
Current Position (s)

- 08/2018–Present **Research Assistant**, *Colorado School of Mines*, Golden, CO.
- o Modeling and design of parametric tuning elements for superconducting qubits
 - NYU Collaboration
 - Semiconducting physics, RF electromagnetic, and circuit quantization modeling of voltage-tunable, planar capacitive coupling elements
 - Rutgers / Northwestern / SQMS Collaboration
 - Simulation and design of tunable couplers for 3D cavities
- 08/2018–Present **Indeterminate Status Employee**, *LLNL*, Livermore, CA.
- o Multiscale modeling of loss in superconducting circuits
- 10/2020–Present **Research Associate / Guest Researcher**, *NIST / JILA / ECEE*, Boulder, CO.
- o Loss characterization of III-V semiconductors used in tunable capacitor and gatemon qubit device stacks using superconducting 3D cavities
 - o Superconducting planar resonator measurements for materials loss extraction

Education

- 08/2018–XX/2023 **PhD Applied Physics**, *Colorado School of Mines*, Golden, CO.
- 09/2016–12/2016 **Distance Learning Program**, *UC Davis Extension School*, Davis, CA.
- o Courses Completed: Condensed Matter Physics (graduate)
- 09/2011–05/2016 **B.S. Electrical Engineering & Physics**, *Northeastern University*, Boston, MA,
Minor in Mathematics, *magna cum laude*.

Awards and Honors

- 01/2020–Present **Sigma Pi Sigma Inductee**, *Colorado School of Mines*.
- 09/2018–Present **Graduate Fellowships for Science, Technology, Engineering, and Mathematics Diversity**, *Colorado School of Mines*.
- 03/2014–05/2016 **NSF Cybersecurity Scholarship for Service**, *Northeastern University*.
- 2016 **IEEE Eta Kappa Nu Inductee**, *Northeastern University*.

Research Experience

- 06/2016–08/2018 **Computer Scientist**, *LLNL*, Livermore, CA.
- o Experimental Focus: developing drivers for superconducting qubit hardware, performing qubit characterization, and 3D cavity measurements
 - o Theory / Computational Focus: modeling dissipation in superconducting circuits with finite element, integro-differential equations, and circuit quantum electrodynamics approaches
- 07/2015–12/2016 **Materials Science Co-op**, *LLNL*, Livermore, CA.
- Purpose: To simulate theoretical sources of noise in superconducting qubits
- 03/2014–03/2015 **Research Assistant**, *Northeastern University*, Boston, MA.
- Focus: To accelerate the calculation of periodic metamaterial structures using GPUs
- 07/2013–12/2013 **Quantum Information Co-op**, *Raytheon BBN Technologies*, Cambridge, MA.
- Focus: To develop low-latency signal demodulation firmware for superconducting qubit readout
- 06/2012–12/2012 **Research Experience for Undergraduates**, *Northeastern University*, Boston, MA.
- Focus: To develop an efficient adaptive integration routine for parallel architectures.

Publications

Journals

- [1] E. T. Holland, Y. J. Rosen, **N. Materise**, N. Woollett, T. Voisin, Y. M. Wang, S. G. Torres, J. Mireles, G. Carosi, and J. L DuBois. High-kinetic inductance additive manufactured superconducting microwave cavity. *Applied Physics Letters*, 111(20):202602, 2017. DOI: <https://doi.org/10.1063/1.5000241>.
- [2] **N. Materise**, M. Dartiaill, J. Shabani, and E. Kapit. Tunable Capacitor For Supercon-

ducting Qubits Using an InAs/InGaAs Heterostructure, 2022. <https://arxiv.org/abs/2212.04598>, Manuscript submitted to *Quantum Science and Technology*.

- [3] **N. Materise**, S. Jones, B. Isakov, A. Gyenis, B. Jaeck, and C. R. H. McRae. Grain size in Ta thin films with low cryogenic dielectric loss, 2023. Manuscript in preparation.

Conferences

- [1] Y. Ukidave, F. N. Paravecino, L. Yu, C. Kalra, Z. Chen, A. Momeni, **N. Materise**, B. Daley, and D. Kaeli. NUPAR: A Benchmark Suite for Modern Heterogeneous Architectures. In *International Conference on Performance Engineering*, 2015. DOI: <https://doi.org/10.1145/2668930.2688046>.
- [2] **N. Materise**. An Introduction to Superconducting Qubits and Circuit Quantum Electrodynamics. In *Proceedings of the 2nd Workshop on Microwave Cavities and Detectors for Axion Research*, 2017. DOI: https://doi.org/10.1007/978-3-319-92726-8_10.

Technical Reports

- [1] J. L DuBois, G. Carosi, N. Woollett, E. Holland, M. Horsley, D. Qu, **N. Materise**., O. Drury, G. Chapline, and S. Friedrich. Report to Lincoln Labs on TWPAs, 2017. Lawrence Livermore National Laboratory, DOI: <https://doi.org/10.2172/1399728>.

Patents

- [1] E. Kapit, **N. Materise**, and J. Shabani. Tunable capacitor for superconducting qubits, [U.S. Patent Application No. 17/564,789](#), December 2020.
- [2] E. Kapit, S. Chakram, **N. Materise**, and J. Koch. Galvanic Coupling Element for 3D Superconducting Cavities, U.S. Patent Application No. XX/XXX,XXX, February 2023.

Conference & Workshop Talks

- 11/2022 **American Vacuum Society 68th International. Symposium**, Pittsburgh, PA.
- 10/2022 **Superconducting Quantum Materials & Systems Center Meeting**, Batavia, IL.
- 03/2018–03/2023 **American Physics Society March Meeting**.
- 01/2017 **Microwave Axion Dark Matter Experiment Cavity Workshop**, Livermore, CA.
- 08/2015 **Microwave Axion Dark Matter Experiment Cavity Workshop**, Livermore, CA.
- 09/2012 **Massachusetts Green High Performance Computing Center Workshop**.

Professional Activities

- 08/2019 **Applied Physics Letters**, *Invited Reviewer*.
- 12/2022 **Nature Physics**, *Co-Reviewer*.

Mentorship

- 10/2021–Present **Senior Design**, Paul Varosy (*Physics Undergraduate*).
- 05/2022–08/2022 **SPUR/SQMS**, Kyle Thompson & Svetlana Doroshevich, (EE, Physics Undergraduates).
- 07/2019–03/2020 **Senior Design**, Mallory Zabrocky (*Physics Undergraduate*).
- 05/2019–08/2019 **Summer Research**, Erik Benson & Haley Vinton (*Physics / Math Undergraduates*).
- 01/2019–05/2019 **Senior Design**, Ryan Morgenstern (*Physics Undergraduate*).

Outreach & Volunteering

- 02/2022–11/2022 [Inspiring Girls Expeditions: Girls on Rock](#), Boulder, CO.
- 10/2021 **Science Riot Late Night Comedy Talk**, Denver, CO.
- 2021–2023 [National Science Bowl Official](#), Colorado, Illinois Regional Competitions.
- 01/2019 **Science Fair Judge**, Evergreen Country Day Middle School.
- 09/2018 **San Joaquin Valley Expanding Your Horizons**, Pacific University.
- 05/2018 **STEM Day**, Lawrence Livermore National Laboratory.
- 08/2017–05/2018 [Girls Who Code](#), East Ave Middle School.
- 03/2017 **Science Fair Judge**, Alameda County Science and Engineering Fair.

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