

Benjamin H. Savitzky

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EDUCATION

Ph.D., Physics Advisor: Prof. Lena F. Kourkoutis	Cornell University, 2015–2018
M.S., Physics Advisor: Prof. Lena F. Kourkoutis	Cornell University, 2012–2015
Sc.B., Chemical Physics Honors, Magna cum laude	Brown University, 2004–2008

APPOINTMENTS

Assistant Professor of the Practice , Brown University Data Science Institute	Providence RI, 2026–present
Senior Research Associate , Brown University Department of Chemistry	Providence RI, 2025–2026
Principal Investigator , NSF SBIR #2322155, h-Bar Instruments	Cambridge MA, 2023–2025
Postdoctoral Fellow , NCEM, TMF, Lawrence Berkeley National Laboratory	Berkeley CA, 2018–2023
NSF GRFP Research Fellow , Cornell University Department of Physics	Ithaca NY, 2015–2018
NSF IGERT Research Fellow , Cornell University Department of Physics	Ithaca NY, 2013–2015
Teaching Assistant , Cornell University Department of Physics	Ithaca NY, 2012–2013
Junior Research Scientist , New York University Department of Physics	New York NY, 2011
Physics & Mathematics Teacher , East Palo Alto Phoenix Academy	East Palo Alto CA, 2008–2010
Undergraduate Researcher , Brown University Department of Chemistry	Providence RI, 2006–2008

SELECTED PUBLICATIONS

- [1] “py4DSTEM: A software package for four-dimensional scanning transmission electron microscopy data analysis.” Savitzky, et al, *Microscopy & Microanalysis*, **27**.4, 712–743 (2021). DOI: 10.1017/S1431927621000477
- [2] “Bending and Breaking of Stripes in a Charge Ordered Manganite.” Savitzky, et al, *Nature Comm.*, **8**.1883, 1–6 (2017). DOI: 10.1038/s41467-017-02156-1
- [3] “Correlative analysis of structure and chemistry of LiFePO_4 platelets using 4D-STEM and X-ray ptychography.” Hughes* & Savitzky* et al., *Materials Today*, **52**, 102–111 (2022). DOI: 10.1016/j.mattod.2021.10.031
- [4] “Image registration of low signal-to-noise cryo-STEM data.” Savitzky, et al, *Ultramicroscopy*, **181**, 56–65 (2018). DOI: 10.1016/j.ultramic.2018.04.008
- [5] “Propagation of Structural Disorder in Epitaxially Connected Quantum Dot Solids from Atomic to Micron Scale.” Savitzky, et al, *Nano Letters*, **16**, 5714 (2016). DOI: 10.1021/acs.nanolett.6b02382
- [6] “Disentangling multiple scattering with deep learning: application to strain mapping from electron diffraction patterns.” Munshi, Rakowski, & Savitzky et al., *npj Computational Materials*, **8**, 254 (2022). DOI: 10.1038/s41524-022-00939-9

TEACHING EXPERIENCE

Workshops

Correlative Imaging	<i>LBL Molecular Foundry User Meeting, Berkeley CA, 2024</i>
Cryo-STEM Imaging	<i>Microscopy & Microanalysis, Cleveland OH, 2024</i> <i>Microscopy & Microanalysis, Cleveland OH, 2024</i> <i>MRS Fall Meeting, Boston MA, 2023</i> <i>Imperial College London, London UK, 2023</i>
4D-STEM	<i>LBL Molecular Foundry User Meeting, Berkeley CA, 2023</i> <i>Microscopy & Microanalysis, Minneapolis MN, 2023</i>

Courses

MATH 1300: Mathematical Explorations	<i>Cayuga Correctional Facility, Moravia NY, 2016</i> - Adapted intro-level Cornell higher math survey course for the prison context - Lead taught inmates through the Cornell Prison Education Program - Students receive college credit and can earn associate degrees
Conceptual Physics	<i>East Palo Alto Phoenix Academy, East Palo Alto NY, 2008-2010</i> - Designed the full classroom & laboratory curriculum - Exploratory & quantitative laboratories - Multimodal pedagogy
Geometry, Algebra & Pre-calculus	<i>East Palo Alto Phoenix Academy, East Palo Alto NY, 2008-2010</i> - Student preparation was highly diverse - Scaffolded lessons extensively to balance access & excellence - Majority of my former students are now 1st generation college graduates

Guest Lectures

MSE 241: Electron Microscopy & Microanalysis Techniques	<i>U. California, Berkeley CA, 2020-2022</i> Title: “4D-STEM in Principal and in Practice”
MATSCIE 465: Struc & Chem Characterization of Materials	<i>U. Michigan, Ann Arbor MI, 2017</i> Title: “The Paracrystal Model: Theory, Characterization, Applications”
AEP 6610: Nanocharacterization	<i>Cornell University, Ithaca NY, 2017-2018</i>
AEP 1200: Intro to Nanoscience & Nanoengineering	<i>Cornell University, Ithaca NY, 2015-2016</i>

