Indranil Ghosh

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ACADEMIC QUALIFICATIONS

THE UNIVERSITY OF CHICAGO,
PhD candidate Nov 2021 - Present
Physical Chemistry with a focus on nonlinear optical spectroscopy to study the mechanisms of reception of light energy by chemical systems and its efficient transfer.

HARRIS SCHOOL OF PUBLIC POLICY,
Diploma - The University of Chicago September 2022 - Winter 2024
Energy and Environmental Policy

THE UNIVERSITY OF CHICAGO,
Master of Science Sep 2020 - July 2021
Physical Chemistry

NATIONAL INSTITUTE OF SCIENCE, EDUCATION AND RESEARCH,
Bachelor of Science; Master of Science Aug 2015 - May 2020
Chemistry Major. GPA **9.29** on a scale of 10 (10 semesters). *Summa cum laude*.

RESEARCH

DOCTORAL THESIS Sep 2020 - Present
Supervisor: Prof. Gregory S. Engel, Multidimensional Ultrafast Spectroscopy

MASTERS THESIS Aug 2018 - May 2020
Supervisor: Prof. Arindam Ghosh, NMR Methodology Group, NISER, India
Developing methodologies in multidimensional NMR experiments: Developed a computer algorithm to suppress diagonal peaks in a COSY spectrum - the oldest multidimensional spectroscopy technique.

SUMMER PROJECT May 2019 - July 2019
Supervisor: Prof. Chad Rienstra, University of Illinois at Urbana-Champaign, Illinois, USA
Biomolecular Solid-State NMR: Investigating structure and dynamics of a celebrated antifungal Amphotericin-B and it's interactions with cholesterol and ergosterol to determine its mechanism of action in a cell.

SUMMER PROJECT May 2018 - July 2018
Supervisor: Prof. Tapan K. Ghanty, Bhabha Atomic Research Centre, India
Theoretical prediction of noble-gas molecules and clusters using quantum chemical techniques: Computational calculations undertaken to predict the existence of rare gas inserted chemical species, motivated from similar species found in interstellar space.

SUMMER PROJECT May 2017 - July 2017
Supervisor: Prof. Sourav Pal, Indian Institute of Technology, Bombay, India
Electronic Structure Theory: Studied Hartree-Fock theory, Configuration Interaction, Many Body Perturbation theory, Density Functional theory and Coupled Cluster theory.

SUMMER PROJECT May 2016 - July 2016
Supervisor: Prof. Ashis K. Bhattacharya, National Chemical Laboratory, Pune, India
Protection and Deprotection of Amino Acids: Synthesized protected amino acids and performed subsequent steps for the total synthesis of biologically active molecules.

SCIENTIFIC PUBLICATIONS

†= contributed equally; * = corresponding author

6. **I. Ghosh**, Q. Shen, P. E. Wu, and G. S. Engel*; "Vibronic Conical Intersection Trajectory Signatures in Wave Packet Coherences". *Journal of Physical Chemistry Letters* **2024**, *15*, 2024.
5. S. Sohoni†, **I. Ghosh**†, G. T. Nash, C. A. Jones, L. T. Lloyd, B. C. Li, K. L. Ji, Z. Wang, W. Lin, and G. S. Engel*; "Optically Accessible Long-Lived Electronic Biexcitons at Room Temperature in Strongly Coupled H-aggregates". *Nature Communications* **2024**, *15* (1), 8280.
4. I. Avdic, L. M. Sager-Smith, **I. Ghosh**, O. C. Wedig, J. S. Higgins, G. S. Engel, and D. A. Mazziotti*; "Quantum sensing using multi-qubit quantum systems and the Pauli polytope". *Physical Review Research* **2023**, *5* (4), 043097.
3. S. Sohoni, L. T. Lloyd, A. Hitchcock, C. MacGregor-Chatwin, A. Iwanicki, **I. Ghosh**, Q. Shen, C. N. Hunter, and G. S. Engel*; "The Phycobilisome's Exciton Transfer Efficiency Relies on an Energetic Funnel Driven by Chromophore-Linker Protein Interactions". *Journal of the American Chemical Society* **2023**, *145* (21), 11659.
2. G. Lin†, G. T. Nash†, T. Luo†, **I. Ghosh**, S. Sohoni, A. J. Christofferson, G. Liu, G. S. Engel, W. Lin*; "Two-Dimensional Nanosonosensitizers Facilitate Energy Transfer to Enhance Sonodynamic Therapy". *Advanced Materials* **2023**, *35* (19), 2212069.
1. **I. Ghosh**, S. Chakraborty, S. Pandey, A. Ghosh*, "Diagonal free processing of conventional phase sensitive COSY using Filter Diagonalization Method", *ChemRxiv* **2022**.

OTHER PUBLICATIONS

†= contributed equally; * = corresponding author

2. **I. Ghosh†***, C. Conzelmann†; "Nuclear Notions: Accounting for Risk Perceptions and Values When Implementing U.S. Nuclear Energy Policies". *Scitech Forefront* **2024**.
1. **I. Ghosh***; "The Future of Nuclear Power in the United States". *Illinois Science Council* **2024**.

