AAMOD ATRE
In Pursuit | M. Sc. Quantum Science and Technology

About Me

1. **INTERESTED** in understanding the interplay of quantum dynamical processes across various timescales
2. **ENJOY** delving into the theoretical underpinnings of a problem and exploring systems computationally
3. **INTEND** to pursue the development of theoretical and numerical tools in quantum optics and many-body physics

Education History

Post-Graduate GPA 1.5/5.0	Max. 1.0	**Technical University of Munich** M. Sc. Quantum Science and Technology	**Oct 2022 - Present**
Undergraduate GPA 8.65/10.0	**Birla Institute of Technology and Science, Pilani** B.E. Chemical Engg.	Minor : Physics	**Aug 2017 - Aug 2021**
Higher Secondary Percentage : 96.5 %	**FIITJEE Junior College, Kukatpally, Hyderabad** Grades XI & XII	**Apr 2015 - Aug 2017**
Senior Secondary GPA : 10.0/10.0	**Delhi Public School, Nacharam, Hyderabad** Grades IX & X	**Mar 2013 - Mar 2015**

Academic Research

Master's Thesis   **Apr. 2024 - Present**
Prof. Frank Pollmann | Technical University of Munich

Numerically studying measurement-induced entanglement transitions, in random quantum circuits of varying local Hilbert-space dimensions, to understand the transition universality and distill a classical analogue of the transition.

Undergraduate Thesis   **Jan. 2021 - June 2021**
Prof. Jeremy Richardson | ETH Zürich

Gauged the efficacy of a spin-mapping-based semiclassical dynamics technique by a Python-based numerical study of the population and coherence dynamics of exciton relaxation in a 1D polymer chain. Formulated a spin-mapping dynamics algorithm for tight-binding polymer chains which conform to SU(2) symmetry.

Work Experience

Student Assistant | *HiWi*   **May. 2024 - Present**
Quantum Computing and Technologies Dept. | Leibniz Supercomputing Centre (LRZ), Munich

Benchmarking C++ and Python-based quantum simulation programs using the QAOA algorithm to solve the Max-Cut problem. Facilitating the integration of the quantum simulation programs into LRZ's HPC infrastructure.

Student Assistant | *HiWi*   **Apr. 2023 - Sept. 2023**
Prof. Peter Rabl | Walther Meißner Institute, Munich

Compared various numerical integration approaches in stochastic Master equation simulations of a dissipative cascading quantum network, to facilitate simulations of larger system sizes.

Remote Research Assistant   **Oct. 2021 - Oct. 2022**
Dr. Aaron Kelly | Max Planck Institute for the Structure and Dynamics of Matter, Hamburg

Benchmarked a semiclassical mapping-based dynamics method (spin-PLDM) by modelling the interactions between a two-level atomic subsystem and a cavity-modified field.

Remote Research Internship   **July 2021 - Sept. 2021**
Prof. Pengfei Huo | University of Rochester, New York

Numerically compared the performance of standard and spin-based partially linearized density matrix (PLDM) algorithms in calculating linear absorption spectra of a bi-exciton coupled dimer model.

Research Internship   **May 2019 - July 2019**
Prof. Bibek Dash | CSIR Institute of Minerals and Materials Technolgy, India

DFT-based computational designing of triazole-based molecular precursors for selective CO_2 capture. Statistically determined the optimum functional-basis combination to model the CO_2-triazole interactions with DFT. Studied CO_2 interactions with the aromatic building blocks to propose a new triazole moiety design.

Technical Skills			Languages
Programming	**Software**	**Packages**	English (Native/Bilingual)
Python	MATLAB	LAMMPS	German (B1)
C++	Maple	Quantum Espresso	French (Elementary)
Julia/C (Elementary)	Mathematica	Gaussian 09	Marathi	Hindi (Native)

Standardized Tests

GRE General Test : 335/340	Quant : 168/170	Verbal : 167/170	Analytical Writing : 5/6	**Aug. 2021**
TOEFL : 115/120	Reading : 30/30	Listening : 30/30	Speaking : 25/30	Writing : 29/30	**Sept. 2021**

Undergraduate Teaching Experience

Teaching Assistant   **Aug. 2020 - Dec. 2020**
Dr. S. D. Manjare | Process Design Principles - I

Teaching Assistant   **Aug. 2020 - Dec. 2020**
Dr. Radhika Vathsan | Quantum Mechanics - II

Featured Undergraduate Projects

Designing Lithium-based metal organic frameworks for hydrogen production   **Jan. 2020 - June 2021**
Design Project | Dr. Paramita Haldar

Ab initio computational study of graphene-based Li-MOFs, employing density functional theory implementation in Quantum Espresso for electronic structure calculations & reactive molecular dynamics within LAMMPS framework to study hydrogen evolution amongst proposed models.

Study of cavity QED formalism and modern quantum control techniques   **Aug. 2020 - Dec. 2020**
Study Project | Dr. Raghunath Ratabole

Literature survey of modern qubit implementations, entangled state preparation and quantum gate implementations in molecule-coupled cavity systems. Study of field quantization, cavity QED formalism and the applications of Jaynes-Cummings model.

Modelling kinetics of photo-catalytic reactions involved in waste-water treatment   **Aug. 2019 - Dec. 2019**
Study Project | Dr. Sharad Sontakke

Modelled TiO_2-based photocatalytic degradation of phenol and extraction of Cr and Cu ions with MATLAB. Optimizated TiO_2 catalyst concentration and reaction rates for varying contamination levels.

Study of metal-organic frameworks as tools for adsorptive CO_2 capture   **Jan. 2019 - May. 2019**
Study Project | Dr. Richa Singhal

Literature review of thermodynamic and electronic properties of MOFs. Studied the methodologies and developments in the field of CO_2 capture, focusing on MOFs.

Extracurricular Activities

Quantum Computing	· Cleared Quantum Open Source Foundation (QOSF) cohort 4 assesment task	**Sept. 2021**
	· Completed IBM Quantum's Global Summer School	**June 2020, July 2022**
Social Groups	· Member - Offerings Dept. : *PushQuantum*	**Nov. 2023 - Present**
	· Core Member : *Kala - Fine Arts Club*	**Mar. 2018 - May 2020**
Hobbies	· Long distance running, and hiking in the Bavarian Alps.	
	· Avid reader of fiction and non fiction literature	

Last Updated November 16, 2024| Munich, Germany 80939