SERVICE

Organizing & Volunteering

• User Executive Committee	<i>The Molecular Foundry, LBNL, Berkeley CA, 2024-present</i>
• UEC User Meeting Subcommittee	<i>The Molecular Foundry, LBNL, Berkeley CA, 2024-present</i>
• Joint NSRC UEC Committee, Chair	<i>Nano. Sci. Research Centers, 5 NSRCs Nationally, 2025-present</i>
• Symposium Organizer	<i>Microscopy & Microanalysis, Salt Lake City UT, 2025</i>
• Symposium & Workshop Organizer	<i>Joint Mol. Foundry & ALS Meeting, LBNL, Berkeley CA 2024</i>
• Outreach Coordinator	<i>Cornell Public Service Center (GRASSHOPR), Ithaca NY 2016-2017</i>
• K-12 Lending Library Lesson Design	<i>Cornell CCMR Outreach, Ithaca NY 2016-2017</i>
• Reading Group Organizer	<i>Cornell Dept. Eng. & Applied Physics, Ithaca NY 2015-2016</i>
• Seminar Organizer	<i>Cornell Dept. Eng. & Applied Physics, Ithaca NY 2014-2015</i>
• Exhibit Design & Museum Docent	<i>Ithaca Sciencenter, Ithaca NY 2013-2018</i>

Open Source

• github.com/py4dstem/py4DSTEM	<i>Python analysis package with 1000's+ users</i>
• github.com/py4dstem/emdfile	<i>Scientific data & metadata management</i>
• github.com/py4dstem/py4DSTEM	<i>py4DSTEM is a community developed hub</i>
• github.com/bsavitzky/rigidRegistration	<i>High precision atomic STEM metrology</i>

GRANTS & AWARDS

- SBIR/STTR Phase I Award #2322155 *National Sciences Foundation* 2023
- R&D100 Award Winner: py4DSTEM *R&D World* 2023
- Graduate Research Fellowship *National Sciences Foundation* 2014
- Student Scholar Award *Microscopy & Microanalysis* 2014
- IGERT Materials for a Sustainable Future Fellowship *National Sciences Foundation* 2013
- Lealyn B. Clapp Prize for Outstanding Undergraduate Thesis *Brown University* 2008
- Paul Cross Prize in Physical Chemistry *Brown University* 2008
- Sigma Xi Scientific Research Society *Brown University* 2008
- Phi Beta Kappa *Brown University* 2008
- Junior Award in Chemical Physics *Brown University* 2007

LIST OF PUBLICATIONS

A. Papers

49. D.J. Romano, B.H. Savitzky, A.M. Carrascosa, A. Narkiewicz-Jodko, J.D. Geiser, P.Y. Wang, L. Huang, S.W. Crane, X. Cheng, M. Liang, S. Mous, M.P. Minitti, M. Simmermacher, A. Kirrander & P.M. Weber, *Spectrally Resolved X-Ray Scattering*. Faraday Discussions (2026). DOI: 10.1039/D6FD00068A
48. A.K. Ackerman, B.H. Savitzky, C. Ophus, M. Danaie, P. Karamched, & D. Dye, *Defect-assisted refinement of nanoscale alpha in titanium alloys..* Communications Materials 7.1, 118 (2026). DOI: 10.1038/s43246-026-01096-y
