Bhaskar De

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Education

Ph.D. in Physics *Expected July 2026*
Indian Institute of Science Education and Research, Bhopal
Advisor: Dr. Rohan Singh.
Topic: Two-dimensional coherent spectroscopy and exciton dynamics.

M.Sc. in Physics *2020*
Indian Institute of Technology Madras. GPA: 8.47/10.

B.Sc. (Hons.) in Physics *2018*
Ramakrishna Mission Residential College, University of Calcutta.

Research Interests

- Frequency comb spectroscopy for high-resolution metrology and rapid spectral mapping.
- Probing material properties using temporally and spatially structured ultrafast pulses.
- Multidimensional coherent spectroscopy for investigating excitonic dynamics.

Publications

- **Bhaskar De**, Pradeep Kumar, Krishna. K. Maurya, Rishabh Tripathi, and Rohan Singh. *Quantitative Lineshape Analysis for Arbitrary Inhomogeneity in Two-Dimensional Coherent Spectroscopy.* *Optics Letters*, **50**, 4502 (2025).
- Rishabh Tripathi, Krishna. K. Maurya, Pradeep Kumar, **Bhaskar De**, and Rohan Singh. *Coherent nonlinear optical response for high-intensity excitation.* *The Journal of Chemical Physics*, **162**, 114111 (2025).
- Pradeep Kumar[†], **Bhaskar De**[†], Rishabh Tripathi, and Rohan Singh. *Exciton–exciton interactions: A quantitative comparison between complementary phenomenological models.* *Physical Review B*, **109**, 155423 (2024) ([†]Equal contribution).

Ongoing Research

- Developing neural-network for lineshape analysis for non-exponential decay dynamics in two-dimensional coherent spectroscopy.
- Integration of orbital angular momentum (OAM) modes in multidimensional spectroscopy experiments for novel light–matter interaction studies.

Technical Skills

Experimental: Established collinear 2D coherent spectroscopy setup, pulse shaping using SLM/gratings, structured-light generation (OAM), pulse characterization (FROG, autocorrelation), photoluminescence/absorption, bright-field microscopy.

Computational & ML: Python, MATLAB, Mathematica, LabVIEW, Blender. Machine Learning: Machine Learning Specialization, Deep Learning Specialization (Andrew Ng)

Awards and Fellowships

- **APS-DLS Travel Award**, 2025 – Awarded by the Divison of Laser Science (APS) to support participation in CLEO 2025.
- **ANRF International Travel Grant**, 2025 – Awarded by Anusandhan National Research Foundation to support participation in CLEO 2025.
- **Prime Minister's Research Fellowship (PMRF)**, 2021–2025 – Prestigious Indian doctoral fellowship for outstanding research potential awarded by the Ministry of Education, Government of India.
- **PMRF Annual Review Commendation**, 2022 – Recognition for exceptional research progress during PMRF tenure by IIT Madras.
- **CSIR Junior Research Fellowship (JRF)**, 2020–2021 – National research fellowship in physical sciences.
- **INSPIRE Scholarship for Higher Education (SHE)**, 2015–2020 – DST scholarship for top 1% in WBCHSE.

Selected Conference Presentations

Oral Presentations

- **APS Global Physics Summit**, *Anaheim, USA, 2025* "*Simulating Two-Dimensional Coherent Spectroscopy with Arbitrary Inhomogeneity Beyond Gaussian Distributions*" – Contributed Talk

Poster Presentations

- **CLEO**, *Long Beach, USA, 2025* "*Two-Dimensional Coherent Spectroscopy with Arbitrary Inhomogeneous Broadening: Simulations and Analysis*"
- **CLEO Pacific Rim**, *Incheon, South Korea, 2024* "*Two-Dimensional Coherent Spectroscopy Simulations with Arbitrary Inhomogeneous Distribution*"
- **PMRF Symposium**, *IIT Madras, 2023* – Highlighted Poster "*Method of Including Random Inhomogeneity in Simulated 2D Spectra*"

Teaching & Mentorship

Mentored four M.S. students on projects in ultrafast spectroscopy and simulations. Teaching assistant for undergraduate labs and theory courses at IISER Bhopal; online TA for NPTEL physics courses.

References

Available upon request.