Serena M. Eley

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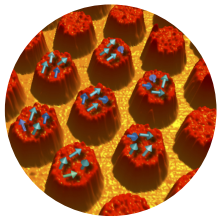

Education

Ph.D., Physics	**University of Illinois Urbana-Champaign**, Urbana, IL
August 2012	Dissertation: Proximity Effects and Vortex Dynamics in Mesoscopic Superconductor-Normal Metal-Superconductor Arrays, John Bardeen Award (for outstanding graduate thesis)
B.S., Physics	**California Institute of Technology**, Pasadena CA
2002	Senior Thesis: Fabrication of MgB_2 Josephson Junctions
Certificate	**International Space University**, Strasbourg, France
2003	Space Studies

Research Appointments

- **Assistant Professor**, Electrical & Computer Engineering, University of Washington (Seattle, WA) 1/2023-pres.
- **Visiting Professor**, Department of Physics, Colorado School of Mines (Golden, CO) 1/2023-pres.
- **Assistant Professor**, Department of Physics, Colorado School of Mines (Golden, CO) 8/2018-1/2023
- **Acting Director of Quantum Engineering Program**, Colorado School of Mines (Golden, CO) 8/2021-11/2021
- **Postdoctoral Researcher**, **Condensed Matter**, Los Alamos National Laboratory (Los Alamos, NM) 2015-2018
- **Technical Staff**, **Department of Quantum Phenomena**, Sandia National Laboratories (Albuquerque, NM) 2012-2015
- **Process & Test Engineer**, Raytheon Infrared Operations (Goleta, CA) 2004
- **Research Assistant**, **Luce Scholars Fellowship**, Superconductivity Research Labs (Tokyo, Japan) 2002-2003

Awards

- Cottrell Scholars Award 2022
- U.S. National Academy of Sciences, 1^{st} U.S.-Africa Frontiers of STEM symposium invited participant (10% acceptance rate) 2022
- Kavli-PARADIM Summer Fellowship 2022
- National Science Foundation (NSF) Career Award 2021
- American Institute for Physics - NSBP Joseph A. Johnson Award for Excellence in Experimental Physics 2021
- John Bardeen Award (University of Illinois, outstanding dissertation) 2012
- 1st Prize for Best Poster Presentation, 7th International Conference on Vortex Matter in Nanostructured Superconductors (Rhodes, Greece) 2011
- Gordon Research Conference Carl Storm Fellowship 2011
- SURGE Fellowship (University of Illinois) 2004-2009
- Verdell Frazier Young Scholarship Recipient (University of Illinois) 2008
- Goddard Award for Best Research Contribution (NASA Academy GSFC) 2005
- International Achievement Summit Delegate (Academy of Achievement) 2004
- Luce Scholar (Henry Luce Foundation) 2002-2003
- Mellon Undergraduate Research Fellow 2000-2002
- Caltech Merit Scholar (4 years, full-tuition); Exxon-Mobil Scholar 1998-2002

Teaching and Mentorship

Courses Taught

University of Washington

- EE280 (Winter), Exploring Devices 2024
- EE201 (Fall), Computer Hardware Skills 2023
- PHGN499 (Spring), Independent Study: Vortices in High-temperature superconductors 2023

Colorado School of Mines

- PHGN215, Analog Electronics 2019-2022
- EENG532, Intro. to Low Temperature & Microwave Measurement for Quantum Applications (co-developed with Prof. Peter Aaen for new Quantum Engineering Master's Program) 2020-2022
- PHGN481/482, Senior Design 2018-pres.
- PHGN 499B, Independent Study: High-temperature superconductivity 2021
- PHGN501, Graduate Seminar 2020

Research Adviser, Colorado School of Mines 2018-pres.