47. E. Tillotson, W. Thornley, W. Talbott, A.S. Eggeman, D. Kriuchkova, S. Sullivan-Allsop, M. Smith, X. Liu, A. Slattery, P.L. Yap, D. Losic, Z. Xu, H. Wang, J. Ciston, A. Rakowski, S.M. Ribet, B.H. Savitzky, M.E. Schuster, C.S. Allen, D. Douglas-Henry, V. Nicolosi, A. Herzing, J. O'Connell, E.J. Olivier, J. Neethling, Y.-C. Zou, E. Duran, R. Cai, D.-T. Ngo, R. Gorbachev, J. Haas, M. Schlegel, J. Meyer, A. Centeno, A. Pesquera, A. Zurutuza, S. Kang, J. Park, I. Erofeev, U. Mirsaidov, S. Ophus, C. Rentenberger, T. Waitz, J. Kotakoski, A. Roy, R. Arenal, A.J. Pollard & S.J. Haigh, *textitA large interlaboratory electron diffraction study of monolayer graphene.* 2D Materials, 13.2, 025007 (2026). DOI: 10.1088/2053-1583/ae2ca1
46. S.H. Sung, N. Agarwal, Y. Zhang, W. Millsaps, M. Shah, E. Rennich, C. Li, M. Chi, B.H. Savitzky, I. El Baggari, R. Hovden, *Liquid helium cryogenic TEM below 1 Å.* arXiv, (2025). DOI: 10.48550/arXiv.2509.12-475
45. N. Schnitzer, L. Bhatt, I. El Baggari, R. Hovden, B.H. Savitzky, M.A. Smeaton, B.H. Goodge, *Quantitative approaches for multiscale structural analysis with atomic resolution electron microscopy.* Physical Review Materials, 9, 093802 (2025). DOI: 10.1103/xd6-31xf
44. J. Donohue, S.H. Mills, B.H. Savitzky, S.E. Zeltmann, C. Ophus, A.M. Minor, *Dynamics and structure of the B2→B19' phase transformation in NiTi revealed through in situ 4D-STEM.* Materials Science and Engineering: A, 962, 147951 (2025). DOI: 10.1016/j.msea.2025.147951
43. Y. Tsarfati, K.C. Bustillo, B.H. Savitzky, L. Balhorn, T.J. Quill, A. Marks, J. Donohue, S.E. Zeltmann, C.J. Takacs, A. Giovannitti, I. McCulloch, C. Ophus, A.M. Minor, A. Salleo, *The hierarchical structure of organic mixed ionic-electronic conductors and its evolution in water.* Nature Materials, 1-8 (2024). DOI: 10.1038/s41563-024-02016-6
42. S.P. Gleason, A. Rakowski, S.M. Ribet, S.E. Zeltmann, B.H. Savitzky, M. Henderson, J. Ciston, C. Ophus, *Random forest prediction of crystal structure from electron diffraction patterns incorporating multiple scattering.* Physical Review Materials, 8.9, 093802 (2024). DOI: 10.1103/PhysRevMaterials.8.09380
41. P. Ercius, I.J. Johnson, P. Pelz, B.H. Savitzky, L. Hughes, H.G. Brown, S.E. Zeltmann, S.-L. Hsu, C.C.S. Pedroso, B.E. Cohen, R. Ramesh, D. Paul, J.M. Joseph, T. Stezelberger, C. Czarnik, M. Lent, E. Fong, J. Ciston, M.C. Scott, C. Ophus, A.M. Minor, P. Denes, *The 4D Camera: an 87 kHz direct electron detector for scanning/transmission electron microscopy.* Microscopy and Microanalysis, 00.0, 1-10 (2024). DOI: 10.1093/mam/ozae086

