)
32. "Ultrafast X-ray Science: A New Frontier for Next Generation Light Sources," SRI2001 Workshop: Energy Recovery Linac Sources of Synchrotron Radiation, Madison, WI, August, 2001.(LBNL-51012 Abs)
33. "Ultrafast X-ray Science at the Advanced Light Source," Vth Femtochemistry Conference, Toledo, Spain, Sept. 2001. (LBNL-48208 Abs)
34. "Generation and Application of Femtosecond X-rays from a Synchrotron," IEEE LEOS 2001 Annual Meeting, San Diego, CA, Oct. 2001. (LBNL-51013 Abs)
35. "Ultrafast X-ray Science: Techniques and Applications," invited tutorial at CLEO/QELS 2002, Long Beach, CA, May 2002. (LBNL-51014 Abs)

36. "Generation and Applications of Femtosecond X-Rays from the Advanced Light Source," invited talk at the Nonlinear Optics Conference, Maui, HI, July 2002. (LBNL-48207 Abs.)
37. "Ultrafast X-ray Science at the ALS: Recent Results and Future Plans," invited talk at the ESRF Workshop on XAS at 3rd Generation Sources: Highlights and Future Perspectives, Grenoble, France, June 2002. (LBNL-53346 Abs.)
38. "Ultrafast X-ray from 3rd Generation Synchrotrons," invited lecture at the Ultrafast X-ray Science Summer School, Cargese, Corsica Island, France, July, 2003. (LBNL-53347 Abs.)
39. "Ultrafast X-ray Science at the ALS: Resolving Atomic and Electronic Structural Dynamics," invited talk at the ICTP Workshop on Theoretical Challenges of 4th Generation X-ray Sources, Trieste, Italy, May, 2004.
40. "LUX – A Recirculating Linac/Laser-based Femtosecond Facility for Ultrafast Science," invited talk at the ICTP Workshop on Theoretical Challenges of 4th Generation X-ray Sources, Trieste, Italy, May, 2004.
41. "Ultrafast X-ray Science at the ALS: Resolving Atomic and Electronic Structural Dynamics," invited talk at the APS Workshop on Time Domain Science using X-ray Techniques, Lake Geneva, WI, Aug. 2004.
42. "Ultrafast Spectroscopy of Photo-Induced Phase Transitions in Complex Materials," 14th National Conference on Synchrotron Radiation Instrumentation, Baton Rouge, LA, Sept. 2005.
43. "Ultrafast X-ray Science at the Advanced Light Source: Recent Results and Future Plans," Lund University, MAXLAB, Lund Sweden, Dec. 2005.
44. "Ultrafast X-ray Science at the ALS: Recent Results and Future Plans 2005 Advanced Light Source Users' Meeting (plenary talk), Berkeley, CA, Oct. 2005.
45. "Ultrafast Structural Dynamics in Complex Materials using X-ray and Visible Pulses," U.C. Berkeley Physics Department, Condensed Matter Seminar Series, May 2006.
46. "Generation of Femtosecond X-ray Pulses from the Advanced Light Source," invited seminar, LBNL Instrumentation Colloquium Series, Sept. 2006.
47. "Ultrafast Structural Dynamics in Complex Materials using Femtosecond Visible and X-ray Pulses," American Vacuum Society 53rd International Symposium, San Francisco, CA, Nov. 2006.
48. "Ultrafast X-ray Spectroscopy of Transition-metal Complexes," invited lecture at the 54th Annual Western Spectroscopy Association Conference, Asilomar, CA, Jan. 2007
49. "Materials Science at Energetic Flux Extremes: photons, electrons, ions, neutrons," plenary lecture at the BES Workshop on Basic Research Needs for Materials under Extreme Environments, Washington, D.C., June 2007.
50. Lecturer at the Stanford Ultrafast X-ray Summer School, Menlo Park, CA, June 2007
51. "Accelerator-based Ultrafast X-ray Light Sources: New Tools for Probing Correlated Electronic Structure," invited talk at OSA Frontiers in Optics 2007 Laser Science XXIII Conference, San Jose, CA, Sept. 2007.