- 24 undergraduate students:
  - **Mines Undergraduate Research Fellows:** Sarah C. Jones (2019), Daniel Alvarez (2020), Josh Moler (2020-21), Paul Slayback (2020-22), Matthew Barbattini (2020-21), Brandon Di Genova (2021-22), Aliyah Matthews (2021-22), Nathan Taylor (2021-22), Connor Hewson (2021-22)
  - **Senior Design/Thesis:** Yu Ying (2018-19), Caleb Hammel (2018-19), Jonathon Kim (2018-19), Bennett Steward (2019-20), Avery Plantz (2019-20), Tara Braden (2019-20), Austin Holmes (2020-21), Alexander Rousch (2020-21), Majid Mohammad (2020-21), Sarah Jones (2020-2021), Haley Cole (2020-21), Mateo Serrano (2021-22), Jonatan Soto Ramos De Oliveira (2021-22), Duncan Fuehne (2021-22), Olivia Jackson (2022-2023), Paul Slayback (2022-2023)
  - **Independent Study:** Roswell Demott (2021-22)
- **4 M.S. students:** Michael Brooks Venuti (2018-2023), Paul Slayback (2022-2023), Shivam Nigam (2022), Farai Mazhandu (2021-2023)
- **1 Ph.D. student:** Elyse McEntee (2021-pres.)

Thesis Committees

- **Ph.D.:** Zhijie Tang (physics), Michael Knight (materials science)
- **M.S.:** Tyjal DeWolf-Moura (physics)

Research Adviser, University of Washington 2023-pres.

- 5 undergraduate students:
  - **Independent Study:** Ben Snitzer (2023-pres.), Alexander Vuu (2024 - pres.), Momoka Sakamoto (2024 - pres.), Anika Paudel (2024- pres.), Ivan Liu (2024- pres.)
- **2 Ph.D. students:** Christopher Matsumura (2023-pres.), Rohin Tangirala (2023-pres.)

Refereed Journal Publications

My students' names are underlined.

1. Rebecca W. Smaha, John S. Mangum, Ian A. Leahy, Julian Calder, Matthew P. Hautzinger, Christopher P. Muzzillo, Craig L. Perkins, Kevin R. Talley, **Serena Eley**, Prashun Gorai, Sage R. Bauers, and Andriy Zakutayev. Structural and Optoelectronic Properties of Thin Film $LaWN_3$. **Physical Review Materials** 7, 084411 (2023). https://doi.org/10.1103/PhysRevMaterials.7.084411

2. Haley Cole, M. B. Venuti, Mun K. Chan, Brian Gorman, Eric D. Bauer, Mun K. Chan, and **Serena Eley**. Plastic vortex creep and dimensional crossovers in the highly anisotropic superconductor $HgBa_2CuO_{4+\delta}$. **Physical Review B** 107, 104509 (2023). https://doi.org/10.1103/PhysRevB.107.104509

3. Mahendra DC, Ding-Fu Shao, Vincent D.-H. Hou, Arturas Vailionis, P. Quarterman, Ali Habiboglu, M. B. Venuti, Fen Xue, Yen-Lin Huang, Chien-Min Lee, Masashi Miura, Brian Kirby, Chong Bi, Xiang Li, Yong Deng, Shy-Jay Lin, Wilman Tsai, **Serena Eley**, Wei-Gang Wang, Julie A. Borchers, Evgeny Y. Tsymbal & Shan X. Wang. Observation of anti-damping spin-orbit torques generated by in-plane and out-of-plane spin polarizations in antiferromagnetic $MnPd_3$. **Nature Materials** 22, 591–598 (2023). https://doi.org/10.1038/s41563-023-01522-3

4. Terence M. Bretz-Sullivan, Rupert M. Lewis, Ana L. Lima-Sharma, Peter A. Sharma, David Lidsky, Christopher Smyth, C. Thomas Harris, Michael Venuti, **Serena Eley**, Tzu-Ming Lu. High kinetic inductance NbTiN superconducting transmission line resonators in the very thin film limit. **Applied Physics Letters** 121, 5 (2022). https://doi.org/10.1063/5.0100961

5. Rachel Sherbondy, Rebecca W. Smaha, Megan Holtz, Kevin R. Talley, Christopher J. Bartelc, Ben Levy-Wendtd, **Serena Eley**, Craig L. Perkins, Andriy Zakutayev, and Geoff Brennecka. High-Throughput Selection and Experimental Realization of Two New Ce-Based Nitride Perovskites: $CeMoN_3$ and $CeWN_3$, **Chemistry of Materials** (2022). https://doi.org/10.1021/acs.chemmater.2c01282

