

Nick Materise

Current Position

- 01/2024–Present **Physicist, LLNL**, Livermore, CA.
o Design and measurement of novel superconducting quantum devices

Education

- 08/2018–12/2023 **PhD Applied Physics**, *Colorado School of Mines*, Golden, CO.
o Advised by Dr. Eliot Kapit
o Thesis title: *Design of tunable couplers and investigation of materials loss mechanisms in 2D and 3D superconducting systems*
- 09/2011–05/2016 **B.S. Electrical Engineering & Physics**, *Northeastern University*, Boston, MA,
Minor in Mathematics, *magna cum laude*.

Awards and Honors

- 10/2023 **NIST NRC Postdoctoral Fellowship Awardee**, *Colorado School of Mines*.
- 01/2020–12/2023 **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] Sarah Garcia Jones, **Nicholas Materise**, Ka Wun Leung, Joel C. Weber, Brian D. Isakov, Xi Chen, Jiangchang Zheng, András Gyenis, Berthold Jaeck, and Corey Rae H. McRae. Grain size in low loss superconducting Ta thin films on c axis sapphire. *Journal of Applied Physics*, 134(14):144402, 10 2023. DOI: <https://doi.org/10.1063/5.0169391>.
- [3] **N. Materise**, M.C. Dartiailh, W.M. Strickland, J. Shabani, and E. Kapit. Tunable capacitor for superconducting qubits using an InAs/InGaAs heterostructure. *Quantum Science and Technology*, 8(4):045014, 2023. DOI: <https://dx.doi.org/10.1088/2058-9565/aceb18>.

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*, 2018. 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. Not Assigned, February 2023.

Conference & Workshop Talks

- 11/2022–11/2023 **American Vacuum Society International Symposium.**
- 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

- 10/2023 **Physical Review Applied, Co-Reviewer.**
- 12/2022 **Nature Physics, Co-Reviewer.**
- 08/2019 **Applied Physics Letters, Invited Reviewer.**

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.**