Vivek Sabarad

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Graduate student

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Indian Institute of Science Education and Research Pune, India

Education

- **University of Vienna** Vienna, Austria
  Doctoral student - Physics, Prof. Walther's group *Starting from September, 2025*
  – Project Title: Photonic Integrated Quantum machine Learning

- **IISER Pune** Pune, Maharashtra
  BS-MS Dual degree - Physics Major 2020 - 2025
  – CGPA 8.2/10
  – MS Thesis GPA 9.3/10, under Prof. T S Mahesh

- **BASE PU College Hubballi** Hubballi, Karnataka
  Higher Secondary School 2018-2020
  – Score: 89.67%

- **Sri Manjunatheshwara Central School** Dharwad, Karnataka
  Secondary School 2018
  – Score: 93.60%

Academic Projects and Activities

- **Quantum Kernel for Entanglement Classification - arXiv** IISER Pune
  MS thesis under Prof. T S Mahesh *August 2024 - Present*
  – Devising a quantum kernel for quantum input data.
  – Numerical simulation of such a kernel and classifying the entangling and non-entangling unitary operators.
  – Experimental implementation of this kernel using a two layered star system in liquid state NMR.

- **Quantum Reservoir Computing using a Solid State NMR System** IISER Pune
  Under Prof. T S Mahesh in collaboration with Prof. M S Santhanam *August 2024 - December 2024*
  – Studied Quantum Kicked Top (QKT) as a quantum reservoir for machine learning tasks such as time series prediction.
  – Implemented quantum reservoir akin to QKT using a solid state NMR system and optimized encoding schemes for the system.
  – Developed methods for encoding quantum inputs for quantum tasks like entanglement classification.

- **Experimental Quantum Kernel in Liquid State NMR** IISER Pune
  MS thesis under Prof. T S Mahesh *March 2024 - August 2024*
  – Understanding NMR techniques for quantum computing.
  – Star systems in liquid state NMR used for computing quantum kernels.
  – Implemented regression and classification algorithms using experimentally computed quantum kernel.

- **Nonperturbative Non-Markovian Dynamics in Open Quantum Systems** IISER Pune
  Semester project Dr. Sachin Jain *May 2023 - July 2023*
  – Investigated the strong-coupling regime for continuous bosonic environments.
  – Computed N-point functions using the Heisenberg picture with image operator formalism.
  – Analyzed equivalence between continuous and discrete bosonic environments, revealing flaws caused by decay in discrete-mode mappings.

- **Causality and Thermodynamic Stability** IISER Pune
  Semester Project Dr. Sachin Jain *March 2023 - May 2023*
  – Characterized the relationship between causality and thermodynamic stability.
  – Verified that stability implies causality.

Conferences and Presentations

- **Foundations of Quantum Mechanics** IISER Kolkata, India
  Conference *December 2024*
  – Attended the talks and presented poster on "Quantum Kernel for Entanglement Classification".

- **Workshop on Quantum Communication and Computing COMSNETS 2025** Bengaluru, India
  Workshop *February 2025*
  – Attended the talks by eminent speakers.

Relevant Coursework

- **Physics**
  Physics Lab IV, Classical mechanics I, Mathematical Methods for Physics II, Condensed Matter Physics I, Quantum Mechanics II, Statistical Mechanics I, Quantum Information and Quantum Computing, Quantum Optics, Quantum Chemistry, Electronics-I with lab

- **Mathematics**
  Introduction to Probability, Calculus II, Data Analysis

- **Data science**
  Introduction to computer programming (Python), Statistical Learning and Data Science, Natural Language Processing, Causal Inference, Fundamentals of AI (NPTEL)

Awards, Achievements & Honours

Best MS Thesis Award in the Department of Physics, IISER Pune 2025

DST INSPIRE Fellowship - SHE . . . . 2020 to 2025
Awarded to top 1% students in the country

CSIR Junior Research Fellowship (JRF) 2024

Physics-GRE: Scored 930/990 2024

TOEFL: Scored 104/120 2024

Gold Medal in National Graduate Physics Examination (NGPE) 2023
Awarded to top 5 students across the nation

Qualified JEE Mains with 99.27 percentile 2020

Obtained AIR 3232 in JEE advanced 2020

Skills and Languages

- Programming and Numerical skills: Python - Qiskit, PyTorch, QuTiP

- Languages: Kannada, Hindi, English (C1), German (A1)

Extra-curricular Activities

- **Volunteer - Disha Club** IISER Pune
  Social Initiatives *Aug 2021 - Feb 2022*
  – Educating marginalized students
  – Encouraging pursuit of higher studies

- **Campus Coordinator - Mimamsa Mains** IISER Pune
  National Science Quiz *Aug 2021 - Feb 2022*
  – Coordinated guests for the event

- **Volunteer - Mimamsa Question Making** IISER Pune
  National Science Quiz *Aug 2021 - Feb 2022*
  – Created concept-testing questions