Abhinove N. Seenivasan

He/Him

E-Mail Website abhinovenagarajans Publications

Profile Summary

I am a third year PhD student in Applied Mathematics working on theoretical physics at the University of Sheffield. I work on the two body problem in general relativity (GR) and on self-force (SF) theory. I have also studied quantum field theory (QFT) methods and effects in gravity.

Notable Achievements

- Best Poster - Maths, Faculty of Science Postgraduate Research Poster Showcase 2025, University of Sheffield
- EPSRC PhD Studentship, 2023 - 2027
- Honorable Mention in the Gravity Research Foundation Essay Competition 2023
- All India Rank 211 out of 17000 test takers in the IIT JAM examination, 2020
- Indian Academy of Sciences Summer Fellowship, 2019, Indian Institute of Science, Bengaluru, India
- Loyola Physics Association Merit Scholarship

Education

PhD Mathematics (Expected) — *University of Sheffield*
Supervisor: Sam Dolan — *2023 - 2027*

MSc. Physics — *Indian Institute of Technology, Guwahati*
Supervisor: Sayan Chakrabarti — *2020 - 2022*

BSc. Physics — *Loyola College, University of Madras*
Chennai, India — *2017 - 2020*

Research Experience

Postgraduate Researcher — *University of Sheffield*
Supervisor: Sam Dolan — *2023 - 2027 (Expected)*

- **Research Area: Fundamental fields and the two-body problem in GR**
- Investigating the role of the Killing Yano two-form in the integrability of a spinning secondary in the two body problem, at linear order in the spin, with potential application in modelling gravitational waves for the Laser Interferometer Space Antenna mission
- Computed the scalar SF in the Schwarzschild star spacetime as an infinite sum, and studied when the SF converges
- Utilized the convergence properties to prove previous results about a vanishing SF, and discovered a new example of a diverging SF. Publication ref: Classical and Quantum Gravity 42 (2025) 18, 185002

Research Intern — *University of Edinburgh*
Supervisor: Suddhasattwa Brahma — *2022 - 2023*

- **Research Area: Gravity mediated entanglement in curved spacetime**
- Evaluated how massive quantum particles "know" about background curvature by studying them in de Sitter and Minkowski spacetimes
- Quantified this effect of gravity by computing measures of quantum entanglement in these two systems. Publication ref: Phys.Lett.B 862 (2025) 139309
- Honorable Mention in the 2023 Gravity Research Foundation Essay Competition: Int.J.Mod.Phys.D 32 (2023) 14, 2342020

Junior Research Fellow — *Indian Institute of Technology, Guwahati*
Supervisor(s): Bihas Ranjan Majhi, Sayan Chakrabarti — *2022 - 2023*

- **Research Area: The fluid-gravity correspondence**

- Constructed a dictionary between gravity and thermodynamics by studying scalar-tensor theories of gravity, where GR behaves as an equilibrium state. Publication ref: Phys.Rev.D 107 (2023) 10, 104027
- Studied hydrodynamics with trace anomalies in curved spacetime and their fluid thermodynamics. Publication ref: JCAP 06 (2024) 069

MSc. Dissertation *Indian Institute of Technology, Guwahati*
Supervisor: Sayan Chakrabarti *2021 - 2022*

- **Thesis Title: Superradiance in Black Hole Spacetimes**
- Researched superradiance in a modified rotating black hole spacetime and compared with results in Kerr spacetime. Computed and compared black hole shadows in both spacetimes.
- Thesis available here and publication ref: Phys.Dark Univ. 39 (2023) 101173

Research Intern *Institute of Mathematical Sciences, Chennai*
Supervisor: Sitabhra Sinha *2021 - 2022*

- **Research Area: Simulating complex systems on graphs**
- Studied synchronisation in the neural network of the Macaque monkey by implementing the Ising model and studying ordering in the connectome

Indian Academy of Science, Summer Research Fellow *Indian Institute of Science, Bengaluru*
Supervisor: Arvind Aiyer *2019 - 2019*

- **Research Area: Markov chains**
- Developed a computer program exploring Markov chains in riffle-shuffles of cards

Skills

Programming Languages: Python and the NumPy stack, Mathematica, Julia, LaTeX, Matlab

Conferences and Workshops

Contributed Talks

- 28th Capra Meeting on Radiation Reaction, July 2025, University of Southampton UK
- Lancaster Meeting on Fundamental Physics and Cosmology, September 2024, Lancaster UK
- Young Theorist's Forum, December 2023, Durham University UK

Attended

- Theoretical Tools for GW Physics, November 2025, ETH Zurich
- Nonlinear Black-Hole Perturbation Theory, September 2025, University of Nottingham, UK
- 2nd Annual Meeting on Amplitudes and Self-Force, September 2025, University of Southampton
- BritGrav2025, April 2025, University of Birmingham
- BritGrav2024, April 2024, Queen Mary University of London

Teaching Experience

Graduate Teaching Associate *University of Sheffield*

- Contributed to the teaching activities of the department as a GTA teaching a variety of courses offered to undergraduates in Maths, Physics, Engineering and Foundation Year students.
- Led and assisted over 200 hours of modules, including Python for Financial Mathematics, Introduction to Astrophysics, Introduction to Python, Mathematics for Engineering, Statistics for Bioengineers.

Undergraduate Research Internship Supervisor *University of Sheffield*

- Supervised two undergraduate students via the Undergraduate Research Internship scheme
- Mentored students interested in applications of classical and quantum field theory and their underlying mathematics

Curriculum Development Intern *Ashwa Education*

- Designed and conducted experimental science classes for a class of 25+ high school students
- Researched and designed course content on scientific thinking, social welfare policy, debate and argumentation