

# Qi Shutong

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## EDUCATION

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**University of Toronto (UofT)**

**Toronto, Canada**

*Ph.D. Student, Electrical and Computer Engineering*

*Sep. 2020 - Oct. 2025 (Expected)*

Research topic: Physics-Informed Machine Learning for Electromagnetic and Multiphysics Modeling

**Beihang University (BUAA)**

**Beijing, China**

*B.Eng., Electronic and Information Engineering*

*Sep. 2016 - Jun. 2020*

Excellent Graduate

## RESEARCH EXPERIENCE

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**University of Toronto, Department of Electrical and Computer Engineering**

**Toronto, Canada**

*Research Assistant, Advised by Professor [Costas D. Sarris](#)*

*Sep. 2020 - Now*

- Developed a hybrid CNN-LSTM model to predict S-parameters from planar circuit layouts, enabling rapid signal integrity analysis from geometry and material inputs.
- Designed a physics-informed deep curl operator for fast, generalizable electromagnetic solvers, achieving over 100× speedup over FDTD in uncertainty-aware design and modeling tasks.
- Established a hybrid Physics-Informed Neural Network (PINN) with finite-difference time-stepping, enabling unconditionally stable time-domain simulations of wave propagation.
- Pioneered an unsupervised PINN-U-Net framework for coupled electrothermal simulations, supporting layout-aware multiphysics analysis in reliability-critical systems.

**Beihang University, School of Electronic and Information Engineering**

**Beijing, China**

*Research Assistant, Advised by Associate Professor [Qiang Ren](#)*

*Sep. 2018 - Jun. 2020*

- Utilized the Finite-Difference Frequency-Domain (FD-FD) method for generating an electromagnetic scattering database.
- Developed a deep neural network (U-net) to accelerate the simulation of 2-D and 3-D electromagnetic scattering problems using the FD-FD approach.

**Dartmouth College, Department of Computer Science**

**Hanover, USA**

*Research Assistant, Advised by Assistant Professor [Xing-dong Yang](#)*

*Jun. 2019 - Sep. 2019*

- Conducted antenna radiation pattern simulations for optimizing communication performance.

## SKILLS

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- Programming languages: Proficient in **Python** and **MATLAB**. Familiar with **C** and **C++**.
- Technologies & Frameworks: Extensive experience with Python libraries and frameworks, including **PyTorch**, **GPyTorch**, **NumPy**, **pandas**, **Scikit-learn**, and **Keras**. Proficient in using version control with **Git** and job scheduling with **Slurm** on HPC clusters, and working in **Linux-based environments**.
- Strong background in electromagnetic theory and numerical methods, particularly **FDTD** and **FEM**. Hands-on experience with industry-standard simulation tools, including **ANSYS HFSS**, **Lumerical**, **COMSOL Multiphysics**, **CST Studio**, and **FlexCompute Tidy3D**.
- TOEFL: 105

## SELECTED PUBLICATIONS

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- **Shutong Qi** and Costas Sarris, "Fast Modeling of Defect Periodic Structures with a Physics-Informed Deep Operator Network," in submission to *IEEE Antennas and Wireless Propagation Letters*, [TechRxiv](#).
- **Shutong Qi** and Costas Sarris, "Physics-Informed Deep Operator Network for 3-D Time-Domain Electromagnetic Modeling," in *IEEE Transactions on Microwave Theory and Techniques*, doi: 10.1109/TMTT.2024.3521389.
- **Shutong Qi** and Costas Sarris, "Hybrid Physics-Informed Neural Network for the Wave Equation with Unconditionally Stable Time-Stepping," in *IEEE Antennas and Wireless Propagation Letters*, doi: 10.1109/LAWP.2024.3355896.
- **Shutong Qi** and Costas Sarris, "Electromagnetic-Thermal Analysis With FDTD and Physics-Informed Neural Networks," in *IEEE Journal on Multiscale and Multiphysics Computational Techniques*, vol. 8, pp. 49-59, 2023, doi: 10.1109/JMMCT.2023.3236946.
- **Shutong Qi** and Costas Sarris, "Deep Neural Networks for Rapid Simulation of Planar Microwave Circuits Based on their Layouts," in *IEEE Transactions on Microwave Theory and Techniques*, 2022, doi: 10.1109/TMTT.2022.3210229.
- **Shutong Qi**, Yinpeng Wang, Yongzhong Li, Xuan Wu, Qiang Ren and Yi Ren, "2D Electromagnetic Solver Based on Deep Learning Technique," in *IEEE Journal of Multiscale and Multiphysics Computational Techniques*, 2020, 5: 83-88.
- **Shutong Qi** and Costas Sarris, "Coupled Electromagnetic-Thermal Analysis for Temperature-Dependent Materials with Physics-Informed Neural Networks," in *2024 IEEE/MTT-S International Microwave Symposium*, Washington D.C., USA, 2024.
- **Shutong Qi** and Costas Sarris, "Physics-Informed Neural Networks for Multiphysics Simulations: Application to Coupled Electromagnetic-Thermal Modeling," in *2023 IEEE/MTT-S International Microwave Symposium*, San Diego, CA, USA, 2023, pp. 166-169, doi: 10.1109/IMS37964.2023.10188015.
- More co-authored papers can be found on my [Google Scholar](#) profile.

## AWARDS & ACHIEVEMENTS

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| • IEEE Microwave Theory and Technology Society Graduate Fellowship | Feb. 2024 |
| • Excellent Graduate, Beihang University                           | Jun. 2020 |