6. Sarah C. Jones, Masashi Miura, Ryuji Yoshida, Takeharu Kato, Leonardo Civale, Roland Willa, and **Serena Eley**. Designing high-performance superconductors with nanoparticle inclusions: comparisons to strong pinning theory. **Applied Physics Letters Materials** 9, 091105 (2021). https://doi.org/10.1063/5.0057479

7. Abigail R. Meyer, P. Craig Taylor, Michael B. Venuti, **Serena Eley**, Vincenzo LaSalvia, William Nemeth, Matthew R. Page, David L. Young, Paul Stradins, and Sumit Agarwal. Atomic structure of light-induced efficiency-degrading defects in boron-doped Czochralski silicon solar cells. **Energy & Environmental Science** 14, 5416-5422 (2021). https://doi.org/10.1039/D1EE01788H.

8. **S. Eley**, A. Glatz, R. Willa. Challenges and Transformative Opportunities in Superconductor Vortex Physics. **Journal of Applied Physics** 130, 050901 (2021). https://doi.org/10.1063/5.0055611. [**Editor's Pick. Featured on the cover**. Highlighted in A. McConnon, Transformative opportunities in superconductor vortex physics, **Journal of Applied Physics** (2021). https://doi.org/10.1063/10.0005714]

9. K. J. Kihlstrom, L. Civale, **S. Eley**, D. Miller, U. Welp, W.-K. Kwok, P. Niraula, A. Kayani, G. Ghigo, F. Laviano, S. Fleshler, M. W. Rupich and M. Leroux, Large enhancement of the in-field critical current density of YBCO coated conductors due to composite pinning landscape, **Superconductor Science & Technology** 34, 015011 (2021). https://doi.org/10.1088/1361-6668/ab9f64

10. **S. Eley**, R. Willa, M. K. Chan, E. D. Bauer, and L. Civale, Vortex phases and glassy dynamics in the highly anisotropic superconductor $HgBa_2CuO_{4+\delta}$, **Scientific Reports** 10, 10239 (2020). https://doi.org/10.1038/s41598-020-65224-5

11. K. R. Sapkota, **S. Eley**, E. Bussmann, C. T. Harris, L. N. Maurer, and T. M. Lu, Creation of nanoscale magnetic fields using nano-magnet arrays, **AIP Advances** 9, 075203 (2019). https://doi.org/10.1063/1.5098768 [Highlighted in C. Patrick, New nanoscale magnetic field method provides step for quantum computing, AIP Advances (2019). https://doi.org/10.1063/1.5116712]

12. L. N. Maurer, J. K. Gamble, L. Tracy, **S. Eley**, and T. M. Lu, Designing Nanomagnet Arrays for Topological Nanowires in Silicon, **Physical Review Applied** 10, 054071 (2018). https://doi.org/10.1103/PhysRevApplied.10.054071

13. **S. Eley**, K. Khilstrom, R. Fotovat, Z.L. Xiao, A. Chen, D. Chen, L. Civale, Glassy Dynamics in a heavy ion irradiated $NbSe_2$ crystal. **Scientific Reports** 8, 13162 (2018). https://doi.org/10.1038/s41598-018-31203-0

14. **S. Eley**, R. Willa, M. Miura, M. Sato, M. D. Henry, L. Civale, Accelerated vortex dynamics across the magnetic 3D-to-2D crossover in disordered superconductors. **npJ Quantum Materials** 3, 37 (2018). https://doi.org/10.1038/s41535-018-0108-1

15. P. Dioguardi, P. Guzman, P. F. S. Rosa, N. J. Ghimire, **S. Eley**, S. E. Brown, J. D. Thompson, E. D. Bauer, F. Ronning. Nuclear magnetic resonance investigation of the heavy fermion system $Ce_2CoAl_7Ge_4$. **Physical Review B** 96, 24 (2017). https://doi.org/10.1103/PhysRevB.96.245132

16. **S. Eley**, M. Miura, B. Maiorov, L. Civale. Universal lower limit on vortex creep in superconductors. **Nature Materials** 16, 409–413 (2017). https://doi.org/10.1038/nmat4840 [Highlighted in Fitzgerald, R.J., Physics Today, 2017. https://doi.org/10.1063/PT.5.7347]

