Srilekha Gandhari

Curriculum Vitae

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Google Scholar

My doctoral research focuses on theoretical quantum information, with a strong emphasis on quantum characterization, validation, and verification (QCVV). I'm working on developing robust methods for analyzing and benchmarking quantum systems that challenge current roadblocks like correlated noise, as well as quantum tomography techniques to accurately characterize quantum states and processes. My broader interests include exploring quantum advantage, and scalability of quantum computers.

Education

2019–*present* **PhD** in Physics
University of Maryland, College Park, MD

2015–2019 **B.Tech (Honors)** in Engineering Physics
Indian Institute of Technology Madras, Chennai, India

Research Experience

August 2020-*present* **Graduate Research Assistant**
PI: Michael Gullans, University of Maryland, College Park, MD

Quantum state tomography
- Devised classical shadow techniques for continuous-variable (CV) quantum systems, establishing rigorous precision bounds
- Developed a succinct framework to compare sampling complexity of different measurement bases
- Verified analytical results with extensive numerical simulations

Effects of non-Markovian noise
- Analyzed effects of non-Markovianity on randomized benchmarking
- Examined the case of qubit systems in Bosonic environments, developed an efficient algorithm to study them under non-Markovian noise, and observed non-exponential decay of fidelity with depth
- Working on understanding more general non-Markovian interactions, guided by spin-Boson systems and process tensor formalism, to efficiently characterize noise

May–July 2023 **Applications Intern at Atom Computing, CA**
PI: Jeffrey Epstein
Topic: Quantum noise characterization
- Studied 2-qubit gates on a neutral atom quantum computing platform and developed a noise estimation theory using compressive Gate Set Tomography
- Simulated its efficiency using various metrics and obtained confidence intervals
- Constructed an optimal recovery circuit for a subsystem error-correcting code using elementary gates native to their platform

May–July 2018 **Research Intern at Laboratoire Kastler Brossel, Paris, France**
PI: Nicolas Treps
Topic: Entanglement properties of Gaussian states of light
- Studied photon-subtracted and photon-added Gaussian states of light, useful for continuous-variable quantum computation
- Proved that a class of symplectic transformations can always be found to make a single photon-subtracted/added Gaussian state separable, extended the result to multi-photon added/subtracted states

December '15 – May '17 **IIT Madras Student Satellite Project**
IIT Madras, Chennai
- Part of the payload team for a scintillator for detecting particle bursts in the low earth orbit, worked on finding a suitable way of distinguishing and measuring the energy of protons, electrons and muons using a single detector
- Calibrated the detector with proton beams at Bhabha Atomic Research Centre (BARC), Mumbai, India

Aug '18– April '19 **Undergraduate Project**
PI: Vaibhav Madhok, IIT Madras, India
Used Stochastic/Itô calculus to understand the quantum trajectory description of open quantum systems and simulated the damped Rabi flopping of a two-level atom using Quantum Monte Carlo wavefunction algorithm

May–July 2017 **Summer Research Fellowship, Indian Academy of Science**
PI: Shubhrangshu Dasgupta, IIT Ropar, India
Light propagation through periodic stratified media – proved that the transparency band of such a structure can be completely controlled by tuning the susceptibility of just one of the media.

2023-2025 **Peer Review**
Journals: Quantum, npj Quantum Information
Conferences: TQC, QCTIP

Publications & preprints

- **S. Gandhari**, M. J. Gullans. Quantum non-Markovian noise in randomized benchmarking of spin-boson models. *arXiv:2502.14702*
- K.A. Pawlak, J. M. Epstein, D. Crow, **S. Gandhari**, M. Li, T. C. Bohdanowicz, J. King. Quantum Subspace Correction for Constraints. *arXiv:2310.20191*
- **S. Gandhari**, V. V. Albert, T. Gerrits, J. M. Taylor, M.J. Gullans. Precision Bounds on Continuous-Variable State Tomography using Classical Shadows. *PRX Quantum 5, 010346 (2024)*

Talks

- **S. Gandhari**, M.J. Gullans. Quantum non-Markovian noise effects in randomized benchmarking. Talk at: APS Global Physics Summit. 2025 March 16-21; *Annaheim, CA*
- **S. Gandhari**, M.J. Gullans. Quantum non-Markovian noise effects in randomized benchmarking. Talk at: APS March Meeting. 2024 March 4-8; *Minneapolis, MN*
- **S. Gandhari**, V.V. Albert, J.M. Taylor, M.J. Gullans. Multimode and Experimental Continuous Variable Shadow Tomography. Talk at: APS March Meeting. 2023 March 5-10; *Las Vegas, NV*

- **S. Gandhari**, V.V. Albert, J.M. Taylor, M.J. Gullans. Shadow tomography of continuous-variable quantum systems. Talk at: APS March Meeting. 2022 March 14-18; *Chicago, IL*
- **S. Gandhari**, V.V. Albert, J.M. Taylor, M.J. Gullans. Shadow tomography of continuous-variable quantum systems.
  Posters presented at: 23rd Annual SQuInT Workshop, 2021; 26th QIP Conference, 2023; 27th QIP Conference, 2024; 3rd APQC Conference, 2024; 28th QIP Conference, 2025

Technical Skills

Programming Languages	Python, C, Mathematica, Git
Quantum Computing	SciPy, PyGSTi, QuTiP, CVXPY
Visualization	Matplotlib, Seaborn, Adobe Illustrator, AutoCAD

Fellowships & Awards

- Dean's Fellowship, Department of Physics, University of Maryland 2019
- Summer Research Fellowship, by Indian Academy of Sciences 2017
- Distinction in National Standard Examination in Physics (NSEP) 2015
- Kishore Vaigyanik Protsahan Yojana (KVPY) Fellowship, Government of India 2014

Mentoring & Teaching

- Teaching assistant for introductory physics labs, Mathematical Physics and Classical Dynamics at the University for Maryland, nominated for Best TA award. 2019-2020
- Student mentor guiding freshmen at IIT Madras, 2016-2018
- Class representative for my major at IIT Madras, 2015-2019

Graduate Coursework

Quantum Physics	Quantum mechanics, Quantum information and quantum computation, Quantum error correction and fault tolerance, Quantum technologies, Quantum field theory
General Physics	Classical dynamics, Non-equilibrium statistical mechanics, Condensed matter physics