

Priyankar Banerjee

Research Interests

Ultracold Atoms, Quantum optics, Light Matter Interaction, Cavity Optomechanics, Open Quantum Systems, Quantum information processing, Circuit QED.

Education

Ongoing **M.Sc. in Physics**, Indian Institute of Technology, Guwahati, India.
CGPA - 8.31/10

2017 - 2020 **B.Sc. (Honours) in Physics**, Vidyasagar College, University of Calcutta, India.
Percentage - 81.38% (Honours Subject)

2015 - 2017 **Indian School Certificate**, St. Jude's High School, Kolkata, India.

2010 **Indian Council for Secondary Education**, International Public School, Kolkata, India.

Theses

Master Thesis

Title Strong Mechanical Squeezing in a quadratically coupled Optomechanical MIM System

Supervisor Prof. Amarendra Kumar Sarma

Description Studying an effective way of achieving robust squeezing in a quadratically coupled optomechanical system by modulating the driving field.

Status Submitted on 27th April 2022. Manuscript in preparation (Preprint to be submitted by the end of July 2022. Thesis available [here](#).)

Research Internships

May 2022 - **Correlating spin squeezing and entanglement in multi-qubit states in a disordered system**,
Ongoing Supervised by Dr. Ujjwal Sen (Harish-Chandra Research Institute, Prayagraj, India), We check how the squeezing and entanglement hold in presence of glassy disorder for arbitrary multi-qubit states. The work involves numerically simulating the one-axis twisting Hamiltonian with or without a transverse-field for different number of spins. .

Nov 2021 - **Implementation of quantum state tomography for multiple spins in a BEC**, Supervised
Mar 2022 by Dr. Tim Byrnes (New York University, Shanghai), Worked on developing an algorithm to reconstruct coherent spin state in a BEC comprising of two spins. Further work would involve generalising the process for N spins in a BEC and studying the effects of decoherence..

May 2021 - **Studying the dynamics of Photon Squeezing using Holstein-Primakoff approach in Two-Photon Dicke Model**, Supervised by Dr. Aranya Bhuti Bhattacharjee (Professor, BITS Pilani, Hyderabad), Studied the behaviour of squeezing time and strength near the unbounded region of the Two-Photon Dicke Model under the Holstein-Primakoff approximation and explored ways to enhance the quadrature squeezing of photons in the large spin limit..

Mar 2021 - **Studying the dynamics of rotating trapped BEC in 2-D by solving the Gross-Pitaevskii equation**, Supervised by Dr. Pankaj Kumar Mishra (Assistant Professor, IIT Guwahati), Did literature review and performed simulations to generate vortex lattices in a rotating BEC in an anisotropic trap for different angular frequencies and non-linearity factors..

Journal Publications

- 2022 Banerjee, Priyanka, Deepti Sharma, Aranya Bhuti Bhattacharjee. "**Enhanced Photon Squeezing in Two-Photon Dicke Model**" In: ArXiv *e-prints*. (Submitted to Phys. Lett. A). arXiv:2203.06720.

Workshops/Schools/Seminars/Courses

- April 2022 **IEEE workshop on Quantum Photonics**, Organized by International Institute of Information Technology, Hyderabad, India.
- March 2022 **Spring School on Open Quantum Systems**, Organized by The Center for Quantum Information and Control (CQuIC), University of New Mexico, U.S.A..
- July 2021 **Short online course on INTRODUCTION TO QUANTUM OPTICS**, Organized by Indian Institute of Science Education and Research (IISER) Tirupati, India..
- July 2021 **International Summer Program (ISP) 2021**, Organized by Osaka University.
- June 2021 **Summer School on Quantum Information and Quantum Technology (QIQT - 2021)**, Organized by Indian Institute of Science Education and Research (IISER) Kolkata, India.
- Dec 2020 **Workshop on Condensed Matter, High Energy, Astrophysics and Cosmology**, Organized jointly by IIT Guwahati-Tokyo Institute of Technology.
- Dec 2020 **C. K. Majumdar Memorial Workshop in Physics**, Organized by S. N. Bose National Centre for Basic Sciences, Kolkata, India.
- July 2018 **Basic Concepts of Quantum Statistics**, One day seminar organised by the University of Calcutta, India. .

Computational Proficiency

Programming Languages

Intermediate C, C++, JAVA, Fortran **Advanced:** Python, Mathematica

Editors and IDEs

Intermediate JupyterLab **Advanced:** \LaTeX , MS Office

Operating Systems

Intermediate Microsoft Windows **Advanced:** Linux

Achievements/Awards

- Ranked 1st out of 75 students in the Department of Physics, Vidyasagar College, University of Calcutta.
- Scored 98.31 percentile in IIT-JAM Physics 2020 and secured an All India Rank 277 among 17000 applicants.
- Third for Poster Presentation on *Remote Sensing, an expert overview* at Vikram Sarabhai Space Exhibition at Bidhan Shishu Udyan, Kolkata.
- Gold Medal for excellent result in Higher Secondary Examination by New Barrackpur Municipality, New Barrackpur, West Bengal.

Relevant Coursework (upto 4th semester)

- Mathematical Physics
- Solid State Physics
- Electrodynamics
- Statistical Mechanics
- Computer programming and numerical methods
- Atomic and Molecular Physics
- Quantum Optics
- Quantum Information and Quantum Computing

Languages

Bengali Native

Mother Tongue

Hindi Fluent
English Fluent

Full Working Proficiency
Full Working Proficiency

References

Dr. Amarendra Kumar Sarma

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Google Scholar

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