JYOTIRMAI SINGH

Stanford, California ◇ joesingh@stanford.edu ◇ (510) 589-5898

Education

Stanford University 2019 — Present
Ph.D. Physics
M.S. Physics 2022

University of California, Berkeley 2015 — 2019
B.A. Physics GPA 3.99/4.00
Highest Honors in Physics, Highest Distinction in General Scholarship, 2018 Phi Beta Kappa

Research Experience

Graduate Student Researcher, Stanford University 09/2019 — Present
Advisor: Kent Irwin *Stanford, CA*

- Building experiments to measure quantum backaction noise of DC SQUID sensors in the MHz frequency range.
- Created superconducting resonators with quality factors Q $\sim 10^5 - 10^6$ for axion dark matter searches.
- Developed Squeezed Diffusion Models, a generative modeling approach inspired by quantum squeezing.
- Developing MHz scale high Q superconducting stripline resonators for quantum memory applications in collaboration with Dave Schuster.

Undergraduate Researcher, Lawrence Berkeley National Laboratory 11/2015 — 05/2019
Advisors: Gabriel Orebi Gann *Berkeley, CA*

- Developed Python analysis pipelines to incorporate uncertainties in particle position/energy reconstruction methods for neutrons linked to atmospheric neutrinos at the Sudbury Neutrino Observatory.

Undergraduate Researcher, SuperCDMS Collaboration, UC Berkeley 06/2018 — 05/2019
Advisor: Matt Pyle *Berkeley, CA*

- Implemented C++ algorithms in the G4CMP package to simulate new phonon physics such as anharmonic decay to improve modeling quality of the SuperCDMS Monte Carlo package.

Skills

Programming	Python
Software	SolidWorks, COMSOL, Altium, Git
Experimental Methods	Superconducting Circuits, Cryogenics (Dilution Refrigerator, Liquid Helium), Laboratory Electronics (Oscilloscope, VNA, Lock-In Amplifiers, Waveform Generators), Machining Tools (CNC, Lathe, Bandsaw), Vacuum Equipment, Residual Gas Analyzer, Piezoelectric Positioners

Awards/Honours

Quad Fellowship ($50,000) 2023-24
Student Presentation Award - APS Group on Instrument & Measurement Science 2021
Isidore Pomerantz Scholarship ($1000) - Department of Physics, UC Berkeley 2018

Publications (Google Scholar)

1. **Squeezed Diffusion Models**
   J. Singh, S. Khanna, J. Burgess, NeurIPS 2025 Workshop on Machine Learning and the Physical Sciences
   arXiv:2508.14871 (2025)

2. **Quantum metrology of low frequency electromagnetic modes with frequency upconverters**
   S. E. Kuenstner, E. C. van Assendelft, S. Chaudhuri, H. M. Cho, J. Corbin, S.W. Henderson, F. Kadribasic, D. Li, A. Phipps, N.M. Rapidis, M. Simanovskaia, **J. Singh**, C. Yu, K. D. Irwin, Phys. Rev. Research 7, 013281 (2025)
3. **Noise limits for dc SQUID readout of high-Q resonators below 300 MHz**
   V. Ankel *et al.* J. Appl. Phys. 138, 094505 (2025)
4. **G4CMP: Condensed Matter Physics Simulation Using the Geant4 Toolkit**
   M. H. Kelsey *et al.* Nuclear Inst. and Methods in Physics Research, A 1055, 168473 (2023)
5. **Measurements of DC SQUID Damping Effects on Superconducting Resonant Circuits**
   E.C. van Assendelft *et al.* IEEE Transactions on Applied Superconductivity (2023)
6. **Projected Sensitivity of DMRadio-m^3: A Search for the QCD Axion Below $1\ \mu$eV**
   L. Brouwer *et al.* (DMRadio Collaboration), Phys. Rev. D 106, 103008 (2022)
7. **Proposal for a definitive search for GUT-scale QCD axions**
   L. Brouwer *et al.* (DMRadio Collaboration), Phys. Rev. D 106, 112003 (2022)
8. **Measurement of neutron production in atmospheric neutrino interactions at the Sudbury Neutrino Observatory**
   B. Aharmim *et al.* (SNO Collaboration), Phys. Rev. D 99, 112007 (2019)

Invited Talks & Conference Presentations

1. **Squeezed Diffusion Models** 12/2025
   NeurIPS 2025 Workshop on Machine Learning and the Physical Sciences (poster)
2. **Measurements of dc SQUID Backaction Noise and Correlations in the kHz-MHz Range** 03/2025
   APS Global Physics Summit 2025
3. **From Darkness to Light: The Search for Axion Dark Matter** 10/2024
   University of San Francisco Physics Department Colloquium
4. **LC Resonators in the DM Radio 50L Experiment** 04/2021
   APS April Meeting 2021
5. **Precision Metrology with Radiofrequency Quantum Upconverters** 03/2021
   APS March Meeting 2021

Professional Affiliations

1. **Q-NEXT National Quantum Information Science Research Center** 2021 — Present
2. **Kavli Institute for Particle Astrophysics and Cosmology** 2021 — Present

Teaching

Teaching Assistant, Stanford University Department of Physics 09/2023 — 12/2023
PHYS 45: Thermodynamics and Optics *Stanford, CA*

Teaching Assistant, Stanford University Department of Physics 03/2020 — 06/2020
PHYS 43: Electricity and Magnetism *Stanford, CA*

Tutor, Computer Science Mentors at Berkeley 02/2017 — 05/2017
CS 61B: Data Structures *Berkeley, CA*