40. T.M. Kucinski, R. Dhall, B.H. Savitzky, C. Ophus, R. Karkee, A. Mishra, E. Dervishi, J.H. Kang, C.-H. Lee, J. Yoo, M.T. Pettes, *Direct Measurement of the Thermal Expansion Coefficient of Epitaxial WSe₂ by Four-Dimensional Scanning Transmission Electron Microscopy*. ACS Nano, 18.27, 17725-17734 (2024). DOI: 10.1021/acs.nano.4c02996
39. M. Chen, K.C. Bustillo, V. Patel, B.H. Savitzky, H. Sternlicht, J.A. Maslyn, W.S. Loo, J. Ciston, C. Ophus, X. Jiang, N.P. Balsara, A. Minor, *Direct Imaging of the Crystalline Domains and Their Orientation in the PS-*b*-PEO Block Copolymer with 4D-STEM*. Macromolecules, 57.12, 5629-5638 (2024). DOI: 10.1021/acs.macromol.3c02231
38. J.H. Montoya, C. Grimley, M. Aykol, C. Ophus, H. Sternlicht, B.H. Savitzky, A.M. Minor, S.B. Torrisi, J. Goedjen, C.-C. Chung, A.H. Comstock, S. Sun, *How the AI-assisted discovery and synthesis of a ternary oxide highlights the capability gaps in materials science*. Chemical Science, 15.15, 5660-5673 (2024). DOI: 10.1039/D3SC04823C
37. G. Varnavides, S.M. Ribet, S.E. Zeltmann, Y. Yue, B.H. Savitzky, V.P. Dravid, M.C. Scott, C. Ophus, *Iterative Phase Retrieval Algorithms for Scanning Transmission Electron Microscopy*. arXiv, (2023). DOI: 10.48550/arXiv.2309.05250
36. S. Susarla, S. Hsu, F. Gómez-Ortiz, P. Garía-Fernández, B.H. Savitzky, S. Das, P. Behera, J. Junquera, P. Ercius, R. Ramesh, C. Ophus, *The emergence of three-dimensional chiral domain walls in polar vortices*. Nature Communications, 14.4465, 1-7 (2023). DOI: 10.1038/s41467-023-40009-2
35. A. Freyer, T.M. Tumieli, M. Smeaton, B.H. Savitzky, L.F. Kourkoutis, T.D. Krauss, *Heterogeneity in Cation Exchange Ag⁺ Doping of CdSe Nanocrystals*. ACS Nanoscience Au, 14.4465, 3.4, 280-285 (2023). DOI: 10.1021/acsnanoscienceau.3c00010
34. T.W.J. Kwok, T.P. McAuliffe, A.K. Ackerman, B.H. Savitzky, M. Danaie, C. Ophus, D. Dye, *The mechanism of twin thickening and the elastic strain state of TWIP steel nanotwins*. Material Science and Engineering: A, 873.145005, 1-6 (2023). DOI: 10.1016/j.msea.2023.145005
33. T. Zhu, H. Sternlicht, Y. Ha, C. Fang, D. Liu, B.H. Savitzky, X. Zhao, Y. Lu, Y. Fu, C. Ophus, C. Zhu, W. Yang, A.M. Minor, G. Lui, *Formation of hierarchically ordered structures in conductive polymers to enhance the performances of lithium-ion batteries*. Nature Energy, 8.2, 129-137 (2023). DOI: 10.1038/s41560-022-01176-6
32. Y. Xie, J. Wang, B.H. Savitzky, Z. Chen, Y. Wang, S. Betzler, K. Bustillo, K. Persson, Y. Cui, L.-W. Wang, C. Ophus, P. Ercius, H. Zheng, *Spatially resolved structural order in low-temperature liquid electrolyte*. Science Advances, 9.2, 1-7 (2023). DOI: 10.1126/sciadv.adc9721
31. J. Munshi, A. Rakowski, B.H. Savitzky, S.E. Zeltmann, J. Ciston, M. Henderson, S. Cholia, A.M. Minor, M.K.Y. Chan, C. Ophus, *Disentangling multiple scattering with deep learning: application to strain mapping from electron diffraction patterns*. npj Computational Materials, 8.254, 1-15 (2022). DOI: 10.1038/s41524-022-00939-9
30. H. Han, S. Kallakuri, Y. Yao, C.B. Williamson, D.R. Nevers, B.H. Savitzky, R.S. Skye, M. Xu, O. Voznyy, J. Dshemuchadse, L.F. Kourkoutis, S. J. Weinstein, T. Hanrath, R.D. Robinson, *Multiscale hierarchical structures from a nanocluster mesophase*. Nature Materials, 21, 518-525 (2022). DOI: 10.1038/s41563-022-01223-3
29. C. Ophus, S.E. Zeltmann, A. Bruefach, A. Rakowski, B.H. Savitzky, A.M. Minor, M.C. Scott, *Automated Crystal Orientation Mapping in py4DSTEM using Sparse Correlation Matching*. Microscopy and Microanalysis, 28.2, 390-403 (2022). DOI: 10.1017/S1431927622000101
28. H.D. Deng, H. Zhao, N. Jin, L. Hughes, B.H. Savitzky, C. Ophus, D. Fraggadakis, A. Borbély, Y.-S. Yu, E.G. Lomeli, R. Yan, J. Liu, D.A. Shapiro, W. Cai, M.Z. Bazant, A.M. Minor, W.C. Chueh, *Correlative image learning of chemo-mechanics in phase transforming solids*. Nature Materials, 21, 547-554 (2022). DOI: 10.1038/s41563-021-01191-0
27. L.A. Hughes*, B.H. Savitzky*, H.D. Deng, N.L. Jin, E.G. Lomeli, Y.-S. Yu, D. A. Shapiro, P. Herring, A. Anapolsky, W.C. Chueh, C. Ophus, A.M. Minor, *Correlative analysis of structure and chemistry of Li₂FePO₄ platelets using 4D-STEM and X-ray ptychography*. Materials Today, 52, 102-111 (2022). DOI: 10.1016/j.mattod.2021.10.031

