PROF. MICHAEL W. ZUERCH
237B Hildebrand Hall, Department of Chemistry
University of California at Berkeley
Berkeley, CA 94720-1460

CURRICULUM VITAE
Phone: (510) 664-4318
Fax: (510) 642-8369
mwz@berkeley.edu

Faculty Scientist, Lawrence Berkeley National Laboratory, Materials Sciences Division

RESEARCH INTERESTS

- Attosecond transient absorption spectroscopy in solid-state materials with special attention to two-dimensional quantum materials (ultrafast carrier dynamics, linear and non-linear optical response, strongly correlated materials)
- High-resolution imaging in the XUV and soft X-ray spectral range (Coherent Diffraction Imaging, Ptychography, Digital In-line Holography)
- Combination of ultrafast time-resolved X-ray spectroscopy and time-resolved X-ray diffraction for multimodal investigation of non-heterogenous samples with special attention to magnetic materials
- Microscopy with singular light beams (vortex beams) in the visible and XUV
- Nonlinear X-ray diffraction microscopy using Free-electron lasers for advanced investigations on nanostructured materials.

PROFESSIONAL EXPERIENCE

2020-present	**Faculty Scientist**, Lawrence Berkeley National Laboratory, Materials Sciences Division
2019-present	**Assistant Professor of Chemistry**, University of California at Berkeley, Department of Chemistry
2018-2020	**Independent Max Planck Research Group Leader (W2)**, Fritz Haber Institute of the Max Planck Society, Department of Physical Chemistry, Berlin, Germany
2018	**Independent Junior Research Group Leader**, Friedrich Schiller University Jena, Institute of Optics and Quantumelectronics and Abbe Center of Photonics
2017-2018	**Senior Post-doctoral Researcher (Habilitand)**, Friedrich Schiller University Jena, Institute of Optics and Quantumelectronics and Abbe Center of Photonics (Group of Christian Spielmann)
2015-2017	**Feodor Lynen Fellow and Post-doctoral Research Associate**, University of California at Berkeley, Chemistry Department. Affiliate Lawrence Berkeley National Laboratory. (Groups of Daniel M. Neumark and Stephen R. Leone)
2014-2015	**Post-doctoral Scientific Research Assistant**, Friedrich Schiller University Jena, Institute of Optics and Quantumelectronics and Abbe Center of Photonics (Group of Christian Spielmann)
2010-2014	**Graduate Scientific Research Assistant**, Friedrich Schiller University Jena, Institute of Optics and Quantumelectronics and Abbe Center of Photonics (Group of Christian Spielmann)

EDUCATION

07/2014	**Doctorate (Dr. rer. nat.)** in physics at Friedrich Schiller University Jena, finished with distinction (*summa cum laude*) on the topic *Coherent High-Resolution Imaging of Artificial and Biological Specimens using Compact Ultrafast Extreme Ultraviolet Sources.* (Group of Christian Spielmann)
09/2010	**Diploma (Dipl.-Phys., M. Sc. equivalent)** in physics at Friedrich Schiller University Jena, finished with distinction (average 1.1) with the topic of the diploma thesis *Limitations of Ultra-Fast Nonlinear Optics in Nanostructured Samples*

AWARDS

2018	Max Planck Research Group, Max Planck Society
2018	Feodor Lynen Alumni Fellowship, Alexander von Humboldt Foundation
2015	Feodor Lynen Fellowship, Alexander von Humboldt Foundation
2015	Reichart-Prize 2015, Academy of Sciences and Humanities in Erfurt (Akademie der gemeinnützigen Wissenschaften zu Erfurt)
2015	Dr.-Ing. Siegfried Werth Dissertation Award, Dr.-Ing. Siegfried Werth Foundation
2015	Finalist Dissertation Award of the German Physical Society
2014	Springer Theses Dissertation Award
2010	Best diploma thesis award of the Faculty of Physics and Astronomy, FSU Jena

List of Publications

1. F. Tuitje, P. Martínez Gil, T. Helk, J. Gautier, F. Tissandier, J.-P.Goddet, A. Guggenmos, U. Kleineberg, S. Sebban, E. Oliva, C. Spielmann, and **M. Zürch**. Nonlinear Ionization Dynamics of Hot Dense Plasma Observed in a Laser-Plasma Amplifier, *submitted*, (2020).

2. C. P. Schwartz, S. L. Raj, S. Jamnuch, C. J. Hull, P. Miotti, R. K. Lam, D. Nordlund, C. B. Uzundal, C. D. Pemmaraju, R. Mincigrucci, L. Foglia, A. Simoncig, M. Coreno, C. Masciovecchio, L. Giannessi, L. Poletto, E. Principi, **M. Zuerch**, T. A. Pascal, W. S. Drisdell, and R. J. Saykally. Ångström-resolved Interfacial Structure in Organic-Inorganic Junctions, *arXiv:2005.01905*, (2020).

