Zoey Tumbleson

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Summary

Fifth year PhD student in experimental condensed matter physics actively researching phase transitions in quantum materials with a primary focus on time-resolved coherent X-ray scattering measurements. Frequent user of X-ray facilities and proficient with scientific Python data analysis with datasets ranging up to multiple PB in size.

Work Experience

Graduate Student Researcher Nov 2021 - present
UC Santa Cruz & Lawrence Berkeley Nat'l Lab

Advisor: Dr. Sujoy Roy
Conducted experiments on hard matter systems and analyzed data with Python programming language. Discovered two magnetic nematic phases in the chiral spin texture of amorphous FeGe with unique spatio-temporal signatures close to the phase transition. Frequent user of synchrotron and free electron laser user facilities and expert on measuring time dynamics with X-ray photon correlation spectroscopy (XPCS) down to the single-photon limit. Measured dynamics on the timescales of nanoseconds (Linearly Coherent Light Source), microseconds (European X-ray Free Electron Laser), and seconds (Advanced Light Source). Commonly performed micromagnetic simulations and occasionally measured samples with magnetic force microscopy (MFM) to complement X-ray scattering measurements. Performed all data analysis with Python including both local and compute cluster analysis.

Graduate Teaching Assistant Oct 2019 - Nov 2021
UC Santa Cruz

Taught undergraduate physics labs for science and engineering students on electricity and magnetism. Required hands-on teaching in small groups, weekly grading of written lab reports, and grading of course exams.

Undergraduate Researcher Jun 2016 - Aug 2019
Argonne Nat'l Lab

Advisor: Dr. Saw-Wai Hla
Performed scanning tunneling microscopy (STM) experiments on molecular machines and acquired data with user collaborators. Assisted during beamtime with the commissioning of the synchrotron X-ray scanning tunneling microscope (SXSTM).

Education

2019 - present	PhD (Physics) at **University of California, Santa Cruz**	(GPA: N/A)
2019 - 2021	MS (Physics) at **University of California, Santa Cruz**	
2015 - 2019	BS (Engineering Physics) at **Ohio University**	(GPA: 3.93/4.0)

Publications

Tumbleson, R., 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 (2024). *Nematicity of a Magnetic Helix*. arXiv: 2404.13212 [cond-mat.mtrl-sci].

McCarter, M. R., A. I. U. Saleheen, A. Singh, **R. 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, **R. 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, **R. 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, **R. 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.

Presentations

Oral

Tumbleson, R., Hollingworth, E., Singh, A., Saleheen, A. U., McCarter, M., Raftrey, D., Morley, S. A., Kevan, S., Fischer, P., Hellman, F., Roy, S. "Defect Mediated Phase Transition in Amorphous FeGe" APS March Meeting 2024.

Tumbleson, R., Hollingworth, E., Singh, A., Saleheen, A. U., McCarter, M., Raftrey, D., Morley, S. A., Kevan, S., Fischer, P., Hellman, F., Roy, S. "Exploring a Magnetic Phase Transition in Non-Collinear Amorphous FeGe Using X-ray Scattering" APS March Meeting 2023.

Tumbleson, R., Burdet, N. G., Hollingworth, E., Singh, A., Saleheen, A. U., McCarter, M., Raftrey, D., Esposito, V., Assefa, T., Morley, S. A., O'Mahoney, D., Decker, F.-J., Reid, A. H., Dakovski, G. L., Kevan, S., Fischer, P., Hellman, F., Turner, J. J., Roy, S. "Investigation of Sub-Nanosecond Fluctuations on Amorphous FeGe Near a Magnetic Phase Transition" 67th Annual Conference on Magnetism and Magnetic Materials 2022.

Tumbleson, R., Burdet, N. G., Hollingworth, E., Singh, A., Saleheen, A. U., McCarter, M., Raftrey, D., Esposito, V., Assefa, T., Morley, S. A., O'Mahoney, D., Decker, F.-J., Reid, A. H., Dakovski, G. L., Kevan, S., Fischer, P., Hellman, F., Turner, J. J., Roy, S. "X-ray Photon Fluctuation Spectroscopy on amorphous FeGe near magnetic phase transition at LCLS-II" APS March Meeting 2022.

Poster

Tumbleson, R., Hollingworth, E., Singh, A., Raftrey, D., Saleheen, A. U., McCarter, M., Morley, S. A., Fischer, P., Hellman, F., Kevan, S., Roy, S. "Dynamics of Disordered Magnetic Helices Probed With Coherent X-ray Scattering" 68th Annual Conference on Magnetism and Magnetic Materials 2023.

Tumbleson, R., Hollingworth, E., Singh, A., Raftrey, D., Saleheen, A. U., McCarter, M., Morley, S. A., Fischer, P., Hellman, F., Kevan, S., Roy, S. "Spin Fluctuations Near a Helical Reorientation Transition" ALS User Meeting 2023.

Tumbleson, R., Hollingworth, E., Singh, A., Burdet, N. G., Raftrey, D., Saleheen, A. U., McCarter, M., Morley, S. A., Esposito, V., Dakovski, G. L., Decker, F.-J., Reid, A. H., Assefa, T., Fischer, P.,

Hellman, F., Kevan, S., Turner, J. J., Roy, S. "Sub-Nanosecond Magnetic Fluctuations near a Helical Reorientation Transition" LCLS User Meeting 2023.