26. J. Donohue, S.E. Zeltmann, K.C. Bustillo, B.H. Savitzky, M.A. Jones, G.F. Meyers, C. Ophus, A.M. Minor, *Cryogenic 4D-STEM analysis of an amorphous-crystalline polymer blend: Combined nanocrystalline and amorphous phase mapping*. iScience, 25.3, (2022). DOI: 10.1016/j.isci.2022.103882
25. P. Behera, M.A. May, F. Gómez-Ortiz, S. Susarla, S. Das, C.T. Nelson, L. Caretta, S.-L. Hsu, M.R. McCarter, B.H. Savitzky, E.S. Barnard, A. Raja, Z. Hong, P. García-Fernandez, S.W. Lovesey, G. van der Laan, P. Ercius, C. Ophus, L.W. Martin, J. Junquera, M.B. Raschke, R. Ramesh, *Electric field control of chirality*. Science Advances, 8.1, (2022). DOI: 10.1126/sciadv.abj8030
24. J. Gim, A. Koch, L.M. Otter, B.H. Savitzky, S. Erland, L.A. Estroff, D.E. Jacob, R. Hovden, *The mesoscale order of nacreous pearls*. Proceedings of the National Academy of Sciences, 118.42, (2021). DOI: 10.1073/pnas.2107477118
23. V. Schoeppler, D. Stier, R.J. Best, C. Song, J. Turner, B.H. Savitzky, C. Ophus, M.A. Marcus, S. Zhao, K. Bustillo, I. Zlotnikov, *Crystallization by Amorphous Particle Attachment: On the Evolution of Texture*. Advanced Materials, 33.37, 210138 (2021). DOI: 10.1002/adma.202101358
22. Y. Yao, Z. Huang, L.A. Hughes, J. Gao, T. Li, D. Morris, S.E. Zeltmann, B.H. Savitzky, C. Ophus, Y.Z. Finfrock, Q. Dong, M. Jiao, Y. Mao, M. Chi, P. Zhang, J. Li, A.M. Minor, R. Shahbazian-Yasser, L. Hu, *Extreme mixing in nanoscale metal alloys*. Matter, 4, 2340-2352 (2021). DOI: 10.1016/j.matt.2021.04.014
21. P.M. Pelz, A. Rakowski, L.R. DaCosta, B.H. Savitzky, M.C. Scott, C. Ophus, *A fast algorithm for scanning transmission electron microscopy imaging and 4D-STEM diffraction simulations*. Microscopy and Microanalysis, 27.4, 835-848 (2021). DOI: 10.1017/S1431927621012083
20. A. Londoño-Calderon, D.J. Williams, M.M. Schneider, B.H. Savitzky, C. Ophus, S. Ma, H. Zhu, M.T. Pettes, *Intrinsic helical twist and chirality in ultrathin tellurium nanowires*. Nanoscale, 13.21, 9606-9614 (2021). DOI: 10.1039/D1NR01442K
19. B.H. Savitzky, S.E. Zeltmann, L.A. Hughes, H.G. Brown, S. Zhao, P.M. Pelz, T.C. Pekin, E.S. Barnhard, J. Donohue, L.R. DaCosta, E. Kennedy, Y. Xie, M.T. Janish, M.M. Schneider, P. Herring, C. Gopal, A. Anapolsky, R. Dhall, K.C. Bustillo, P. Ercius, M.C. Scott, J. Ciston, A.M. Minor, C. Ophus, *py4DSTEM: A Software Package for Four-Dimensional Scanning Transmission Electron Microscopy Data Analysis*. Microscopy and Microanalysis, 27.4, 712-743 (2021). DOI: 10.1017/S1431927621000477
18. A. Londoño-Calderon, D.J. Williams, M. Schneider, B.H. Savitzky, C. Ophus, M.T. Pettes, *Local Lattice Deformation of Tellurene Grain Boundaries by Four Dimensional Electron Microscopy*. Journal of Physical Chemistry C, 125.6, 3396-34-5 (2021). DOI: 10.1021/acs.jpcc.1c00308
17. X. Hong, S.E. Zeltmann, B.H. Savitzky, L.R. DaCosta, A. Müller, A.M. Minor, K.C. Bustillo, C. Ophus, *Multibeam Electron Diffraction*. Microscopy and Microanalysis, 27.1, 129-139 (2021). DOI: 10.1017/S1431-927620024770
16. N. Yang, C. Ophus, B.H. Savitzky, M.C. Scott, K. Bustillo, K. Lu, *Nanoscale characterization of crystalline and amorphous phases in silicon oxycarbide ceramics using 4D-STEM*. Materials Characterization, 181, 111512 (2021). DOI: 10.1016/j.matchar.2021.111512
15. S.E. Zeltmann, A. Müller, K.C. Bustillo, B.H. Savitzky, L. Hughes, A.M. Minor, C. Ophus, *Patterned probes for high precision 4D-STEM bragg measurements*. Ultramicroscopy, 209, 112890 (2020). DOI: 10.1016/j.ultramic.2019.112890
14. A.R.C. McCray*, B.H. Savitzky*, K. Whitham, T. Hanrath, L.F. Kourkoutis, *Orientational Disorder in Epitaxially Connected Quantum Dot Solids*. ACS Nano, 13.10, 11460-11468 (2019). DOI: 10.1021/acsnano.9b04951
13. A.R. Freyer, P.C. Sercel, Z. Hou, B.H. Savitzky, L.F. Kourkoutis, A.L. Efros, T.D. Krauss, *Explaining the Unusual Photoluminescence of Semiconductor Nanocrystals Doped via Cation Exchange*. Nano Letters, 19.7, 4797-4803 (2019). DOI: 10.1021/acs.nanolett.9b02284
12. J.M. Noble, J. Lubieniecki, B.H. Savitzky, J. Plitzko, H. Engelhardt, W. Baumeister, L.F. Kourkoutis, *Connectivity of centermost chromatophores in Rhodobacter sphaeroides bacteria*. Molecular Microbiology, 109.6, 812-825 (2018). DOI: 10.1111/mmi.14077