17. **S. Eley**, M. Leroux, M.W. Rupich, D.J. Miller, H. Sheng, P.M. Niraula, A. Kayani, U. Welp, W.-K. Kwok, L. Civale Decoupling and tuning competing effects of different types of defects on flux creep in irradiated $YBa_2Cu_3O_{7-\delta}$ coated conductors. **Superconductor Science & Technology** 30, 015010 (2017). https://doi.org/10.1088/0953-2048/30/1/015010

18. K. Huang, **S. Eley**, P.F.S Rosa, L. Civale, E.D. Bauer, R.E Baumbach, M.B. Maple, M. Janoschek. Quantum Critical Scaling in the Disordered Itinerant Ferromagnet $UCo_{1-x}Fe_xGe$. **Physical Review Letters** 117, 237202 (2016). https://doi.org/10.1103/PhysRevLett.117.237202

19. M. Durkin, I. Mondragon-Shem, **S. Eley**, T. L. Hughes, N. Mason. History-dependent dissipative vortex dynamics in superconducting arrays. **Physical Review B** 94, 024510 (2016). https://doi.org/10.1103/PhysRevB.94.024510

20. M. W. Rupich, S. Sathyamurthy, S. Fleshler, Q. Li, V. Solovyov, T. Ozaki, U. Welp, W.-K. Kwok, M. Leroux, A.E. Koshelev, D.J. Miller, K. Kihlstrom, L. Civale, **S. Eley**, A. Kayani. Engineered Pinning Landscapes for Enhanced 2G Coil Wire. **IEEE Transactions Applied Superconductivity** 26, 3 (2016). https://doi.org/10.1109/TASC.2016.2542270

21. N. J. Ghimire, S. K. Cary, **S. Eley**, N.A. Wakeham, P.F.S. Rosa, T. Albrecht-Schmitt, M. Janoschek, C. M. Brown, L. Civale, J.D. Thompson, F. Ronning, E.D. Bauer Physical properties of the $Ce_2MAl_7Ge_4$ heavy-fermion compounds (M=Co,Ir,Ni,Pd). **Physical Review B** 93, 205141 (2016). https://doi.org/10.1103/PhysRevB.93.205141

22. H. Sheng, J. Wen, L.Wang, D.J. Miller, M. Leroux, U. Welp, W.K. Kwok, M.W. Rupich, P.M. Niraula, A. Kayani, **S. Eley**, L. Civale, Irradiation Induced Defects in $YBa_2Cu_3O_{7-\delta}$ Coated Conductors, **Microscopy and Microanalysis** 22 (2016). https://doi.org/10.1017/S1431927616008308

23. M. Leroux, K.J. Kihlstrom, S. Holleis, M.W. Rupich, S. Sathyamurthy, S. Fleshler, H.P. Sheng, D.J. Miller, **S. Eley**, L. Civale, A. Kayani, P.M. Niraula, U. Welp, W.K. Kwok. Rapid Doubling of the Critical Current of $YBa_2Cu_3O_{7-\delta}$ Coated Conductors for Viable High-Speed Industrial Processing. **Applied Physics Letters** 107, 192601 (2015). https://doi.org/10.1063/1.4935335

24. **S. Eley**, S. Gopalakrishnan, P. M. Goldbart, N. Mason. Dependence of global superconductivity on inter-island coupling in arrays of long SNS junctions. **Journal of Physics: Condensed Matter** 25, 445701 (2013). https://doi.org/10.1088/0953-8984/25/44/445701

25. **S. Eley**, S. Gopalakrishnan, P. M. Goldbart, N. Mason. Approaching zero-temperature metallic states in mesoscopic superconductor – normal – superconductor arrays. **Nature Physics** 8(1), 59–62 (2012). https://doi.org/10.1038/nphys2154 [Highlighted in Annett, J. F., Nature Physics 8, 8–9 (2012). https://doi.org/10.1038/nphys2192]

In Review

1. Abigail Myer, Tarek Abdul Fattah, Craig P. Taylor, Michael Venuti, **Eley, Serena**, Vincenzo LaSalvia, William Nemeth, Matthew Page, David Young, Matthew Halsall, Paul Stradins, Sumit Agarwal. Comparison of Light-Induced Degradation in Boron- and Gallium-doped Czochralski Silicon. *(Submitted)*.

