

Samuel Elkin

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Education

Purdue University | Ph.D. in Electrical Engineering

August 2023 - Ongoing

Focus Area: Fields and Optics

Current GPA: 4.0/4.0

Purdue University | Bachelor of Science in Electrical Engineering

May 2022

Final GPA: 3.96/4.0

Graduated with Highest Distinction

Publications

- **S. T. Elkin**, M. Haider, and T. E. Roth, "Multiphysics numerical method for modeling Josephson traveling-wave parametric amplifiers," pre-print arXiv:2403.15217, 2024.
- T. E. Roth and S. T. Elkin, "Maxwell-Schrodinger modeling of a superconducting qubit coupled to a transmission line network," IEEE Journal on Multiscale and Multiphysics Computational Techniques, vol. 9, pp. 61-74, Jan 2024.
- **S. T. Elkin** and T. E. Roth, "Toward a Fully-Coupled Semiclassical Model of Transmon Control Dynamics: Classical Case," 2022 IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting (AP-S/URSI), 2022, pp. 701-702

Research Experience

Purdue University | Graduate Research Assistant | Computational Quantum

Electromagnetics (CQEM) Lab

August 2023 - Ongoing

- Developed a multiphysics numerical method for modeling Josephson traveling wave parametric amplifiers (JTWPAs) to enable analysis of manufacturing variations
- Implemented sophisticated quantum control algorithms using a semiclassical numerical method to identify novel methods of constructing high-fidelity quantum gates
- Integrated semiclassical simulations with JTWPAs to develop a tool for combined characterization to enable more compact system design

Purdue University | Undergraduate Research Assistant | Computational Quantum

Electromagnetics (CQEM) Lab

August 2021 - May 2022

- Assisted in development of models describing the coupling of a transmon qubit and a transmission line resonator in order to demonstrate the significance of their interaction
- Wrote a custom MATLAB implementation of a time-domain method describing this interaction using one-dimensional finite element method time domain and finite differencing

Purdue University | Member | System-on-Chip

Extension Technologies

January 2021 - May 2022

- Designed a schematic for a 28 GHz 5G class AB power amplifier in 22 nm fully depleted silicon-on-insulator (FD-SOI) process using a stacked-cell architecture
- Leveraged time and frequency domain simulations to characterize circuit performance in terms of output power, power efficiency, and linearity
- Used numerical full-wave simulations to characterize the impacts of interconnect and component parasitics on layout results in order to improve final performance

Presentations

IEEE AP-S/URSI 2022, Denver, CO, "Toward a Fully Coupled Semiclassical Model of Transmon Control Dynamics: Classical Case"

Professional Experience

Indesign, LLC | Electrical Engineer | Indianapolis, IN July 2022 – July 2023

- Architected and created schematics for printed circuit boards in a variety of fields, with a focus on meeting client requirements for functionality, size, and cost
- Tested printed circuit boards for consistent functionality over ranges of inputs, temperature and vibrational conditions, and electrostatic discharge conditions
- Developed GreenPAK designs to consolidate functionality into a single integrated circuit for reduced footprint and cost

Indesign, LLC | Electrical Engineering Intern | Indianapolis, IN June 2021 – August 2021

ThermalTech Engineering | Electrical Engineering Intern |

Cincinnati, OH

June 2020 – August 2020

Skills & Abilities

- Proficient in MATLAB, Python, and with the Finite Element Method
- Proficient in Cadence OrCAD and Cadence Virtuoso
- Proficient using test equipment including Spectrum Analyzers, Oscilloscopes, and high-precision multimeters
- Experience in C, JavaScript, and HTML

Membership

- IEEE Member (March 2020 – Ongoing)
- IEEE HKN Member (March 2020 – Ongoing)
- Purdue Engineering Outreach Member (September 2018 – January 2022)