Abhinandan Bhatia

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PROFILE

- Second-year undergraduate in mathematics with a strong foundation in theoretical and abstract mathematics, and growing interdisciplinary research experience spanning theoretical and computational astrophysics, stellar dynamics, and data-driven modeling.
- Driven by a commitment to rigorous inquiry, meaningful problem-solving, and responsible scientific engagement. Actively building research skills across domains and seeking to contribute to globally collaborative, high-impact science.

LINKS

- Github: https://abhinandan-bhatia.github.io/ Linkedin: Abhinandan Bhatia | LinkedIn

EDUCATION

Aug 2024 — Present

BS Math, Shiv Nadar Institution of Eminence — Delhi-NCR, India

Achieved 9.25 GPA in the first semester.

Achieved *highest possible grade* in all core math courses in the first and second semesters.

- SGPAs: 9.25 (Sem I), 8.67 (Sem II)
- CGPA: 8.90/10
- Awarded **University Dean's List Honor** for *outstanding academic performance* in Monsoon Semester 2024

RESEARCH INTERESTS

Theoretical Mathematics, Theoretical Physics and Computational Astrophysics, Stellar Dynamics, Statistical Modeling, Scientific Inference, Mathematical Structures in Physical Systems.

RESEARCH EXPERIENCE

Jun 2025 — Jul 2025

Research Intern – D.S. Kothari Centre for Research and Innovation in Science Education, Miranda House, University of Delhi — Delhi, India

- *Theoretical and Computational Astrophysics Project on Globular Clusters*

9 June – 18 July 2025

- Conducted a comprehensive research project on the extra-tidal regions of **globular cluster NGC 7078**, supervised by Dr. Richa Kundu, theoretical astrophysicist at Miranda House.
- Performed **astrometric membership analysis** using **Gaia EDR3** proper motion and photometric data.
- Developed a hybrid probabilistic model combining **2D Gaussian Mixture Models** and **Kernel Density Estimation (KDE)** for precise cluster–field separation.
- Applied **Bayesian classification** techniques to assign membership probabilities and model tidal structure.
- Built and interpreted **Color-Magnitude Diagrams (CMDs)**, applied **extinction correction**, and fitted **PARSEC isochrones** to identify cluster sequences.
- Completed a literature survey on **cluster dynamics** and **halo substructure**.
- **Presented a formal research poster** at the project culmination day, communicating methodology and results to peers and faculty.
- **Entrusted with writing the complete project report**, synthesizing the group's findings and articulating the theoretical framework under faculty mentorship.
- **Collaborative paper** preparation is currently in planning.

Jun 2025 — Jun 2025

IIIT-Delhi Undergraduate Summer Program in Mathematics — Delhi, India

Advanced Courework in Theoretical Mathematics

12 June – 28 June 2025

- Selected for this highly competitive national-level summer school (approx. 10% acceptance rate) focused on advanced mathematical training.
- Attended faculty-led modules in **Abstract Algebra, Real Analysis, Geometry**, and **Topology**.

- Participated in intensive problem-solving sessions and attended faculty research talks on topics such as **entropy and information theory, spectral analysis, projective geometry, mathematical logic, random walks**, and **arithmetical functions**.
- Gained significant exposure to formal mathematical abstraction, proof-writing, and theoretical depth beyond the standard undergraduate curriculum.
- Attended a special lecture by eminent number theorist Dr. M. Ram Murty

Sep 2022 — Dec 2022

Independent Projects

Exploratory Math Research – *Decimal Digits of an Exponentiated Integer*

- Investigated the behavior and bounds of the number of decimal digits in numbers of the form *a^p*.
- Developed inequality conditions relating the exponent *p* and digit count *h*, with applications to bounding *p*th power sums over *k*-digit numbers.
- Explored probabilistic methods to estimate values of *a* such that *a^p* yields a desired number of digits.
- Shared findings with Dr. Thomas Britz (Math Prof, UNSW, Australia), editor of *Parabola*, and received appreciative feedback.
- Gained early experience in mathematical reasoning, proof-writing, and expository communication.

ACHEIVEMENTS AND ACTIVITIES

Aug 2024 — Dec 2024

University's Dean's List Awardee

In Feb 2025, I was honored with the Dean's List Award for *Outstanding Academic Performance* in the Monsoon Semester 2024 at Shiv Nadar Institution of Eminence.

May 2024 — Jun 2024

National Level Entrance Tests

Delhi, India

- Achieved **Rank 1 out of 3,461 candidates**, Guru Nanak Dev University's Undergraduate Common Entrance Test.
- Achieved 628/800 CUET Score. For such highly competitive score in the All India CUET Exam, I received **admission offers at premier** Delhi University Colleges for B.S. (Hons.) Mathematics, namely at both Ramjas College and Kirori Mal College, University of Delhi, as well as B.A (Hons) Mathematics at Dr. B.R. Ambedkar University Delhi.