2. M. B. Venuti, Xiyue S. Zhang, Eric J Lang, Sadhvikas J. Addamane, Hanjong Paik, Portia Allen, Peter Sharma, David Muller, Khalid Hattar, Tzu-Ming Lu, **Serena Eley**. Inducing a Tunable Skyrmion-Antiskyrmion System through Ion Beam Modification of FeGe Films. https://arxiv.org/abs/2311.13130. *(Submitted)*.

3. Masashi Miura, **Serena Eley**, Kazumasa Iida, Jumpei Matsumoto, Hidenori Hiramatsu, Yuki Ogimoto, Takumi Suzuki, Tomoki Kobayashi, Toshinori Ozaki, Hodaka Kurokawa, Naoto Sekiya, Ryuji Yoshida, Takeharu Kato, Tatsunori Okada, Hiroyuki Okazaki, Tetsuya Yamaki, Jens Hänisch, Satoshi Awaji, Atsutaka Maeda, Boris Maiorov2 and Hideo Hosono. Quadrupling the depairing current density in the iron-based superconductor $SmFeAsO_{1-x}H_x$. *(Submitted)*.

4. H.S. Ruiza, J. Hänisch, M. Polichettic, A. Galluzzic, L. Gozzelinoe, D. Torselloe, S. Milošević Govedarović, J. Grbović Novaković, O.V. Dobrovolskiy, W. Lang, G. Grimaldi, A. Crisani, P. Badicai, A.M. Ionescui, P. Cayadob, R. Willa, B. Barbiellinim, **S. Eley** and A. Badía–Majós. The concept of critical current in advanced superconductors. *(Submitted)*.

Presentations

Invited

- Vortex Creep in Superconductors. MRM2023/IUMRS-ICA2023 (Materials Research Meeting 2023 / International Union of Materials Research Societies), Kyoto, Japan. December 2023.
- Vortices in Superconductors. Invited by the U.S. National Academy of Sciences, U.S.-Africa Frontiers of Science, Engineering, and Medicine symposium. Nairobi, Kenya. October 2022.
- Vortices in Superconductors. Virtual. CalBridge Program. Virtual. May 2022.
- Resistance is Not Futile: Pinning Down Elusive Vortices in Superconductors, Physics Colloquium. Virtual. University of Oregon. May 2022.
- Resistance is Not Futile: Pinning Down Elusive Vortices in Superconductors, Physics Seminar. Brown University, Providence, RI. March 2022.
- Resistance is Not Futile: Pinning Down Elusive Vortices in Superconductors, Physics Colloquium. University of Colorado Boulder, Boulder, CO. February 2022.
- Resistance is Not Futile: Pinning Down Elusive Vortices in Superconductors, Materials Science Seminar. Virtual. University of Washington. February 2022.
- Resistance is Not Futile: Pinning Down Elusive Vortices in Superconductors, Quantum Seminar Series at Rice University, Houston, TX. January 2022.
- Designing high-performance superconductors with nanoparticle inclusions: comparisons to strong pinning theory, National Society of Black Physicists Conference, Virtual. November 2021.
- Designing high-performance superconductors with nanoparticle inclusions: comparisons to strong pinning theory, 7^{th} International Conference on Superconductivity & Magnetism, Milas-Bodrum, Turkey. October 2021.
- Designing high-performance superconductors with nanoparticle inclusions: comparisons to strong pinning theory, APS Four Corners Meeting, Virtual. October 2021.
- Resistance is Not Futile: Pinning Down Elusive Vortices in Superconductors, Physics Seminar. University of California Los Angeles. March 2021.

