# Sriram Gopalakrishnan

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## Education

**University of Waterloo** – Master of Science in Physics 2023
**Indian Institute of Technology Madras** – Bachelor of Technology in Engineering Physics (rank: 4/28) 2020

## Skills

**Languages:** Python, C++, MATLAB, LaTeX, Markdown, English, Hindi, Tamil
**Design Tools:** COMSOL RF Module, AWR Microwave Office (Cadence), LTSpice
**Libraries & Frameworks:** Git, C++ STL, NumPy, SciPy, Matplotlib, CUDA, Gmsh
**Beginner Proficiency:** PyTorch, XGBoost, Scikit-Learn, Docker

## Experience

**Independent Learning** – Waterloo, Canada 2024
- Learnt and applied CUDA kernel programming for image processing tasks: git repo
- Upskilled in generative AI with LLMs (by AWS and DeepLearning.AI): verification
- Wrote 20+ blog posts related to machine learning, distributed computing, and databases

**Resident Ph.D. student,** Perimeter Institute for Theoretical Physics – Waterloo, Canada 2021 – 23
- Modeled the spatial energy distribution in quantum systems at thermal equilibrium: git repo, report
- Framed the evolution of local marginals with temperature as an initial value problem
- Simulated the model in Python using the generalized RK4 algorithm for coupled differential equations

**Graduate Teaching Assistant,** University of Waterloo – Waterloo, Canada 2022 – 23
- Led tutorials, led laboratory demonstrations, held office hours, set problems, graded, and proctored for 4 large undergraduate Physics and ECE classes (PHYS111L, ECE106, PHYS175, PHYS359)
- Received positive feedback from both students and professors: lab feedback

**Bachelor's Thesis - Vector 3D FEM for EM scattering,** IIT Madras – Chennai, India 2019 – 20
- Formulated from first-principles, and implemented in C++ a vector-based 3D Finite Element Method for microwave remote sensing: git repo, report, thesis
- Meshed a 3D domain tetrahedrally using Gmsh, parsed the mesh output in C++ to create node and element data structures, developed a novel algorithm for edge creation with linear-time deduplication
- Implemented Mie scattering in C++ and MATLAB as a verification mechanism for FEM performance
- Formulated, implemented, and verified in C++ a dyadic Green's function formalism to propagate FEM near-fields to a far-field limit, a crucial capability in remote sensing software

**Research Intern,** Tata Institute of Fundamental Research – Mumbai, India 2019
- 2021: Publication in Physical Review Applied with Nature coverage [PDF]
- My presentation and report won a best project award out of 7 interns in Condensed Matter Physics
- Optimized the design of a novel ring-resonator architecture for superconducting qubits
- Simulated microwave scattering data for 6 relative angles in the architecture using COMSOL's RF module
- Transferred the above data to AWR microwave office, where I measured inter-qubit coupling strength as a function of qubit frequency by sweeping the nonlinear inductance of each chip, repeated for 6 angles

**Research Intern & NIUS scholar,** Homi Bhabha Centre for Science Education – Mumbai, India 2017 – 20
- 2020: First-authored publication in Superlattices and Microstructures [PDF]
- Modeled and simulated in Python the energy levels of a 2D quantum dot in a magnetic field: git repo
- Found the model agreeing well with experiments on InGaAs-GaAs quantum dots
- Attended the NIUS Physics camp, wrote a short review on quantum many-body theory: report

## Volunteering

**Steering Committee Member,** QIndia – Global 2021-Present
**General Executive,** UWaterloo Table Tennis Club – Waterloo, Canada 2022
**Department Legislator Physics,** IIT Madras – Chennai, India 2019-2020