SKILLS

- **Physical Sciences, Experimental:** Class 4 pulsed laser systems and Two-Dimensional Electronic Spectroscopy; Atomic Force Microscopy (AFM); Confocal Raman Microscopy; Photoluminescence; UV-Vis-NIR Absorption and Circular Dichroism spectroscopy; Nuclear Magnetic Resonance (NMR) spectroscopy; Electron Spin Resonance (ESR) spectroscopy.
- **Wet Chemistry, Synthesis and Isolation:** Organic reaction setup; column chromatography; distillation; spin-coating and drop-casting for thin-films; plasma etching; bacterial culture growth and isolation.
- **Programming:** MATLAB, Python, Mathematica, C#; Signal processing algorithms; LabVIEW.

CONFERENCES AND WORKSHOPS

- **Gordon Research Conference - Spin Dynamics in Nanostructures, 2025**. Invited to present work on spin coupled exciton dynamics in the Nitrogen Vacancy center.
- **Quantum Frontiers Summer School - Institute for Complex Adaptive Matter, 2025**. Selected to attend a ten day workshop on quantum materials and quantum information.
- **Gordon Research Conference - Electron Donor Acceptor Interactions, 2024**. Presented work on suppression of biexciton annihilation.
- **American Chemistry Society, Fall 2023**. Presented work on conical intersection dynamics. Awarded *best poster*.

ACCOLADES AND ACHIEVEMENTS

- **Quantum Materials Accelnet Science Exchange Award** to attend and present research at the Quantum Frontiers Summer School in France, hosted by the Institute of Complex Adaptive Matter (iCAM), 2025.
- **James Franck Institute Award** to attend and present research at the Gordon Research Conference - Spin Dynamics in Nanostructures, 2025.
- **Olshansky Graduate Student Award** to attend and present research at the Gordon Research Conference - Electron Donor Acceptor Interactions, 2024.
- **Distinguished Leadership and Service Award** for service to the university as part of Graduate Council, The University of Chicago.
- **Freud fellowship** for the academic year 2020-2021 in the department of chemistry, The University of Chicago.
- **Gold Medal for highest CGPA** in School of Chemical Sciences in the 5 year Integrated Masters degree program at NISER.
- **Smt. Jayalaxamma Memorial Medal** for overall outstanding academic and extracurricular performance over five years (2015-2020) at NISER.
- Recipient of the *Indo-US Science and Technology Forum* **S. N. Bose fellowship 2019** for a summer internship in the **University of Illinois at Urbana-Champaign, USA**.
- Recipient of **INSPIRE fellowship** from the Department of Science and Technology (DST), Government of India from August 2015 to May 2020.
- Recipient of **IAS fellowship** from the Indian Academy of Sciences (IAS), Government of India from May to July, 2018.
- Team leader - 3rd place in **MIMAMSA 2017** - national level science competition in India.
- **State rank 16 among ~800,000 students** in the state of West Bengal (12th grade) in 2015, India.
- Cracked School Level (Stage I) National Standard Examination in Chemistry **(NSEC)** 2014 - Chemistry Olympiad.

TEACHING EXPERIENCE

- Undergraduate General Chemistry - Teaching Assistant - Fall 2020, Winter 2021 and Spring 2021 - UChicago Chemistry.
- Undergraduate General Chemistry - Head Teaching Assistant - Fall 2022 - UChicago Chemistry.

ACADEMIC REFEREES

Prof. Gregory S. Engel,
Professor, Department of Chemistry, The University of Chicago
Gordon Center for Integrative Science, 929 E 57th St, Chicago, IL 60637, USA.
Email: *gsengel@uchicago.edu*

Prof. Arindam Ghosh,
Associate Professor, School of Chemical Sciences, NISER
P.O.: Bhimpur-Padanpur, Jatni, Odisha 752050, India.
Email: *aringh@niser.ac.in*

LEADERSHIP AND SERVICE

GRS - ELECTRON DONOR ACCEPTOR INTERACTIONS July 2026

Gordon Research Seminar

Elected Co-Chair for the 2026 Gordon Research Seminar - Electron Donor Acceptor Interactions. Responsibilities include federal and private fundraising, creating the program, inviting speakers and attendees.

PUBLIC SAFETY ADVISORY COUNCIL September 2022 - July 2024

The University of Chicago, IL, USA

Inform and vote on policy to improve campus and community safety. Working under the Office of the Provost. Voting Member.

EDUCATION MENTOR November 2021 - April 2025

Illinois Science and Technology Coalition, IL, USA

Mentoring senior-year high school students with their yearlong AP capstone projects. Mentored 6 seniors across 4 years.

GRADUATE COUNCIL January 2021 - June 2022

The University of Chicago, IL, USA

Graduate student government. Managed ∼$150,000 student conference travel budget as one of the **vice presidents**. Conducted a **campus safety** survey over ∼1400 graduate students - analyzed and reported safety statistics and student opinions to the Department of Safety and Security of the university.

ZAARIYA Sep 2015 - May 2020

National Institute of Science Education and Research, Bhubaneswar, India

Social service club. Served as **Secretary** and **President**. Oversaw two cyclone relief projects by providing food ration and clothing to affected areas. Managed education mentorship of ∼100 teenagers across two villages through 3 years. Fundraised through non-profits and on-campus events to support two teenagers' school expenses and one's college expense - all from difficult backgrounds.

SPICMACAY Oct 2015 - May 2020

Odisha, India

Volunteered for SPICMACAY Odisha chapter. SPICMACAY is a non-profit that focusses on promoting Indian classical music and culture among the youth.