- Resistance is Not Futile: Pinning Down Elusive Vortices in Superconductors, Reed College Physics Seminar, Virtual. February 2021.
- Methods for studying and tuning vortex-defect interactions in superconductors, QED-C Materials Defects and Losses in Superconducting Circuits (Google and SRI organized invitation-only workshop), Santa Barbara, CA. January 2020.
- Resistance is Not Futile: Pinning Down Elusive Vortices in Superconductors, Physics Colloquium. University of Colorado - Colorado Springs, Colorado Springs, CO. March 2019.
- Resistance is Not Futile: Pinning Down Elusive Vortices in Superconductors, Seminar. University of Wyoming, Laramie, WY. March 2019.
- Introduction to Superconductivity, High Precision Devices (HPD), Boulder, CO. February 2019.
- Resistance is Not Futile: Pinning Down Elusive Vortices in Superconductors, Physics Colloquium. Colorado State University, Fort Collins, CO. February 2019.
- Resistance is Not Futile: Pinning Down Elusive Vortices in Superconductors, Physics Colloquium. University of Denver, Denver, CO. January 2019.
- Resistance is Not Futile: Pinning Down Elusive Vortices in Superconductors, Seminar. Advanced Instrumentation Group Seminar, Stanford Linear Accelerator Lab (SLAC), Stanford, CA. April 2018.
- Universal Lower Limit for Creep in Superconductors, European Conference on Applied Superconductivity, Geneva, Switzerland. September 2017.
- Resistance is Not Futile: Pinning Down Elusive Vortices in Superconductors, Physics Colloquium. Missouri University of Science & Technology, Rolla, MO. April 2017.
- Universal Lower Limit for Creep in Superconductors, Energy Frontiers Research Center: Center for Emergent Superconductivity Workshop, Stony Brook, NY. November 2016.
- Josephson Effects in Superconductor-Normal-Superconductor Arrays. Physics Seminar Series, Indiana University South Bend. South Bend, IN. April 2012.

Contributed

- Plastic vortex creep and dimensional crossovers in the highly anisotropic superconductor $HgBa_2CuO_{4+x}$, European Applied Superconductivity Conference (EUCAS), Bologna, Italy. October 2023.
- Plastic vortex creep and dimensional crossovers in the highly anisotropic superconductor $HgBa_2CuO_{4+x}$, Applied Superconductivity Conference, Honolulu, Hawaii. October 2022. (poster)
- Accelerated vortex dynamics across the magnetic 3D-to-2D crossover in disordered superconductors, Applied Superconductivity Conference, Seattle, WA. October 2018. (poster)
- Dramatic Increase in Vortex Creep Rate with Decreasing Film Thickness in Disordered Superconductors, 2018 APS March Meeting. Los Angeles, CA.
- Universal Lower Limit for Creep in Superconductors, 2017 APS March Meeting. New Orleans, LA.
- Universal Lower Limit for Creep in Superconductors, Applied Superconductivity Conference, Denver, CO. September 2016. (poster)
- Competition Between Point and Nanoparticle Defects in Irradiated $YBa_2Cu_3O_{7-\delta}$ Coated Conductors, International Conference on Superconductivity and Magnetism, Fethiye, Turkey. April 2016.
- Tuning Vortex Creep in Irradiated $YBa_2Cu_3O_{7-\delta}$ Coated Conductors, 2016 APS March Meeting. Baltimore, MD.
- Vortex Dynamics in YBCO Coated Conductors with Different Pinning Landscapes, American Superconductor, Devens, MA. April 2015.
- Proximity Effect in Mesoscopic Superconductor-Normal-Superconductor Arrays. 2012 APS March Meeting. Boston.
- Proximity Effect in Superconductor-Normal Metal-Superconductor Arrays. Nanohour Interdisciplinary Seminar Series. University of Illinois, Urbana, IL. November 2011.
- Phase Fluctuations and Transitions in Proximity-coupled Superconducting Arrays. Seventh International Conference on Vortex Matter in Nanostructured Superconductors (VORTEX VII). Rhodes, Greece. September 2011. (poster)
- Phase Fluctuations and Transitions in Proximity-coupled Superconducting Arrays. 2011 Gordon Research Conference on Superconductivity. Waterville Valley, NH. June 2011. (poster)
- Proximity Effects and Vortex Dynamics in Nanostructured Superconductors. 2011 APS March Meeting. Dallas, TX.
- Proximity Effect in Nanostructured Superconductors. 2010 APS March Meeting. Portland, OR.
- Proximity Effect in Nanostructured Superconductors. Exotic Insulating States of Matter. Baltimore, MD. January 2010.
- Dissipation in Nanostructured Superconductors. Physics Graduate Student Association Student Colloquium. University of Illinois, Urbana, IL. May 2009.

