

# Stavya Puri

GRADUATE · PHYSICS · COMPUTER SCIENCE

☎ (+91) 8130-929-036 | ✉ f20200912@pilani.bits-pilani.ac.in | 📄 Stavya Puri | 🎓 Stavya Puri | 06/02/2025

## Education

### Integrated MSc.Physics and B.Eng. Computer Science - CGPA 8.79/10

BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI

Rajasthan, India

Sept. 2020 - July 2025

## Publications and Preprints

### ArXiv preprint

Stavya Puri, Tanoy Kanti Konar, Leela Ganesh Chandra Lakkaraju, and Aditi Sen De. *Floquet driven long-range interactions induce super-extensive scaling in quantum batteries*. 2024. arXiv: 2412.00921 [quant-ph]. URL: <https://arxiv.org/abs/2412.00921>

## Academic Research Experience

### Master's Thesis Project

HARISH CHANDRA RESEARCH INSTITUTE (SUPERVISOR: DR. ADITI SEN DE, CO-SUPERVISOR: DR. J. N. BANDYOPADHYAY)

Praygraj, India  
September 2024 - June 2025

- Surveyed the existing literature of quantum batteries and various many-body spin chain models along-with open quantum systems.
- Reproduced various quantum battery models using Liouville Von-Neumann evolution equation with many-body interactions
- Demonstrated a quantum advantage with long-range interactions in Floquet driven quantum batteries leading to a first author [arxiv preprint](#).
- Invoked Floquet theory for analytical results along-with numerical simulations performed in C++ using Armadillo and QIClib.
- Presented evidence for super-extensive scaling of maximum power with system size and higher power storage in system under consideration.
- Currently, working on the stability of quantum batteries within noisy conditions and methods to enhance the stability.

### Bachelor's Thesis Project

HARISH CHANDRA RESEARCH INSTITUTE (SUPERVISOR: DR. ADITI SEN DE, CO-SUPERVISOR: DR. ASHUTOSH BHATIA)

Praygraj, India  
September 2024 - June 2025

- Examined the literature for classical cryptographic protocols including Diffie-Hellman public key exchange and RSA schemes.
- Studied the fundamental aspects of entropic quantifiers of quantum information such as the Entropic uncertainty principle.
- Performed detailed analysis on seminal protocols in Quantum Key Distribution, especially the Six-state, LM05 and qubit-SDC protocols.
- Gained insight into the the information theoretic aspects of modern (Devetak-Winter rate) and archetypal ( $\epsilon$ -security) definitions of security.
- Invoked these quantum information-based definitions in proving security of different Quantum Key distribution protocols.

### Globalink Research Intern

UNIVERSITY OF WINDSOR, MITACS (SUPERVISOR: DR. CHITRA RANGAN)

Windsor, Canada  
June 2024 - August 2024

- Worked on computationally evolving a dense ensemble of 3-level atom and interacting EM-fields using Lindblad equation and Maxwell's equations based on fourth order Runge Kutta (RK-4) method and pseudospectral time domain (PSTD) method.
- Gained insights into concepts of electromagnetically induced transparency and slow light in the application of quantum memory devices.
- Also performed an environmental scan on the topic quantum sensors based on electron spin resonance, surveying over 400 patents and papers leading to presentation of a poster in the Quantum Day Conference, 2024.

### Semester Project

READING PROJECT

BITS, Pilani  
January 2024 - May 2024

- **Vortex Particles and Beams** (Supervisor: Dr. Rakesh Choubisa):  
Studied the theory of vortex particles and electron vortex beams having an intrinsic orbital angular momentum. Proposed the applications of electron vortex beams in the fields of quantum cryptography and quantum communication given the similarity with optical vortex beams.
- **Quantum Information Scrambling and OTOCs** (Supervisors: Dr. Aritra Banerjee and Dr. J.N. Bandyopadhyay):  
Learned quantum information scrambling in quantum chaotic systems and transverse Ising chains and out-of-time order correlators. Simulated OTOCs in integrable systems (particle in a 1D-box and harmonic oscillators) and non-integrable (quantum billiards).

### Scattering of Radiation by Atomic Systems

SEMESTER PROJECT (SUPERVISOR: DR. AMOL HOLKUNDKAR)

BITS, Pilani  
August 2023 - January 2024

- Analysed various scientific models involved in scattering of radiation (intense laser field) by atomic systems for studying their evolution and Hamiltonians using QPROP (in C++).
- Devised and modified QPROP models to simulate the light-matter interactions and multi-electron phenomena.

## Quantum Biometrics

*BITS, Pilani*

SEMESTER PROJECT (SUPERVISOR: DR. KAMLESH TIWARI)

*August 2023 - January 2024*

- Implemented machine learning(ML) algorithms and image recognition techniques for feature extraction.
- Devised image similarity score algorithm based on quantum algorithms utilizing the platforms such as QISKIT and Tensorflow Quantum.

