Peyton D. Murray, Ph. D.

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Skills Open-Source Leadership, Scientific Computing, Data Visualization, Full-Stack Development

Languages Python, Go, C/C++, Rust, Typescript

Frameworks & Tools CI/CD (GitHub Actions), FastAPI, Django, React, PostgreSQL, Pytest, Python scientific ecosystem, Meson

Experience

OpenTeams (formerly Quansight) *Senior Software Engineer* May 2021 - Present

- Led design and delivery for open source contracts as tech lead for teams of 5-10 engineers on contracts as large as ~$1M, providing open-source consulting services for foundational packages in the Python scientific ecosystem. Delivered all contracts on schedule and within budget.
- Mentored and advocated for a global team of junior engineers; managed multiple open-source contracts simultaneously.
- As an individual contributor I developed bug fixes, features, accessibility enhancements, performance optimizations, tests, improved observability, CI/CD, and project maintenance for `jupyter`, `scipy`, `numpy`, `conda`, `ray`, `tensorflow`, and many smaller projects used by millions of Python developers.
- Reduced `ray`'s CI documentation build time (~1hr) by 50%, and automated the building, linting, publishing, and testing of the `tensorflow` ecosystem with ~40 CI/CD workflows spread across multiple projects.
- Built and released Python code in addition to C/C++ and Rust for performance-critical applications.

Voltaiq *Software Engineer* Oct 2019 - May 2021

- Developed, deployed, maintained, and supported production deployments for a SAAS data analytics platform for the world's largest battery manufacturers and consumers.
- Built REST APIs (Python, Django, PostgreSQL) and React dashboards with Plotly.js for data visualization.

Tampere University *Postdoctoral Scholar* Jan 2019 - Aug 2019

- Developed 3D voronoi tessellation and performance improvements for an open-source magnetics simulation engine using Go and CUDA C, improving materials research for thousands of top magnetics scientists.
- Scaled simulations by automating configuration and parallelizing across a GPU cluster using SLURM.

UC Davis Department of Physics *Graduate Student Researcher* Aug 2012 - Dec 2018

- Developed open source Python tools for analyzing and plotting magnetic measurements and MCMC sample analysis.

Lawrence Berkeley National Laboratory *Junior Specialist* May 2011 - May 2012

- Developed control software (C++ and Qt) for automated circuit testing. Hardware tested with this system was deployed as part of the Insertable B-Layer system at the Large Hadron Collider in 2014, enabling continued studies of the Higgs boson.

St. Mary's College of California · Moraga, CA *Research Assistant* Sep 2010 - May 2011

- Classified astronomical data from the Arecibo Observatory as part of the ALFALFA Collaboration.

Education

University of California, Davis: M.S. & Ph.D. Physics 2012 - 2018
St Mary's College of California: B.S. Physics, Minor: Mathematics 2007 - 2011

Teaching

Teaching Assistant, **Physics Department, University of California, Davis** 2012 - 2016
Student Tutor and Live-In Mentor, **Dept. of Physics, St Mary's College of California** 2010 - 2011

Laboratory Skills

Fabrication

Sputtering, e-beam evaporation, and e-beam-/photo-lithography and lift-off.

Magnetic Characterization

Vibrating sample magnetometry (VSM), magneto-optic Kerr effect (MOKE), SQUID magnetometry, and magnetoresistance.

Other Techniques

X-ray diffraction (XRD), reciprocal space mapping (RSM), scanning electron microscopy (SEM), polarized neutron reflectometry (PNR), x-ray absorption spectroscopy (XAS) and magnetic circular dichroism (XMCD), and electrical techniques including Hall effect and van der Pauw resistivity methods.

Publications

1. Murray, P. D. et al. Electrically Enhanced Exchange Bias via Solid-State Magneto-ionics. ACS Applied Materials & Interfaces 13 (32), 38916-38922 (2021).
2. Burks, E. C. et al. 3D Nanomagnetism in Low Density Interconnected Nanowire Networks. Nano Letters 21, 716–722. issn: 1530-6984 (2021).
3. Gilbert, D. A. et al. Reconstructing phase-resolved hysteresis loops from first-order reversal curves. Scientific Reports 11, 4018. issn: 2045-2322 (2021).
4. Murray, P. D. et al. Interfacial-Redox-Induced Tuning of Superconductivity in YBa2 Cu3 O7–δ . ACS Applied Materials & Interfaces, 9b18820. issn: 1944-8244 (2020).
5. Karayev, S. et al. Interlayer exchange coupling in Pt/Co/Ru and Pt/Co/Ir superlattices. Physical Review Materials 3, 041401 (2019).
6. Rippy, G. et al. X-ray nanodiffraction studies of ionically controlled nanoscale phase separation in cobaltites. Physical Review Materials 3, 082001. issn: 2475-9953 (2019).
7. Skaugen, A. et al. Analytical computation of the demagnetizing energy of thin film domain walls. Phys. Rev. B 100, 094440 (2019).
8. Gilbert, D. A. et al. Ionic tuning of cobaltites at the nanoscale. Physical Review Materials 2, 104402 (2018).
9. Quintana, A. et al. Voltage-Controlled ON–OFF Ferromagnetism at Room Temperature in a Single Metal Oxide Film. ACS Nano 12, 10291–10300 (2018).
10. De Toro, J. A. et al. Remanence plots as a probe of spin disorder in magnetic nanoparticles. Chemistry of Materials 29, 8258–8268 (2017).
11. Sun, L. et al. Magnetization reversal in kagome artificial spin ice studied by first-order reversal curves. Physical Review B 96, 144409 (2017).
12. Zhang, Q. et al. Magnetic fingerprint of interfacial coupling between CoFe and nanoscale ferroelectric domain walls. Applied Physics Letters 109, 082906 (2016).
13. The ATLAS IBL Collaboration. Prototype ATLAS IBL modules using the FE-I4A front-end readout chip. Journal of Instrumentation 7, P11010–P11010 (2012).

Selected Conferences

- P. D. Murray. Invited colloquium: Tuning Ionic Distributions for Multifunctional Materials. Tampere University, Tampere, Finland (2019).
- P. D. Murray, D. A. Gilbert, A. J. Grutter, B. J. Kirby, D. Hernandez-Maldonado, M. Varela, Z. E. Brubaker, R. V. Chopdekar, V. Taufour, R. Zieve, J. R. Jeffries, E. Arenholz, Y. Takamura, J. Borchers, and K. Liu. Poster: Interfacial-Redox-Induced Tuning of Superconductivity in YBa2 Cu3 O7–δ . International Conference on Magnetism and Magnetic Materials, San Francisco, CA (2018).
- P. D. Murray, Z. Chen, D. A. Gilbert, J. Zang, T. Stückler, K. Lenz, B. B. Maranville J. Fassbender, H. Yu, J. Borchers, and K. Liu. Poster: Topological Hall Effect in Planar Artificial Skyrmion Lattices. Conference on Magnetism and Magnetic Materials, Pittsburgh, PA (2017).
- P. D. Murray, D. A. Gilbert, A. J. Grutter, A. L. Ionin, R. V. Chopdekar, A. T. N'Diaye, B. J. Kirby, B. B. Maranville, Y. Takamura, E. Arenholz, K. Liu, and J. Borchers. Talk: Complete Suppression of Magnetism in Gd/(La,Sr)CoO3 Films via Redox Design of Oxygen

Awards

3rd Place Winner, 2020 John D. Hunter Excellence in Plotting Contest. Entry (video), Source repository