3. N. C. Geib, R. Hollinger, E. Haddad, P. Herrmann, F. Légaré, T. Pertsch, C. Spielmann, **M. Zürch**, and F. Eilenberger. Discrete dispersion scan setup for measuring few-cycle laser pulses in the mid-infrared, *arXiv:2004.12145*, (2020).

4. R. Geneaux, C. J. Kaplan, L. Yue, A. D. Ross, J. E. Bækhøj, P. M. Kraus, H.-T. Chang, A. Guggenmos, M.-Y. Huang, **M. Zürch**, K. J. Schafer, D. M. Neumark, M. B. Gaarde, and S. R. Leone. Attosecond time-domain measurement of core-excitonic decay in magnesium oxide, *Physical Review Letters*, accepted, (2020).

5. C. J. Kaplan, P. M. Kraus, E. M. Gullikson, L. J. Borja, S. K. Cushing, **M. Zürch**, H.-T. Chang, D. M. Neumark, S. R. Leone. Retrieval of the complex-valued refractive index of germanium near the M4,5 absorption edge, *Journal of the Optical Society of America B* **36**, 1716 (2019).

6. G. K. Tadesse, W. Eschen, R. Klas, M. Tschernajew, F. Tuitje, M. Steinert, M. Zilk, V. Schuster, **M. Zürch**, T. Pertsch, C. Spielmann, J. Limpert, J. Rothhardt. Wavelength-scale ptychographic coherent diffractive imaging using a high-order harmonic source, *Scientific Reports* **9**, 1735 (2019).

7. T. Helk, **M. Zürch**, C. Spielmann. Towards single shot timeresolved microscopy using short wavelength table-top light sources, *Structural Dynamics* **6**, 010902 (2019).

8. S. K. Cushing, A. Lee, L. M. Carneiro, H.-T. Chang, **M. Zürch**, S. R. Leone. Differentiating Photoexcited Carrier and Phonon Dynamics in the Δ, L, and Γ Valleys of Si(100) with Transient Extreme Ultraviolet Spectroscopy, *Journal of Physical Chemistry C* **123** (6), 3343-3352 (2019).

9. S. K. Cushing, **M. Zürch**, P. M. Kraus, L. M. Carneiro, A. Lee, H.-T. Chang, C. J. Kaplan, S. R. Leone. Hot phonon and carrier relaxation in Si(100) determined by transient extreme ultraviolet spectroscopy, *Structural Dynamics* **5**, 054302 (2018).

10. C. J. Kaplan, P. M. Kraus, A. D. Ross, **M. Zürch**, S. K. Cushing, M. F. Jager, H.-T. Chang, E. M. Gullikson, D. M. Neumark, S. R. Leone. Femtosecond Tracking of Carrier Relaxation in Germanium with Extreme Ultraviolet Transient Reflectivity, *Physical Review B* **97**, 205202 (2018).

11. P. M. Kraus, **M. Zürch**, S. K. Cushing, D. M. Neumark, S. R. Leone. The Ultrafast X-ray Spectrocopic Revolution in Chemical Dynamics, *Nature Reviews Chemistry* **2**, 82-94 (2018).

12. R. Sollapur, D. Kartashov, **M. Zürch**, A. Hoffmann, T. Grigorova, G. Sauer, A. Hartung, A. Schwuchow, J. Bierlich, J. Kobelke, M. Chemnitz, Markus A. Schmidt, C. Spielmann. Resonance-enhanced multi-octave supercontinuum generation in antiresonant hollow-core fibers, *Light: Science & Applications*, **6**, e17124 (2017).

13. **M. Zürch**, R. Jung, C. Spaeth, J. Tümmler, A. Guggenmos, D. Attwood, U. Kleineberg, H. Stiel and C. Spielmann. Spatial Coherence Limited Coherence Diffraction Imaging using a Molybdenum Soft X-ray Laser Pumped at Moderate Pump Energies, *Nature Scientific Reports* 7:5314, 1-10 (2017).

14. **M. Zürch**, H.-T. Chang, P. M. Kraus, S. K. Cushing, L. J. Borja, A. Gandman, J. S. Prell, D. Prendergast, C. D. Premmaraju, D. M. Neumark, and S. R. Leone. Carrier Thermalization and Trapping in Silicon-Germanium Alloy Probed by Attosecond XUV Transient Absorption Spectroscopy, *Structural Dynamics* **4** (4), 044029 (2017).