REFERENCES

- Dr Pradip Kumar, Associate Professor, Department of Mathematics, Shiv Nadar Institution of Eminence. pradip.kumar@snu.edu.in
- Dr Amber Habib, Professor, Department of Mathematics, Shiv Nadar Institution of Eminence. amber.habib@snu.edu.in
- Dr Binson Babu, Assistant Professor, Department of Physics, Shiv Nadar Institution of Eminence. binson.babu@snu.edu.in
- Dr. Richa Kundu, Assistant Professor, Department of Physics, Miranda House, University of Delhi. richa.kundu@mirandahouse.ac.in

STATEMENT

Personal Statement for GYSS 2026

My academic path reflects a focused progression toward deep, rigorous research in mathematics and its real-world applications. From a highly selective summer program at IIIT-Delhi to a faculty-mentored astrophysics project on globular cluster dynamics, I have actively pursued opportunities that challenge me intellectually and cultivate my research aptitude. My training in theoretical mathematics and experience in astrophysics research projects has further shaped a central aspiration: to pursue research that is both scientifically rigorous and globally meaningful.

Beyond the classroom and lab, I have engaged with broader questions surrounding education, research culture, and the role of knowledge in society**.** I have contributed letters to *The Indian Express* and *Hindustan Times*, writing on themes such as mental health, social harmony, university academics, and the scientific ecosystem — reflecting my strong interest in the humanistic and institutional dimensions of intellectual life.

The Global Young Scientists Summit offers a rare opportunity to learn from world-leading researchers and collaborate with intellectually curious peers across disciplines. I am eager to contribute actively to this global community — sharing my perspective, learning from diverse insights, and exploring research directions that address shared challenges. With a strong foundation in the mathematical sciences, growing interdisciplinary experience, and a commitment to globally engaged research, I look forward to contributing meaningfully to GYSS 2026 and beyond.

COURSES

Aug 2024 — Jan 2025

Selected Coursework

- *Mathematics*: Linear Algebra, Vector Calculus, Foundations of Mathematics, Multivariable Calculus, Real Analysis, Probability, Abstract Algebra, Differential Geometry of Curves and Surfaces.
- *Physics & Computing*: Theoretical Electrodynamics, Theoretical Mechanics and Relativity, Mathematical Modelling, Introduction to Programming (Python, C)
- *Independent Reading*: Chinn & Steenrod's *Topology*, Herstein's *Abstract Algebra*, Arnold's *Experimental Mathematics*

SKILLS

Fast Learner

Ability to Work Under Pressure

Programming (Python, C)

Communication Skills

Collaborative Research & Teamwork

LANGUAGES

English, Hindi, Punjabi — Highly proficient

OTHER EXTRA CURRICULARS

Feb 2022 — Present

Published, Indian Express, Hindustan Times

Letters to the Editor: I've been published in the National Edition of the Indian Express on topics related to education and as well as in the Punjab Edition of the Hindustan Times.

Indian Express:

- Empathy Needed, published on Feb 22, 2022: On Children's Mental Health in Post Pandemic Schooling
- Towards Plurality, published on March 1, 2022: On the Learned Mind and Social Harmony
- Rule Bound, published on April 25, 2022: On promoting academic flexibility in university policies.

Hindustan Times (Most Recent):

- Anderson's Legacy, published on 18th July 2024: A tribute to the English Cricketer Sir James Anderson on his retirement.
- Dazzling Debut, published on 27th Dec, 2024: On the eye-catching debut of the Australian Cricketer Sam Konstas,
- Champions of Hearts, published on 12th March, 2025: On India's historic Champions Trophy victory.
- India's Opportunity, published on 4th June, 2025: On fostering global research ecosystems in India.

Sep 2022 — Oct 2022

Conducted Interview of Inter-State Migrants — Amritsar, India

I conducted interviews with three local migrant workers, discussing their reasons for migration, the state of education in their villages, and the shared circumstances faced by their families and communities.

Dec 2024 — Dec 2024

Attended 2024 Winter School Delhi School of Economics — Delhi, India

Attended Plenary Sessions of prominent economists: Prof. Rohini Pande and Prof Samuel Kortum (Yale University), Prof. Arvind Panagariya (Columbia University), Prof. Julia Cagé and Prof. Thomas Piketty (Paris School of Economics),

Attended Parallel Sessions on topics under Microeconomics (Merger Waves in Vertically Related Markets), International Economics (Dominance of Dollar), Mathematical Economics (Contest Design), Electoral Dynamics and Finance, Temporary vs Permanent Migration in Indian Economy.

HOBBIES

Classic Songs, Movies of 50s, 60s, 70s, Cricket and Computers.