Sankalp Chudmunge

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GitHub — Website

SUMMARY

Physics graduate from IIT Palakkad with research experience in quantum many-body systems and computational modeling. Worked on numerical simulations exploring Majorana zero modes in extended quantum Ising chains, focusing on topological phase characterization and stability analysis. Possesses a strong foundation in computational methods, numerical linear algebra, and scientific programming,interested in quantum technologies, photonic devices, and the intersection of physics and computation for next-generation quantum materials and information systems.

EDUCATION

Indian Institute of Technology Palakkad Aug 2022 – May 2024
Master of Science in Physics (Computational Physics)

Shivaji University, Kolhapur Jun 2018 – Oct 2021
Bachelor of Science in Physics

PROJECTS

Majorana Zero Edge States with Longer-Range Interactions in a Quantum Ising Chain(link) Jan 2024 – May 2024
Guided by Dr. K. Dhochak.

· Explored the emergence of Majorana zero modes in extended quantum Ising chains using Jordan-Wigner and Bogoliubov-de-Gennes transformations.

· Developed numerical simulations in **Python** to diagonalize the Hamiltonian and plotted phase diagrams for various parameter regimes.

· Identified and characterized critical phase transition points, including regions with one and two Majorana zero modes, using topological invariants such as the winding number.

· Demonstrated the robustness of Majorana zero modes under extended interactions, providing theoretical insights into topological qubit stability for quantum computation.

Exploring Quantum Spin Models: Understanding Phases and Quantum Phase Transitions Aug 2023 – Dec 2023
Guided by Dr. Uma Divakaran.

· Studied 1D quantum spin models and performed analytical calculations for system diagonalization.

· Computed quantities such as magnetization and correlation functions.

SKILLS

- **Soft Skills:** Team Player, Project Management, Presentation Skills, Critical Thinking and Problem-Solving in Theoretical Physics
- **Technical:** Python (FastAPI, SQLModel, NumPy, Pandas, scikit-learn), MATLAB, Fortran, C++, MS Office Suite, Numerical techniques for Hamiltonian diagonalization and data visualization,Algorithm optimization, computational modeling, numerical simulations
- **Languages:** English, Hindi, Marathi

WORK EXPERIENCE

Academic R&D *PhysicsWallah* Oct 2024 – Present
integrated ML-ready datasets for educational research.

Summit Coordinator *IIT Palakkad* Aug 2022
Coordinated industry–academia conclave, engaging leaders in research and innovation.

Accounting Intern *Surya Nutritional Products India Pvt Ltd* May – Jul 2019
Assisted in structured data management, reporting, and record-keeping.

ADDITIONAL PROJECTS

Free Learning Tool – Menttor *Hobby Project*
menttor.vercel.app

- Designed and implemented backend APIs for content recommendation and adaptive learning modules.
- Tech Stack: Python, FastAPI, PostgreSQL, Redis, Docker, Google Cloud, Next.js, TypeScript.

CONFERENCES AND WORKSHOPS

· Attended the workshop on **Emerging Topics in Quantum Technology**, IIT Palakkad (2-4 Nov 2023).

HONORS AND ACHIEVEMENTS

· Qualified **Joint Admission Test for Masters (JAM-2022)** with **AIR 768**.

· State Intra-Tournament Cricket (2012): Represented Sangli District in the Under-14 State Tournament, where the team secured runner-up position.

· Sports Meet (2011-2014): Achieved **1st place in Long Jump** competition consecutively for three years.

INTERESTS

· Tutoring: Provided math and science tutoring to students aged 10-18 during undergraduate studies.

· Computational Physics: numerical simulations of complex physical systems.