11. B.H. Savitzky, I. El Baggari, C. Clement, E. Waite, J.P. Sheckelton, C. Pasco, A.S. Admasu, J. Kim, S.-W. Cheong, T.M. McQueen, R. Hovden, L.F. Kourkoutis, *Image registration of low signal-to-noise cryo-STEM data*. Ultramicroscopy, 181, 56-65 (2018). DOI: 10.1016/j.ultramicro.2018.04.008
10. I. El Baggari, B.H. Savitzky, A.S. Admasu, J. Kim, S.-W. Cheong, R. Hovden, L.F. Kourkoutis, *Nature and evolution of incommensurate charge order in manganites visualized with cryogenic scanning transmission electron microscopy*. Proceedings of the National Academy of Sciences, 115.7, 1445-1450 (2018). DOI: 10.1073/pnas.1714901115
9. D.R. Nevers, C.B. Williamson, B.H. Savitzky, I. Hadar, U. Banin, L.F. Kourkoutis, T. Hanrath, R.D. Robinson, *Mesophase Formation Stabilizes High-Purity Magic-Sized Clusters*. Journal of the American Chemical Society, 140.10, 3652-3662 (2018). DOI: 10.1021/jacs.7b12175
8. B.H. Savitzky, I. El Baggari, A.S. Admasu, J. Kim, S.-W. Cheong, R. Hovden, L. F. Kourkoutis, *Bending and Breaking of Stripes in a Charge Ordered Manganite*. Nature Communications, 8.1883, 1-6 (2017). DOI: 10.1038/s41467-017-02156-1
7. B.E. Trembl, B.H. Savitzky, A.M. Tirmzi, J. Cimada DaSilva, L.F. Kourkoutis, T. Hanrath, *Successive Ionic Layer Absorption and Reaction for Post-Assembly Control over Inorganic Inter-Dot Bonds in Long-Range Ordered Nanocrystal Films*. ACS Applied Materials & Interfaces, 9, 13500 (2017). DOI: 10.1021/ac-sami.7b01588
6. M. Unni, A.M. Uhl, S. Savliwala, B.H. Savitzky, R. Dhavalikar, N. Garraud, D. P. Arnold, L.F. Kourkoutis, J.S. Andrew, C. Rinaldi, *Thermal Decomposition Synthesis of Iron Oxide Nanoparticles with Diminished Magnetic Dead Layer by Controlled Addition of Oxygen*. ACS Nano, 11, 2284-2303 (2017). DOI: 10.1021/acsnano.7b00609
5. R. Hovden, A.W. Tsen, P. Liu, B.H. Savitzky, I. El Baggari, Y. Liu, W. Lu, Y. Sun, P. Kim, A.N. Pasupathy, L.F. Kourkoutis, *Atomic lattice disorder in charge-density-wave phases of exfoliated dichalcogenides (1T-TaS₂)*. Proceedings of the National Academy of Sciences, 113, 11420-11424 (2016). DOI: 10.1073/pnas.1606044113
4. B.H. Savitzky, R. Hovden, K. Whitham, J. Yang, F. Wise, T. Hanrath, L.F. Kourkoutis, *Propagation of Structural Disorder in Epitaxially Connected Quantum Dot Solids from Atomic to Micron Scale*. Nano Letters, 16, 5714-5718 (2016). DOI: 10.1021/acs.nanolett.6b02382
3. K. Whitham, J. Yang, B.H. Savitzky, L.F. Kourkoutis, F. Wise, T. Hanrath, *Charge Transport and Localization in Atomically Coherent Quantum Dot Solids*. Nature Materials, 15, 557-563 (2016). DOI: 10.1038/nmat4576
2. H. Zhang, B.H. Savitzky, J. Yang, J.T. Newman, K.A. Perez, B.-R. Hyun, L.F. Kourkoutis, T. Hanrath, F.W. Wise, *Colloidal Synthesis of PbS and PbS/CdS Nanosheets Using Acetate-Free Precursors*. Chemistry of Materials, 28, 127-134 (2016). DOI: 10.1021/acs.chemmater.5b03348
1. B.H. Savitzky, R.M. Stratt, *Anatomy of an Energy Transfer Event in a Liquid: The High-Energy Rotational Relaxation of OH in Solution*. Journal of Physical Chemistry B, 112, 13326-13334 (2008). DOI: 10.1021/jp805792e