$ Grants

- MRSEC: UW Molecular Engineering Materials Center — 2023-2029
  National Science Foundation, *Award #* (Co-PI)
- Identifying the Microscopic Origins of Energy Loss Mechanisms in Superconducting Quantum Circuits through Defect Landscape Engineering — 2022-2025
  Research Corporation For Science Advancement (RCSA), *Cottrell Scholars Award* (PI)
- Supporting Minority Serving Institutions in the Creation of a Diverse, Quantum-Ready Workforce — 2021-2022
  National Science Foundation, *Award # 2139007* (Co-PI)
- CAREER: Skyrmion-Vortex Interactions in Ferromagnet-Superconductor Heterostructures — 2021-2026
  National Science Foundation, *Award # 2046925* (PI)
- Superconducting quantum circuits based on epitaxial nitrides — 2020-2022
  DOE NREL Laboratory Directed Research and Development (LDRD) (Co-PI)
- MRI: Acquisition of an Automated, Variable Temperature and Magnetic Field Multi-property Measurement System — 2019-2023
  National Science Foundation, *Award # 1917860* (PI)
- Quantum and Thermal Creep of Skyrmions and Superconducting Vortices — 2019-2023
  National Science Foundation, *Award # 1905909* (PI)
- QLCI-CG: The Open Quantum Frontier Institute — 2020-2021
  National Science Foundation, *Award # 1936835* (Co-PI)
- 2018 Physics Research and Education Gordon Research Conference and Gordon Research Symposium — 2018
  National Science Foundation, *Award # 1744229* (Co-PI)

Internal

- 2023 Northwest Nanotechnology Seed Grant — 2023
  University of Washington, NSF National Nanotechnology Coordinated Infrastructure (NNCI)
- Mulitechnique Thin Film Deposition System for Next Generation Devices — 2021
  Colorado School of Mines Technology Fee, *Award PH-01* (co-PI)
- Microwave Measurement Equipment and Prototype Station to Support Quantum Education at Mines — 2020
  Colorado School of Mines Technology Fee, *Award #13 EE-01* (co-PI)
- Cryostat to Support Quantum Education at Mines — 2020
  Colorado School of Mines Technology Fee, *Award #57 PH-01* (PI)

Outreach

- Volunteer at various STEM events — 2008-pres.
  - Society of Physics Students Haunted Halloween: Demonstrations for the public (2021); Judge at Denver Metro Regional Science and Engineering Fair (2019, 2021); LANL Summer School for Middle School Girls (2017); Expanding your Horizons Conf. for Middle School Girls (2017); FIRST Lego League Regional Robot Design Judge (2008-2010)
- **Co-founder & President**: Building Bridges community service organization — 2000-2002
- **Volunteer**: Union Rescue Mission (Homeless Shelter), Los Angeles, CA — 1998-2002

Inclusion

- **Workshop Organizer**: Supporting MSIs in the Creation of a Diverse, Quantum-Ready Workforce — 2021-2023
- **Research Advisory Board:** IBM-HBCU (Historically Black College & Universities) Quantum Coalition — 2020-pres.
- Mentor for Científico Latino Graduate Student Mentorship Initiative (GSMI) — 2020-2024
  - Provide graduate school application guidance to talented undergraduates from underrepresented groups
- **Facilitator**: Building Authentic MSI-PWI Partnerships Workshop, Irvine, CA — 2018
- **Recruiter**: Advertised NASA summer programs to Minority Serving Institutions — 2005

Professional Activities

International Activities

- **Scientific Programme Committee:** European Applied Superconductivity Conference, Bologna, Italy 2022-2023
- **Invited Speaker & Representative (by the U.S. National Academy of Sciences):** U.S.-Africa Frontiers of Science, Engineering, and Medicine symposium (10% acceptance rate), Nairobi, Kenya 2022
- **Member:** European COST Action CA19108 "High Temperature Superconductivity for Accelerating the Energy Transition" 2022-pres.
- **Session Moderator:** *Vortices and Nanostructured Superconductors* sessions at the International Conference on Superconductivity & Magnetism (ICSM), Bodrum, Turkey 2021

