Priyankar Banerjee

Indian Institute of Technology Guwahati
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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 27^{th} April 2022. Manuscript in preparation (Preprint to be submitted by the end of July 2022. Thesis available here.)

Research Interships

May 2022 - Ongoing **Correlating spin squeezing and entanglement in multi-qubit states in a disordered system**, *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 - Mar 2022 **Implementation of quantum state tomography for multiple spins in a BEC**, *Supervised 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 - Feb 2022 **Studying the dynamics of Photon Squeezing using Holstein-Primakoff approach in Two-Photon Dicke Model**, *Supervised by Dr. Aranya Bhuti Bhattacherjee (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 - May 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, Priyankar, Deepti Sharma, Aranya Bhuti Bhattacherjee. "**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 1^{st} 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 4^{th} 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	*Full Working Proficiency*
English	Fluent	*Full Working Proficiency*

References

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