B. Talks

35. “Data, algorithms, & innovation in cryogenic STEM”, **Lawrence Berkeley National Laboratory, The Molecular Foundry**, Berkeley CA, January 17, 2025. (Invited)
34. “Comprehensive characterization of sustainable materials by data integration”, **Imperial College London, Department of Materials**, London UK, January 17, 2025. (Invited)
33. “Data is an interface: integration, automation, and remote control for national user facilities”, **Sandia National Laboratory, Center for Integrated Nanomaterials Colloquium Series**, Carlsbad NM, November 6, 2024. (Invited)
32. “Data is an interface: integration, automation, and remote control for national user facilities”, **Los Alamos National Laboratory, Center for Integrated Nanomaterials Colloquium Series**, Los Alamos NM, November 5, 2024. (Invited)

31. “Stability requirements for ultracold atomic imaging: opportunities in 4D-STEM”, **Microscopy & Microanalysis**, Cleveland OH, July 31, 2024. (Invited)
30. “How cold is cold: what’s the temperature at the tip? The mathematics of heat loss in in situ cryo-TEM”, **Microscopy & Microanalysis**, Cleveland OH, July 30, 2024. (Vendor Tutorial)
29. “Imaging complex heterogenous phases in classical and quantum materials with advanced scanning transmission electron microscopy”, **5th International Conference on Materials Science and Engineering**, San Francisco CA, June 12, 2024. (Invited)
28. “Experiment and Simulation in Methods in 4D-STEM”, **Materials Research Society Webinar**, Virtual, May 23, 2024. (Invited)
27. “py4DSTEM for Materials Discovery”, **Toyota Research Institute & Toyota Advanced Materials Engineering Division Joint Seminar**, Toyota Central R&D Labs, Virtual, March 25, 2024. (Invited)
26. “Nanodiffract (verb): to image with tact to extract every fact, all in one scale-bridging experimental act”, **University of Vienna PNM Seminar**, Virtual, December 13, 2023. (Invited)
25. “4D Scanning Transmission Electron Microscopy for Multiscale and Multimodal Materials Characterization”, **STROBE Fall Seminar Series**, Virtual, November 30, 2023. (Invited)
24. “Mapping local topology, defects, and emergent order of picometer-scale periodic lattice modulations”, **MRS Fall Meeting**, Boston MA, November 28, 2023.
23. “Multiscale and Multimodal Materials Characterization with (4D)-STEM”, **Imperial College London LCN Seminar**, London UK, November 1, 2023. (Invited)
22. “EMD 1.0 and ‘emdfile’: an HDF5 / Python Interface”, **Microscopy & Microanalysis**, Minneapolis MN, July 27, 2023.
21. “Four-dimensional Scanning Transmission Electron Microscopy for Multiscale and Multimodal Materials Characterization”, **University of Michigan Materials Science & Engineering Seminar**, Ann Arbor, MI, May 24, 2023. (Invited)
20. “Four-dimensional Scanning Transmission Electron Microscopy Materials Characterization Spanning Picometer to Micron Length Scales”, **Pennsylvania State University TEM Seminar Series**, Virtual, April 2, 2022. (Invited)
19. “4D-STEM in Principle and in Practice”, **University of California Berkeley, Electron Microscopy Laboratory Guest Lecture**, Berkeley CA, March 8&10, 2022. (Invited)
18. “4D-STEM in Principle and in Practice”, **University of California Berkeley, Electron Microscopy Laboratory Guest Lecture**, Berkeley CA, March 11, 2021. (Invited)
17. “4D-STEM in Principle and in Practice”, **University of California Berkeley, Electron Microscopy Laboratory Guest Lecture**, Berkeley CA, March 5, 2020. (Invited)
16. “4D-STEM Data Analysis with py4DSTEM”, **Microscopy & Microanalysis**, Virtual, August 5, 2020.
15. “py4DSTEM: Open Source Software for 4D-STEM Data Analysis”, **Microscopy & Microanalysis**, Portland OR, USA, August 4, 2019.
14. “Mapping Picometer Scale Periodic Lattice Distortions with Aberration Corrected Scanning Transmission Electron Microscopy”, **Microscopy & Microanalysis**, St. Louis, MO, USA, August 6, 2017.
13. “Epitaxial Quantum Dot Superlattices: From Synthesis to Characterization to Electronic Structure”, **Microscopy & Microanalysis**, St. Louis, MO, USA, August 6, 2017.
12. “Mapping Picometer-Scale Lattice Displacements in a Charge-Ordered Manganite: Observing the Interplay of Disorder and Emergent Order”, **Cornell Applied and Engineering Physics First Friday Seminar**, Ithaca, NY, April 7, 2017. (Invited)
11. “The Paracrystal Model: Theory, Characterization, Applications”, **University of Michigan Microscopy Seminar**, Ann Arbor, MI, March 29, 2017. (Invited)

10. “Mapping Picometer Scale Lattice Displacements in Charge Density Wave Systems to Measure Local Symmetry, Elasticity, and Disorder”, **American Physical Society March Meeting**, New Orleans, LA, USA, March 13, 2017.
9. “Electron Microscopy of Structural Disorder in Quantum Dot Solids and Periodically Distorted Lattices from Picometer to Micron Length Scales”, **Brown University Chemistry Seminar**, Providence, RI, October 25, 2016. (Invited)
8. “Quantitative, Real-Space Statistical Analysis of Imperfect Lattices”, **Microscopy & Microanalysis**, Columbus, OH, USA, July 25, 2016.
7. “Atomic-Scale Mapping of Periodic Lattice Modulations and their Disorder in a Stripe-Ordered Manganite”, **Cornell Center for Materials Research IRG Seminar**, Ithaca, NY, May 19, 2016. (Invited)
6. “Charge Transport and Localization in Atomically Coherent Quantum Dot Solids”, **Cornell Physics Lunch Talks**, Ithaca, NY, April 18, 2016. (Invited)
5. “Long Range Order in Square PbSe Quantum Dot Solids Mediated by Thickness and Atomic Connectivity”, **Materials Research Society Fall Meeting**, Boston, MA, USA, November 30, 2015.
4. “Open Source Geometric Phase Analysis with Python: from Theory to Implementation”, **Nion Swift Workshop**, Kirkland, WA, August 10, 2015. (Invited)
3. “Long Range Order and Atomic Connectivity in Two-Dimensional Square PbSe Quantum Dot Solids”, **Microscopy & Microanalysis**, Portland, OR, USA, August 5, 2015.
2. “Arrangement and Connectivity of Lead-Chalcogenide Nanocrystal Assemblies for Next Generation Photovoltaics”, **Microscopy & Microanalysis**, Hartford, CT, USA, August 4, 2014.
1. “Electron Microscopy for Photovoltaic Materials”, **University of New South Wales Photovoltaics Seminar**, NSW Australia, June 10, 2014.