52. "Ultrafast Structural Dynamics in Solvated Transition-metal Complexes and Oxide Materials," invited talks at the Advanced Photon Source Short Pulse X-ray Workshop, Argonne, IL, May 2008.
53. "Ultrafast Laser Science," two invited lectures at the Stanford Ultrafast X-ray Summer School, Menlo Park, CA, June 2008.

54. "Ultrafast Soft X-ray Spectroscopy of Spin-crossover Dynamics in Solvated Transition-metal Complexes," invited talk at the Photo-induced Phase Transitions and Cooperative Phenomena Conference, Osaka, Japan, Nov. 2008.
55. "Advanced Ultrafast Techniques for Understanding and Controlling Complex Materials," invited talk at the LANL Workshop on Research Frontiers for Controlling and Designing Functional Materials, Los Alamos, NM, Jan. 2009.
56. "Ultrafast X-ray and Visible Spectroscopy of Transition-Metal Oxides," invited lecture, Iowa State University Physics Colloquium, March 2009.
57. "Ultrafast X-ray Spectroscopy: Structural Dynamics in Solvated Transition-metal Complexes and Oxide Materials," invited talk at the Advanced Photon Source Users' Meeting, Argonne, IL, May 2009.
58. "Ultrafast Science: Using Lasers and X-rays to Reveal the Motion of Atoms and Electrons," invited seminar, LBNL Summer Lecture Series, July 2009.
59. "Time-resolved X-ray Absorption Spectroscopy of Photoinduced Insulator-Metal Transition in a Colossal Magnetoresistive Manganite," invited talk at the Nonlinear Optics Conference, Honolulu, HI, July 2009.
60. "Ultrafast X-ray Spectroscopy of Solvated Transition-metal Complexes and Oxide Materials," invited talk at the 441 Wilhelm and Else Heraeus Workshop on Ultrafast X-ray Methods for Studying Transient Electronic Structure and Nuclear Dynamics, Bad Honnef, Germany, Sept. 2009.
61. "Ultrafast Science: Using Lasers and X-rays to Reveal the Motion of Atoms and Electrons," UK New Light Source Seminar, Blackett Laboratory, Imperial College, London UK, Sept. 2009.
62. "Ultrafast Soft X-ray Spectroscopy of Spin-Crossover Dynamics in Solvated Transition-Metal Complexes," invited talk at the OSA Annual Meeting: Frontiers in Optics, San Jose, CA Oct. 2009.
63. "Ultrafast X-ray Spectroscopy: Structural Dynamics in Transition-metal Complexes and Oxide Materials," invited talk at the Ultrafast X-ray Science Workshop 2010 POSTECH, Pohang, Korea, Jan. 2010.
64. "Ultrafast X-ray Spectroscopy: Structural Dynamics of Solvated Transition-metal Complexes," invited talk at the Optical Society of Korea 20th Anniversary and Winter Annual Meeting 2010, KAIST Daejeon Korea, Jan. 2010.
65. "Ultrafast X-ray Spectroscopy of Solvated Transition-metal Complexes and Oxide Materials," invited talk at the Kavli Institute for Theoretical Physics workshop on X-ray Science in the 21st Century, Santa Barbara, CA July 2010.
66. "Using Ultrafast Lasers and X-rays to Understand Correlated Phenomena in Complex Materials," invited talk, Condensed Matter Physics Seminar, U.C. San Diego, Feb. 2010.
67. "Ultrafast Science and the Next Generation X-ray Laser Array at the Berkeley Lab," invited talk, Physics and Applied Physics Department Colloquium, Stanford University, April 2011.
68. "Ultrafast X-ray Studies of Complex Materials: Science Challenges and Opportunities," invited talk, Cornell XDL2011 Workshop, June 2011.
69. "A Next Generation X-ray Laser Array at the Berkeley Lab: Science Drivers and Facility Overview," invited talk, Optical Society of America Annual Meeting – Frontiers in Optics, San Jose, Oct. 2011.
70. "Enabling X-ray Science: The Advanced Light Source, The Next Generation Light Source," invited talk, Conference on Lasers and Electro-optics/Quantum Electronics and Laser Science (CLEO/QELS), San Jose, May 2012.

