Zoey Tumbleson

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SUMMARY

- Physics PhD from UC Santa Cruz; worked from Berkeley Lab in the Advanced Light Source and Materials Sciences Division for dissertation research
- Four years of experience in x-ray characterization of materials and development of Python algorithms
- Proven ability to communicate scientifically rigorous details effectively and collaborate with scientists with diverse scientific expertise

EDUCATION

University of California, Santa Cruz
Ph.D. Physics **August 2025**
M.Sc. Physics **August 2021**
Santa Cruz, CA

Ohio University
B.S. Engineering Physics (Honors Tutorial College), GPA 3.93/4.0 **May 2019**
Athens, OH

RESEARCH AND WORK EXPERIENCE

Lawrence Berkeley National Laboratory **September 2021 –August 2025**
Graduate Student Researcher, Sujoy Roy Group **Berkeley, CA**

- Characterized structural, orbital, and magnetic features of thin films and crystals with x-ray scattering at synchrotron facilities
- Developed time-resolved coherent soft x-ray scattering algorithms and experimental techniques to characterize and discover phases in materials
- Wrote highly technical scientific articles (see Tumbleson *et al.*, Sci. Adv. **11,** eadt5680 (2025))
- Conducted research in small groups and both led experiments and collaborated as a team member
- Commissioned equipment for both personal experiments and user research
- Wrote GPU-accelerated micromagnetic simulations to understand experimental observations
- Wrote Python data analysis pipelines that were scalable up to PBs
- Presented research results to funding agencies and conferences
- Determined data visualization to effectively communicate results succinctly
- Characterized samples with a wide range of techniques including resonant x-ray scattering, x-ray diffraction (XRD), x-ray photon correlation spectroscopy (XPCS), atomic force microscopy (AFM), magnetic force microscopy (MFM), and Laue diffractometry
- Determined strength and validity of scientific arguments and what experiments would provide more thorough results

UC Santa Cruz **September 2019 –August 2021**
Graduate Student Researcher, Jairo Valasco Lab **Santa Cruz, CA**

- Fabricated graphene devices in a clean room environment
- Imaged nanoscale structures with scanning tunneling microscopy (STM) and atomic force microscopy (AFM)

UC Santa Cruz **September 2019 –August 2021**
Teaching Assistant **Santa Cruz, CA**

- Facilitated laboratory component for undergraduate physics course on electricity and magnetism
- Graded weekly lab reports and final exams

Argonne National Laboratory **June–August 2016, 2017, 2018, 2019**
Summer Intern, Center for Nanoscale Materials, Saw-Wai Hla Group **Lemont, IL**

- Imaged molecular machines with scanning tunneling microscope (STM)
- Collaborated on user experiments and publications
- Performed commissioning tasks
- Competed internationally in world's first nanocar race (see highlight from C&En)
- Aided in commissioning tasks and beamline experiments for synchrotron x-ray scanning tunneling microscope

Ohio University **August 2016 – May 2018**
Teaching Assistant **Athens, OH**

- Facilitated laboratory components for introduction to computer engineering (logic devices), electricity and magnetism, and Newtonian mechanics
- Graded weekly lab reports

PUBLICATIONS

- **Tumbleson, Z.**, S. A. Morley, E. Hollingworth, A. Singh, T. Bayaraa, N. G. Burdet, A. U. Saleheen, M. R. McCarter, D. Raftrey, R. J. Pandolfi, V. Esposito, G. L. Dakovski, F.-J. Decker, A. H. Reid, T. A. Assefa, P. Fischer, S. M. Griffin, S. D. Kevan, F. Hellman, J. J. Turner, and S. Roy (2025). "Thermodynamic phase transitions of nematic order in magnetic helices". In: Science Advances 11, (25) eadt5680 doi: 10.1126/sciadv.adt5680.
- Saleheen A. U., A. Singh, D. Raftrey, M. A. Brozius, M. R. McCarter, **Z. Tumbleson**, M.-Y. Im, S. A. Montoya, E. E. Fullerton, P. Fischer, S. D. Kevan, S. Roy, S. A. Morley (2025). "Multimodal correlative study of Hall transport and magnetic phases in Fe/Gd multilayer systems". In: Applied Physics Letters; 126 (14): 142401. https://doi.org/10.1063/5.0239472
- McCarter, M. R., A. I. U. Saleheen, A. Singh, **Z. Tumbleson,** J. S. Woods, A. S. Tremsin, A. Scholl, L. E. De Long, J. T. Hastings, S. A. Morley, and S. Roy (2023). "Antiferromagnetic real-space configuration probed by dichroism in scattered x-ray beams with orbital angular momentum". In: Physical Review B 107. doi: 10.1103/PhysRevB.107.L060407.
- Singh, A., E. Hollingworth, X. M. Chen, **Z. Tumbleson**, P. Fischer, F. Hellman, S. Roy, S. A. Morley, A. U. Saleheen, M. R. Mccarter, and S. D. Kevan (2023). "Characterizing Temporal Heterogeneity by Quantifying Nanoscale Fluctuations in Amorphous Fe-Ge Magnetic Films". In: Advanced Functional Materials 33.29, p. 2300224. issn: 1616-3028. doi: 10.1002/ADFM.202300224.
- Zhang, Z., Y. Li, B. Song, Y. Zhang, X. Jiang, M. Wang, **Z. Tumbleson**, C. Liu, P. Wang, X. Q. Hao, T. Rojas, A. T. Ngo, J. L. Sessler, G. R. Newkome, S. W. Hla, and X. Li (2020). "Intra- and intermolecular self-assembly of a 20-nm-wide supramolecular hexagonal grid". In: Nature Chemistry 12.5, pp. 468–474. issn: 17554349. doi: 10.1038/s41557-020-0454-z.
- Zhang, Y., J. P. Calupitan, T. Rojas, **Z. Tumbleson**, G. Erbland, C. Kammerer, T. M. Ajayi, S. Wang, L. A. Curtiss, A. T. Ngo, S. E. Ulloa, G. Rapenne, and S. W. Hla (2019). "A chiral molecular propeller designed for unidirectional rotations on a surface". In: Nature Communications 10.1, pp. 1–9. issn: 20411723. doi: 10.1038/s41467-019-11737-1

SKILLS

Materials science and characterization: Soft X-ray Synchrotron Coherence Techniques, Resonant X-ray Scattering (RSoXS), X-ray photon correlation spectroscopy (XPCS), X-ray Free electron Lasers (XFEL), X-ray Absorption Spectroscopy (XAS), X-ray Diffraction (XRD), Scanning Tunneling Microscopy (STM), Magnetic Force Microscopy (MFM), Atomic Force Microscopy (AFM), Laue X-ray Diffraction, X-ray magnetic Circular Dichroism (XMCD), Mass Spectrometry
Data analysis and software: Python, MATLAB, C++, GoLang, SLURM high performance computing (HPC), Numpy, Scipy, Numba, Matplotlib, Dask, Pytorch, xarray, Bokeh, SQL, Multiprocessing, Microsoft Office, Google Suite, Mumax3, Monte-Carlo, pymc, diffusion
Soft skills: Scientific writing, Public speaking, Communication, Teamwork, Leadership, Teaching, Mentorship