SATTWIK DEB MISHRA

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EDUCATION

Sep 2018 – Dec 2023	MS/Ph.D., Electrical Engineering, **Stanford University** (GPA: 3.93/4.0) *Advisor:* Prof. Jelena Vučković
July 2014 – June 2018	B.Tech., Electrical Engineering, **Indian Institute of Technology, Bombay** (GPA: 9.88/10.0) (Ranked **1st** in the department and **3rd** in the institute by GPA)

AWARDS

- **Soheil and Susan Saadat Graduate Fellowship**, Stanford University.
- **Institute Academic Prize (2015, 2017)** for ranking 1st in the Department of Electrical Engineering, Indian Institute of Technology Bombay.
- **Urvesh Medh Memorial Prize (2015, 2016)** and **Aditya Choubey Memorial Prize (2015)** for academic achievement, Indian Institute of Technology Bombay.

PATENTS

- Optimized quantum transduction, Stanford docket number S20-514.

JOURNAL PUBLICATIONS AND PREPRINTS

THEORY/COMPUTATIONAL

[1] Classically computing performance bounds on depolarized quantum circuits.
Sattwik D. Mishra*, Miguel Frías-Pérez*, Rahul Trivedi
arXiv:2306.16360 (in review at *PRX Quantum*) [Code (tensor network simulations)].

[2] Control Design for Inhomogeneous-Broadening Compensation in Single-Photon Transducers.
Sattwik D. Mishra*, Rahul Trivedi*, Amir H. Safavi-Naeini, Jelena Vučković
Phys. Rev. Applied 16, 044025 (2021).

[3] Point-coupling Hamiltonian for frequency-independent linear optical devices.
Rahul Trivedi*, Kevin Fischer*, **Sattwik D. Mishra** and Jelena Vučković
Physical Review A 100, Issue 4, page 043827 (2019).

[4] Steady-state tunable entanglement thermal machine using quantum dots
Anuranan Das, Adil A. Khan, **Sattwik D. Mishra**, Parvinder Solanki, Bitan De, Bhaskaran Muralidharan, Sai Vinjanampathy
Quantum Sci. Technol. 7, 045034 (2022)

EXPERIMENTAL

[1] Two-emitter multimode cavity quantum electrodynamics in thin-film silicon carbide photonics
Daniil M. Lukin*, Melissa A. Guidry*, Joshua Yang, Misagh Ghezellou, **Sattwik D. Mishra**, Hiroshi Abe, Takeshi Ohshima, Jawad Ul-Hassan, Jelena Vučković
Phys. Rev. X 13, 011005 (2023)

[2] Narrow-linewidth tin-vacancy centers in a diamond waveguide.
Alison Rugar*, Shahriar Aghaeimeibodi*, Constantin Dory*, Haiyu Lu, Patrick McQuade, **Sattwik D. Mishra**, Shuo Sun, Zhixun Shen, Nicholas Melosh, Jelena Vučković
ACS Photonics, 7 (9), 2356-2361 (2020).

[3] 4H-silicon-carbide-on-insulator for integrated quantum and nonlinear photonics
Daniil M. Lukin*, Constantin Dory*, Melissa A. Guidry*, Ki Youl Yang, **Sattwik D. Mishra**, Rahul Trivedi, Marina Radulaski, Shuo Sun, Dries Vercruysse, Geun Ho Ahn, Jelena Vučković
Nature Photonics 14, 330 (2020).

TECHNICAL SKILLS

- **Programming languages:** Python, C++, MATLAB, Wolfram Language (Mathematica), Bash.
- **Relevant libraries and tools:** QuTiP, google/JAX, google/TensorNetwork, Lumerical, COMSOL.

TEACHING EXPERIENCE

- Teaching assistant for **Applied Quantum Mechanics II** (Winter 2022) with Prof. David Miller at Stanford University.

RELEVANT COURSES

- Machine Learning
- Artificial Intelligence
- Convex Optimization
- Nanophotonics
- Optical Micro- and Nano-cavities
- Quantum Optics
- Many-body Quantum Dynamics
- Advanced Topics in Quantum Mechanics
- Data Structure and Algorithms
- Computer Networks
- Computational Electromagnetics
- Nonlinear Dynamical Systems

ADDITIONAL RESEARCH EXPERIENCE

[1] Construction and characterization of an optical tweezer for trapping and manipulating cold Yb atoms.
Princeton University, 2017. *Advisor:* Prof. Jeff Thompson.
Supported by **International Student Internship Program, Princeton University.**

[2] Approximate W-state generation in NV centers through magnetic dipolar interaction.
Purdue University, 2016. *Advisor:* Prof. Peter Bermel.
Supported by **S. N. Bose Scholars Program, Indo-U.S. Science and Technology Forum.**

OTHER ACADEMIC ACHIEVEMENTS

- Awarded **AP** grade (**for exceptional performance**) in Digital Communications, Microprocessors, Computer Programming, Differential Equations, Data Analysis and Interpretation, and Economics courses at IIT Bombay.
- **All Indian Rank 131** and **State Rank 1** in Joint Entrance Examination (JEE) Advanced 2014 (out of 126,000 examinees).
- Awarded **Kishore Vaijyanik Protsahan Yojana** (KVPY) scholarship by the Department of Science and Technology, Govt. of India, in 2013. **Ranked 81** out of 1000 awardees nationwide.
- Awarded scholarship by the NCERT, Government of India, through 2010-2012 for securing rank **83** (out of 1000) in the **National Talent Search Examination**.

SELECTED COURSE PROJECTS

- **Learning preconditioners for electromagnetic simulations** Fall 2020
  Machine Learning with Prof. Andrew Ng *Computer Science, Stanford Univ.*

  Implemented data-driven preconditioners, learnt from a library of electromagnetic simulation data of photonic multiplexers, to improve the conditioning of discretized Maxwell's equation and speed up iterative numerical solvers.

- **Floquet Majorana end modes and topological invariants** Spring 2020
  Many-body Quantum Dynamics with Prof. Vedika Khemani *Physics, Stanford Univ.*

  Studied and reviewed topological protection of Majorana end modes, Floquet theory, and the induction of Floquet Majorana end modes by time-periodic driving of the Kitaev chain.

- **Matrix Product States** Fall 2018
  Atoms, Fields and Photons with Prof. Amir Safavi-Naeini *Applied Physics, Stanford Univ.*

  Learnt about tensor network decompositions of quantum states. Implemented matrix product state decomposition and contraction in Python.

- **Zombie Apocalypse Simulator** Spring 2015
  Computer Programming with Prof. Kavi Arya *Computer Science and Engineering, IIT Bombay*

  Developed an environment to simulate the actions of 'humans' trying to survive by gathering food in a 'zombie' infested world. Implemented Ant Colony Optimization in C++ to simulate the food gathering of humans. Designed a GUI in SDL2/C++.
