

Owen Duke

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EDUCATION

- 2017 - 2021 **YALE UNIVERSITY, New Haven, CT**
BS in Applied Physics. Cumulative GPA of 3.95, graduated summa cum laude. One of two recipients of the Department of Applied Physics Senior Prize for 2021.
- 2012 - 2016 **PHILLIPS EXETER ACADEMY, Exeter, NH**
Four years Highest Honors, Early Cum Laude, cumulative GPA of 3.87.

EMPLOYMENT

- 2021 - Present **Research Engineer at Commonwealth Fusion Systems, Cambridge, MA**
My main responsibility is a series of experiments to understand and minimize the effects of ionizing radiation on optical fibers at cryogenic temperatures. This campaign has extended the survivable radiation dose of the most radiation-resistant fibers available by more than three orders of magnitude, retiring one of the top ten known risks to the SPARC tokamak. I also direct two external research collaborations on radiation effects to optical fibers, maintain our internal fiber laser safety protocols, design and execute other cryogenic and mechanical tests related to fiber optic sensors, and manage the R&D shared lab space.
- 2018 - 2020 **Undergraduate Researcher in the Devoret Group, New Haven, CT**
I built a simulation pipeline and microwave instrumentation for the implementation of an entangling gate between noise-biased superconducting qubits. Other projects include a clamping mechanism to improve the thermalization of sapphire microchips used in the lab's circuitQED experiments, a nanometer-scale superconducting transformer to channel DC magnetic fields into shielded environments, and a microwave cavity attenuator tuned to selectively absorb thermal noise and reduce qubit dephasing.
- 2019, 2020 **Engineering Intern at Commonwealth Fusion Systems, Cambridge, MA**
During my two summers interning at CFS I designed, built, and programmed a material handling machine for superconducting tape, upgraded and standardized the superconductor characterization software used across the project, and designed an upgrade (currently being implemented) to an existing critical surface measurement system which will increase its throughput by an expected 75%.
- 2017 **Engineering Intern at Evans Findings, East Providence, RI**
I designed, built, and programmed an automated packaging and quality control system for use with a transfer press. The machine is able to sample and package ~30,000 parts at a time without human intervention.

SKILLS

A variety of fabrication techniques, including machining (~300 hours experience), carpentry, soldering and simple circuit design from DC to 1 GHz, and TIG and MIG welding in aluminum and steel. Proficient with Python, Solidworks, and Siemens NX, with a working knowledge of C++ and Comsol.

PUBLICATIONS

- [Submitted] Owen Duke, Joseph Desroches, Aliya Greenberg, Erica E. Salazar, J. J. Schuyt, D. A. Moseley, "Reducing Radiation Effects on Fiber Optic Quench Detection Sensors with Optical Annealing," *IEEE Transactions on Applied Superconductivity*
- Xiyong Huang, Mike Davies, Dominic A. Moseley, Erica E. Salazar, Charlie Sanabria, Owen Duke, Bart M. Ludbrook, and Rodney A. Badcock, "Temperature and strain sensitivities of a groove bonded fiber Bragg grating at room and cryogenic temperatures," *Appl. Opt.* 61, 8427-8434 (2022)
- B. M. Ludbrook *et al.*, "Continuous Fiber Bragg Grating Optical Sensors for Superconducting Magnet Quench Detection: The Effects of Attenuation and Position in the Array," in *IEEE Transactions on Applied Superconductivity*, vol. 33, no. 5, pp. 1-5, Aug. 2023, Art no. 4700905, doi: 10.1109/TASC.2023.3244762.
- J. J. Schuyt, O. Duke, D. A. Moseley, B. M. Ludbrook, E. E. Salazar, R. A. Badcock; Gamma irradiation of Ge-doped and radiation-hard silica fibers at cryogenic temperatures: Mitigating the radiation-induced attenuation with 1550 and 970 nm photobleaching. *J. Appl. Phys.* 28 July 2023; 134 (4): 043103. <https://doi.org/10.1063/5.0155057>
- Xiyong Huang, Mike Davies, Dominic A. Moseley, Erica E. Salazar, Charlie Sanabria, Owen Duke, Bart M. Ludbrook, and Rodney A. Badcock, "Temperature and strain sensitivities of a groove bonded fiber Bragg grating at room and cryogenic temperatures," *Appl. Opt.* 61, 8427-8434 (2022)
- Frattini, N., Cortiñas, R., Puri, S., Duke, O., Lei, C., Girvin, S., & Devoret, M. (2021). Toward a topological CNOT between two Kerr-cat qubits: part 2/2. In *APS March Meeting Abstracts* (pp. L33.007).
- Cortiñas, R., Frattini, N., Puri, S., Duke, O., Lei, C., Girvin, S., & Devoret, M. (2021). Toward a topological CNOT between two Kerr-cat qubits: part 1/2. In *APS March Meeting Abstracts* (pp. L33.006).

PATENTS

- [PROVISIONAL]: Mitigation of attenuating effects from ionizing radiation in silica optical fibers by photobleaching. Owen Beals Duke, Erica Elizabeth Salazar, David Paul Meichle. US #WO2023096852A1
- [PROVISIONAL]: Dense Linear Ramp Bragg Grating Pattern for Quench Detection in High Temperature Superconducting Magnets. Owen Duke, Erica Elizabeth Salazar.

PERSONAL PROJECTS

- 2014-2016 **Automated Solar Etching Machine.** Burns pictures into plywood using sunlight.
- 2016-Present **Handmade Musical Instruments** including a violin, a mandocello, a theremin, and a cittern/banjo hybrid.