

# Priyankar Banerjee

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## Research Interests

Ultracold Atoms, Quantum optics, Light Matter Interaction, Cavity Optomechanics, Open Quantum Systems, Quantum information processing, Quantum many-body physics.

## 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% (Physics)
- 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** Dr. 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<sup>th</sup> April 2022. Manuscript in preparation (Preprint to be submitted by the end of July 2022. Thesis available [here](#).)

## Research Projects

- May 2022 - **Correlating spin squeezing and entanglement in multi-qubit states in a disordered system**,  
Ongoing *Supervised by Dr. Ujjwal Sen (Professor H, Harish-Chandra Research Institute, Prayagraj, India),* We check how the relation between the squeezing and pairwise entanglement in arbitrary symmetric states hold in presence of glassy disorder in the system. The work involves analytically and 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 by*  
Mar 2022 *Dr. Tim Byrnes (Associate Professor, New York University, Shanghai),* Worked on developing an algorithm to reconstruct coherent spin state in a BEC comprising of two spins..
- 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),* Reviewed papers 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:**  $\text{\LaTeX}$ , MS Office

### Operating Systems

**Intermediate** Microsoft Windows **Advanced:** Linux

## Achievements/Awards

- Ranked 1<sup>st</sup> 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

- 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  
Hindi Fluent

Mother Tongue  
Full Working Proficiency

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## References

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