15. **M. Zürch**, H.-T. Chang, L. J. Borja, P. M. Kraus, S. Cushing, A. Gandman, C. J. Kaplan, M. H. Oh, J. S. Prell, D. Prendergast, C. D. Premmaraju, D. M. Neumark, and S. R. Leone. Direct and Simultaneous Observation of Ultrafast Electron and Hole Dynamics in Germanium, *Nature Communications* **8**:15734, 1-11 (2017).

16. H.-T. Chang, **M. Zürch**, P. M. Kraus, L. J. Borja, D. M. Neumark, and S. R. Leone. Simultaneous generation of sub-5-femtosecond 400 nm and 800 nm pulses for attosecond extreme ultraviolet pump-probe spectroscopy, *Optics Letters* **41** (22), 5365-5368 (2016).

17. G.K. Tadesse, R. Klas, S. Demmler, S. Hädrich, I. Wahyutama, M. Steinert, C. Spielmann, **M. Zürch**, T. Pertsch, A. Tünnermann, J. Limpert and J. Rothhardt. High speed and high resolution table-top nanoscale imaging, *Optics Letters* **41** (22), 5170-5173, also arxiv.org/pdf/1605.02909 (2016).
Selected as Editor's pick.

18. L. J. Borja, **M. Zürch**, C. D. Premmaraju, M. Schultze, K. Ramaseha, A. Gandman, J. S. Prell, D. Prendergast, D. M. Neumark, and S. R. Leone. Extreme Ultraviolet Transient Absorption of Solids from Femtosecond to Attosecond Timescales, *Journal of the Optical Society of America B* **33** (7), C57-C64 (2016).

19. A. Hoffmann, **M. Zürch** and Ch. Spielmann. Extreme nonlinear optics using shaped pulses spectrally broadened in an Ar or SF_6 filled hollow core fiber, *Applied Sciences* **5** (4), 1310-1322 (2015).

20. C. Kern, **M. Zürch** and C. Spielmann. Limitations of Extreme Nonlinear Ultrafast Nanophotonics, *Nanophotonics* **4** (1), 303-323 (2015).

21. **M. Zürch** and C. Spielmann. Extreme ultraviolet digital in-line holography using a table top source, *Applied Optics* **54** (19), 5992-5997 (2015).

22. **M. Zürch**, J. Rothhardt, S. Hädrich, S. Demmler, M. Krebs, J. Limpert, A. Tünnermann, A. Guggenmos, U. Kleineberg, and C. Spielmann. Real-time and Sub-wavelength Ultrafast Coherent Diffraction Imaging in the Extreme Ultraviolet, *Nature Scientific Reports* **4** (7356), 1-5 (2014).

23. **M. Zürch**, S. Foertsch, M. Matzas, K. Pachmann, R. Kuth, and Ch. Spielmann. Cancer cell classification with coherent diffraction imaging using an extreme ultraviolet radiation source, *Journal of Medical Imaging* **1** (3), 031008 (2014).

24. A. Hoffmann, **M. Zürch**, M. Gräfe, and Ch. Spielmann. Spectral broadening and compression of sub-millijoule laser pulses in hollow-core fibers filled with sulfur hexafluoride, *Optics Express* **22**, 12038-12045 (2014).

25. **M. Zürch**, A. Hoffmann, M. Gräfe, B. Landgraf, M. Riediger, and Ch. Spielmann. Characterization of a broadband interferometric autocorrelator for visible light with ultrashort blue laser pulses, *Optics Communications* **321**, 28-31 (2014).

26. **M. Zürch**, C. Kern, and Ch. Spielmann. XUV coherent diffraction imaging in reflection geometry with low numerical aperture, *Optics Express* **21** (18), 21131-21147 (2013).
*Selected for publication in Virtual Journal for Biomedical Optics **8** (10), 2013.*

27. **M. Zürch**, C. Kern, P. Hansinger, A. Dreischuh, and Ch. Spielmann. Strong-field physics with singular light beams, *Nature Physics* **8**, 743-746 (2012).

28. S. Eyring, C. Kern, **M. Zürch**, and C. Spielmann. Improving high-order harmonic yield using wavefront-controlled ultrashort laser pulses, *Optics Express* **20** (5), 5601-5606 (2012).

29. C. Kern, **M. Zürch**, J. Petschulat, T. Pertsch, B. Kley, T. Käsebier, U. Hübner, and C. Spielmann. Comparison of femtosecond laser-induced damage on unstructured vs. nano-structured Au-targets, *Applied Physics A* **104** (1), 15-12 (2011).
Selected as rapid communication.