## Visiting Student Program in Physics (VSP), HRI

*Prayagraj, India*

RESEARCH INTERN (SUPERVISOR: DR. ADITI SEN DE)

*June 2023 - August 2023*

- Covered the fundamentals of quantum information theory including measurement theory, ensemble theory, entanglement theory.
- Reproduced various papers (using C++, Python, Mathematica) and studies involving many-body quantum systems, quantum batteries, quantum algorithms, Haar Measure, state evolution using Liouville Von-Neumann equation and prepared a report([Link](#)).

## Relevant Skills

**Languages** C++, C, Python, Mathematica, R, Latex, Java

**Libraries** Armadillo, QIClib, NumPy, Qiskit, Tensorflow Quantum, CirQ, Matplotlib, Gnuplot

## Workshops and Schools

### Quantum Day Conference

*University of Windsor*

POSTER PRESENTATION

*July 2024*

Studied the theoretical background of quantum sensing (especially NV-Diamond Sensors) and performed an environmental scan on Quantum Sensors based on electron spin resonance by reviewing patents and research papers. I presented a scientific poster on quantum sensors Based On ESR and its application in the first Quantum Day conference at University of Windsor.

### Qiskit Global Summer School 2023

*Virtual*

IBM QUANTUM CHALLENGE

*July 2023 - August 2023*

Implemented behind various quantum algorithms like the variational quantum eigensolvers, quantum teleportation protocols. Earned the Excellence Badge([Link](#)) by solving and implementing the quantum circuits such as violation of bell's inequality, quantum phase estimation, Shor's algorithm and iterative phase estimation on simulators and noisy quantum computers using Qiskit.

### Quantum Science Days 2023

*Virtual*

QWORLD CONFERENCE

*May 2023*

Attended the scientific conference organized by [QWorld](#) to provide opportunities to the quantum community to present and discuss their research results. Also participated in the introductory workshop held by the researchers at Classiq to build and design quantum circuits using their software.

## Relevant Coursework

	Quantum Mechanics-1, Quantum Mechanics-2, Advanced Quantum Mechanics, Atomic and Molecular Physics, Quantum Optics,
<b>Physics</b>	Quantum Architecture and Programing, Statistical Mechanics, Solid State Physics, Computational Physics, Mathematical Methods of Physics, EMT-I, EMT-II, Physics Labs
<b>CompSc. and Math</b>	Mathematics-I, Mathematics-II, Mathematics-III, Data Structures and Algorithms, Machine Learning, Database Systems, Design and Analysis of Algorithms
<b>External Courses</b>	Introduction To QC: Quantum Algorithms and Qiskit (NPTEL:IIT Madras), Quantum Information and Computing (NPTEL:IIT Bombay)

## Achievements

2024	<b>MITACS GRI Scholarship</b> , Selected for a fully funded Summer Research Internship in Canada	<i>India</i>
2023	<b>HRI-VSP Fellow</b> , Part of a prestigious 4-student Theoretical QIC group selected across the country.	<i>India</i>
2020	<b>MCN Scholarship - BITS, Pilani</b> , Secured fee waiver of 80% for 2 consecutive semesters	<i>India</i>
2020	<b>All India Percentile - 98.05% (JEE Mains, 2020)</b> , Secured a score among top 0.42% people in the physics section	<i>India</i>
2020	<b>All India Topper - 100% in Maths</b> , Class 12th CBSE Board Exam	<i>India</i>

# Extracurricular Activity

---

## Quantum Computing Interest Group

*BITS Pilani*

MEMBER

*April 2023 - Present*

- A group lead by Dr. Ashutosh Bhatia, Dr. Ashutosh Vyas and Dr. Sainath Bitragunta.
- Covering and understanding Quantum Computing from the perspective of a Computer Scientist to implement the Quantum Analog of various classical Algorithms

## Physics Association

*BITS Pilani*

MEMBER

*Mar. 2021 - June 2025*

- Part of an active Society passionate about various domains of Physics and organises various events in Technical fests.
- Member of the Quantum Information and Computing Study Group

## Astro Club

*BITS Pilani*

CORE MEMBER

*Oct. 2020 - June 2025*

- Generated INR 50K+ managing organizing Star-gazing events during APOGEE (Technical Fest) & OASIS (Cultural Fest) through a 700+ crowd
- Conducted Quizzes and took part in Group Discussions on Cosmology and Astrophysics.

## Karaoke Club

*BITS Pilani*

JOINT COORDINATOR AND LEAD VOCALIST

*Oct. 2020 - June 2025*

- Organising and managing club events throughout the semester
- Mentoring the Juniors in vocal training
- Composing Music

# References

---

<b>Prof. Aditi Sen De</b>	Professor-H, Harish Chandra Research Institute, <a href="mailto:aditi@hri.res.in">aditi@hri.res.in</a>
<b>Prof. J.N. Bandyopadhyay</b>	Professor, Birla Institute of Tchnology and Science Pilani, <a href="mailto:jayendra@pilani.bits-pilani.ac.in">jayendra@pilani.bits-pilani.ac.in</a>
<b>Prof. Amol Holkundkar</b>	Professor, Birla Institute of Tchnology and Science Pilani, <a href="mailto:amol.holkundkar@pilani.bits-pilani.ac.in">amol.holkundkar@pilani.bits-pilani.ac.in</a>