C. Conference Proceedings

12. B. H. Savitzky, R. Hovden, I. El Baggari, *Stability requirements for ultra-cold atomic imaging: opportunities in 4D-STEM*. Microscopy & Microanalysis, 30.S1: 1856-1858 (2023). DOI: 10.1093/mam/ozae044.917
11. B. H. Savitzky, A. Rakowski, A. Bruefach, S. M. Ribet, G. Varnavides, S. E. Zeltmann, T. Mishra, M. C. Scott, A. M. Minor, C. Ophus, *Architecture, Development Cycle, and Governance Considerations in Co-created Research Software: the Example of py4DSTEM and Analysis of 4D-STEM Data*. Microscopy & Microanalysis, 29.S1: 339-341 (2023). DOI: 10.1093/micmic/ozad067.158
10. B. H. Savitzky, S. E. Zeltmann, A. Bruefach, A. Rakowski, M. C. Scott, M. L. Henderson, C. Ophus, *EMD 1.0 and ‘emdfile’: an HDF5 / Python Interface*. Microscopy & Microanalysis, 29.S1: 721-723 (2023). DOI: 10.1093/micmic/ozad067.356
9. B. H. Savitzky, C. Ophus, *Accuracy, Reproducibility, and Calibration in 4D-STEM*. Microscopy & Microanalysis, 28.S1: 470-471 (2022). DOI: 10.1017/S1431927622002550
8. B. H. Savitzky, I. El Baggari, C. Clement, E. Waite, R. Hovden, L. F. Kourkoutis, *Image Registration of Low-Signal-to-Noise STEM Data with Open Source Software*. Microscopy & Microanalysis, 25.S2, 200-201 (2019). DOI: 10.1017/S1431927619001739
7. B. H. Savitzky, I. El Baggari, C. Clement, E. Waite, R. Hovden, J. P. Shekelton, C. Pasco, T. M. McQueen, A. S. Admasu, J. Kim, S.-W. Cheong, L. F. Kourkoutis, *Tricky Registration for Unruly Data: Image Registration of Low-Signal-to-Noise Cryo-STEM Data*. Microscopy & Microanalysis, 24.S1, 518-519 (2018). DOI: 10.1017/S1431927618003082
6. B. H. Savitzky, I. El Baggari, A. S. Admasu, J. Kim, S.-W. Cheong, R. Hovden, L.F. Kourkoutis, *Mapping Picoscale Lattice Displacements in Charge Density Wave Systems to Measure Local Symmetry, Elasticity, and Disorder*. APS March Meeting, V20-006 (2017)

5. B. H. Savitzky, I. El Baggari, A. S. Admasu, J. Kim, S-W. Cheong, R. Hovden, L.F. Kourkoutis, *Mapping Picometer Scale Periodic Lattice Distortions with Aberration Corrected Scanning Transmission Electron Microscopy*, Microscopy & Microanalysis, 23.S1, 420-421 (2017). DOI: 10.1017/S1431927617002781
4. B. H. Savitzky, R. Hovden, K. Whitham, T. Hanrath, L.F. Kourkoutis, *Epitaxial Quantum Dot Superlattices: From Synthesis to Characterization to Electronic Structure*, Microscopy & Microanalysis, 23.S1, 1884-1885 (2017). DOI: 10.1017/S143192761701008X
3. B. H. Savitzky, R. Hovden, K. Whitham, J. Yang, F. Wise, T. Hanrath, L.F. Kourkoutis, *Quantitative, Real-Space Statistical Analysis of Imperfect Lattices*, Microscopy & Microanalysis, 22.S3, 892-893 (2016). DOI: 10.1017/S1431927616005304
2. B.H. Savitzky, R. Hovden, K. Whitham, T. Hanrath, L.F. Kourkoutis, *Long Range Order and Atomic Connectivity in Two-Dimensional Square PbSe Quantum Dot Solids*, Microscopy & Microanalysis, 21.S3: 1329-1330 (2015). DOI: 10.1017/S1431927615007436
1. B.H. Savitzky, R. Hovden, K. Whitham, H. Bian, B. Treml, T. Hanrath, L.F. Kourkoutis, *Three-Dimensional Arrangement and Connectivity of Lead-Chalcogenide Nanocrystal Assemblies for Next Generation Photovoltaics*, Microscopy & Microanalysis, 20.S3: 542-543 (2014). DOI: 10.1017/S1431927614004437