71. “Science Challenges & Opportunities for an Advanced X-ray Free-electron Laser,” invited talk, SLAC Photon Sciences Seminar, Menlo Park, CA, Oct. 2013
72. “Dynamics of Electronic Ordering in Transition-metal Oxides via Time-resolved Resonant Soft X-ray Scattering,” invited talk, U. Hamburg SFB/ZOQ Colloquium, Hamburg, Germany, Dec. 2013.
73. “Time-resolved X-ray Spectroscopy of Charge Dynamics in Transition-metal Complexes” invited talk, TRSC Workshop: Breaking and Making Bonds with Light, Telluride Research Center, Colorado July 2014.
74. “Science challenges and opportunities for the LCLS-II X-ray lasers” invited talk, Nobel Symposium on Free Electron Laser Research, Stockholm, Sweden, June 2015.
75. “Revealing Spin Texture Dynamics in Complex Materials via Time-resolved Resonant Soft X-ray Scattering,” invited talk, American Vacuum Society 62nd International Symposium, San Jose, CA, Oct. 2015.
76. “LCLS-II Science Opportunities and Prospects for Multicolor X-ray Spectroscopy,” invited talk, RESONANCES Workshop (Multicolor FEL Pulses and Coherent Control Opening New Science Perspectives), Trieste, Italy, Dec. 2015.
77. “Science Opportunities for LCLS-II Soft X-ray Lasers,” invited talk, Workshop to Define the Science Case for a Soft X-ray Laser Beamline at MAX IV, Stockholm, Sweden, March 2016
78. “Science Opportunities for LCLS-II Soft X-ray Lasers,” invited talk, LANL MaRIE Workshop – New X-ray Sources for Mesoscale Functional Materials, Santa Fe, July 2016.
79. “Science Opportunities for High-repetition-rate X-ray Lasers: LCLS-II and LCLS-II-HE,” PULSE Institute 10th Anniversary Symposium, Menlo Park, CA, Oct. 2016.
80. “LCLS Recent Developments, Science Opportunities and Plans for LCLS-II and LCLS-II-HE,” BioXFEL 4th International Conference, Las Vegas, NV, Jan. 2017.
81. “Chemical Applications fo X-ray FELs,” Italian Physical Society: International School of Physics – Enrico Fermi, Physics of and Science with X-ray Free-Electron Lasers, Varenna, Italy, June 2017.
82. “Current & Future Research Topics for X-ray FELs,” Italian Physical Society: International School of Physics – Enrico Fermi, Physics of and Science with X-ray Free-Electron Lasers, Varenna, Italy, June 2017.
83. “LCLS-II & LCLS-II-HE Science Opportunities,” Shanghai Topical Workshop on High Repetition-Rate XFEL Physics & Technology, Shanghai, China, Aug. 2017.
84. “Science Opportunities at LCLS-II and LCLS-II-HE,” 7th International Conference on Hard X-Ray Photoelectron Spectroscopy, Berkeley, CA Sept. 2017.
85. “LCLS Recent Developments, Science Opportunities and Plans for LCLS-II and LCLS-II-HE,” Advances in Free-electron Laser Science – Workshop of the Peter Paul Ewald Fellows, DESY Hamburg, Germany Oct. 2017.
86. “LCLS Recent Developments, Science Opportunities and Plans for LCLS-II and LCLS-II-HE,” Science@FELs Conference, Stockholm, Sweden June 2018.
87. “Element-specific View of Molecular Dynamics and future opportunities for Ultrafast Chemical Science at XFELs,” American Chemical Society Conference, Boston, MA, Aug. 2018.
88. “XFEL Science Opportunities and Plans for LCLS-II and LCLS-II-HE,” Femtosecond Electron Imaging and Spectroscopy – 4, Lincoln, NE May 2019.
89. “X-ray Free-Electron Lasers are Driving a Revolution in the X-ray Science of Complex Matter,” Northwestern University Materials Science and Engineering Symposium, Chicago, IL April 2021.

90. “LCLS Today & Tomorrow: Recent Science, Future Opportunities & Development Plans,”
European XFEL Science Seminar Series, Hamburg, Germany April 2021.