Domestic Conferences and Workshops

- **Organizer:** Supporting MSIs in the Creation of a Diverse, Quantum-Ready Workforce, San Juan, PR 2023
- **Organizer:** Supporting MSIs in the Creation of a Diverse, Quantum-Ready Workforce, Virtual 2021
- **Organizer:** Front Range Advanced Magnetics Symposium (FRAMS), Colorado School of Mines, Golden, CO 2020
- **Co-Organizer:** Open Quantum Frontier Institute Workshop 2020
- **Chair of Gordon Research Seminar and Discussion Leader at Gordon Research Conference on Physics Research & Education :** Bryant University, Smithfield, RI 2017-2018

Committees

- **Journal Reviewer:** Cryogenics, J. Applied Physics, IEEE Trans. Appl. Supercond., Ceram. Int. 2013, 2016-2018
- **Grant Proposal Reviewer:** National Science Foundation (2019-2023), National Science Foundation Reverse Site Visit Proposal Review Panelist (2023), Department of Energy (2020), Oak Ridge Associated Universities (ORAU) (2023)
- **Colorado School of Mines:** Undergraduate Student Re-admissions Committee (2020-2023); Physics Undergraduate Research Council (2019-2023); Shared Instrumentation Facility Board Member (2021-2022); Faculty Policies Review Committee (2021-2022); Physics Graduate Admission Committee (2022); Physics Graduate Research Council (2018-2019); Research Team for Mines National Science Foundation Research Traineeship (NRT): *A Program for Training a Quantum Workforce* (2021-pres.) Nanofab. Committee (2022);
- **University of Washington:** Founder & Organizer, UW ECE Industry Mentors Program (2023 - pres.), ECE Undergraduate Admissions Committee (2023), ECE Undergraduate Scholarship Review Committee (2023);
- **Application Reviewer:** APS Four Corners Harry Lustig Award (2019-pres.); APS Four Corners Student Presentation Judge (2021); NASA Soffen Travel Grant (2005-2011); NASA Academy (2000-2009)

Technical Skills

Thin film-based Nanofabrication

- Class 100 - 10k cleanroom experience
- Electron beam lithography, Photolithography
- Metal deposition (e-beam, thermal, sputtering)
- Dry etching (ion milling, reactive ion etching)
- Wirebonding
- Technician on UHV (10^{-10} torr) deposition system

Microanalysis of materials

- Scanning electron microscopy
- Atomic force microscopy

Low temperature Measurements

- Set-up, operation, and maintenance of pumped He-4 cryostat, He-3 cryostat, wet & dry dilution refrigerators
- Experience with compressed gases & cryogens
- Electrical dc transport & magnetization measurements
- Some experience with microwave measurements

Software

- OriginPro (Labtalk), LABVIEW, Matlab, Adobe Suites, Mathematica, LaTeX

Running

Select Marathon Awards

- Budapest, Hungary 6th female, 3:03 10/2016
- Marine Corps, VA 6th in division 10/2014
- Indianapolis, IN PR 3:02 11/2013
- Green Bay, WI 5th in div. (15th female) 6/2007
- Nagano, Japan 3rd in div. (19th female) 4/2003

Select Ultramarathon Awards

- Grindstone 100 mi 3rd female 9/2023
- Angeles Crest 100 mi 2nd female 8/2017
- Angel Fire 50 mi 1st overall 6/2017
- Bighorn, WY 100 mi 3rd female 6/2015
- Old Goats, CA 50 mi 1st female 3/2014
- Jemez, NM 50 K 1st female 5/2014

Dances with Dirt 50Ks

- Devil's Lake, WI 2nd female 6/2010
- Hell, MI 1st female 9/2010
- Green Swamp, FL 1st female 2/2011
- Gnaw Bone, IN 1st female 5/2011

Long Distance Relays, Captain & Founder, Girls Heart Rockets relay team 2006-pres.

- Team has participated in 25 relays (won 19)