

# Kamal Sharma, Ph.D.

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## Research Interests

Quantum Many-body theory, Superconducting circuits, Quantum Optics, Condensed matter, Non-equilibrium Physics.

## Employment

2021–current    Postdoctoral Research Associate, Texas Tech University

2020–2021    Postdoctoral Researcher, Georgia Institute of Technology

## Education

2012–2019    Ph.D., Physics, Georgia Institute of Technology, Atlanta, GA

                  M.S., Physics, Georgia Institute of Technology, Atlanta, GA

2005–2009    B.Tech., Civil Engineering, Indian Institute of Technology, Roorkee, India

## Publications

### Dissertation

- Kamal Sharma. *Transport in low-dimensional interacting systems*. PhD thesis, Georgia Institute of Technology, 2019.

### Journals

- [1] Kamal Sharma and N Kumar. *First-passage time: Lattice versus continuum*. *Physical Review E*, 86(3):032104, 2012.
- [2] Sharma, Kamal, and N. Kumar. “*Getting Acquainted with Gears and Wheels-Quantum Mechanically*.”, *Resonance* 18.1 (2013):67-77.

## Research

2021-Present **Postdoctoral Research Associate** with Prof. Wade DeGottardi

*Theory of Superconducting Circuits* - Quantum simulations on Superconducting Circuits (circuit QED) Developing measurement methods to extract quantum information from superconducting circuits simulating complex quantum systems.

*Light and Matter Interactions* – Study of finite one-dimensional many-electron system coupled to light. When excited, a system like this undergoes de-excitation depending on the details of the excited state and emits a cascade of photons. The emitted radiation can reveal rich array of physics reminiscent of the Dicke model. The manuscript is under preparation.

2020-2021 **Postdoctoral Researcher** with Prof. Flavio Fento, Georgia Tech, Atlanta, GA

*Computational non-linear Dynamics* – Used high-performance GPU computing for sensitivity analysis and comparison of selected mathematical models of the human heart. Goal of this FDA-supported research is to develop an in-silico method to study the effects of various drugs-parameters on human cardiac rhythm. **Computational Languages used: WebGL, JavaScript, C++**

2012–2019 **Ph.D. candidate** with adviser Prof. Michael Pustilnik

Thesis Title: *Transport in low-dimensional interacting systems*. Investigated the effects of electron-electron interaction on transport properties of quantum wires. Calculated correction to thermal conductance of a quantum-wire beyond Luttinger liquid model.

2011–2012 **Visiting Student**, Raman Research Institute, Bangalore

*Phase Transition in Liquid Crystals*: Simulated Annealing algorithm (Monte Carlo) in C programming language and Python to study the ground state and phase transitions in liquid crystals.

*First-passage time* in one dimensional quantum lattice. Worked on the First-passage time probability problem for a stochastic system and determined a modification to the traditional boundary conditions needed to find the time of first passage of a particle past a barrier.

## Posters

- [1] Kamal Sharma, Abouzar Kaboudian, Flavio Fenton, and Elizabeth Cherry. *A detailed sensitivity analysis of the human ventricular cell model in one-dimensional and two-dimensional tissue using GPU computing*. 2021.
- [2] Sharma, K., Bolla R., and Khamesra B. “*Gravitational Wave Analysis using Machine Learning.*”, Georgia Regional Astronomy Meet, 2017.

## Contributed Talks

- [1] Sharma Kamal, DeGottardi Wade *Probing Many-Body Correlations in Superconducting Circuits* at the APS March Meeting 2023.

- [2] Sharma Kamal *Violation of wiedemann-franz law in strongly interacting one-dimensional electrons*. 2021.
- [3] Sharma K., Kaboudian A., and Fenton F. (2020), “A Sensitivity Analysis of the OVVR Human Ventricular Model in 1D and 2D Tissue” at *Modelling the Physiological Flows by MOX - Politecnico di Milano*.

## Other Roles and Activities

- **2012-2019:** Graduate Teaching Assistant: Taught labs and recitations for graduate level and undergraduate level Electromagnetism, Mechanics and Quantum Mechanics.
- **2020:** Prepared an Individual Development Plan in a team of 4 students to promote and enforce a fruitful relationship between advisers and their students.
- **2019:** Co-ordinated a Massive Open Online Course (MOOC) with graduate students from the School of Physics as a remote learning undergraduate Physics course in Electromagnetism.
- **2018:** Served as a judge at 13th Annual Undergraduate Research Spring Symposium at Georgia Tech.

## Teaching Assistant

Teaching assistant for the following courses for all semesters from August 2012 to December 2020. Details can be provided on request.

PHYS-6105	Quantum Mechanics I	Georgia Institute of Technology
PHYS-6106-A	Quantum Mechanics II	Georgia Institute of Technology
PHYS-2802	Vibration and Waves	Georgia Institute of Technology
PHYS-2211	Intro Physics I	Georgia Institute of Technology
PHYS-2212	Intro Physics II	Georgia Institute of Technology
PHYS-2212	Traditional Intro EnM Lab	Georgia Institute of Technology