

ABHINOVE NAGARAJAN S

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(He/Him)

EDUCATION

Indian Institute of Technology, Guwahati

2020 - 2022

M.Sc. Physics

Cumulative GPA 8.43/10

Dissertation: Superradiance in Rotating Black Holes

Loyola College (University of Madras)

2017 - 2020

B.Sc. Physics

Cumulative GPA: 9.33/10

PSBB Senior Secondary School

2016

All India Senior School Certificate (High School Certificate)

Aggregate score 476/500

Subjects: Physics, Chemistry, Biology, Mathematics, English

PUBLICATIONS/PREPRINTS

- Devi, Saraswati and **S, Abhinove Nagarajan** and Chakrabarti, Sayan and Majhi, Bibhas Ranjan “Shadow of Quantum Extended Kruskal Black Hole and its Super-radiance Propert”,
In ArXiv: [doi:10.48550/arxiv.2105.11847](https://arxiv.org/abs/doi:10.48550/arxiv.2105.11847) (Submitted to Classical and Quantum Gravity)
- Suddhasattwa Brahma, Jaime Calderón-Figueroa, **Abhinove Nagarajan S** “Graviton Entanglement in de Sitter Spacetimes” (Manuscript in preparation)

RESEARCH EXPERIENCE

Indian Institute of Technology, Guwahati

Junior Research Fellow

PI(s): Dr. Bibhas Ranjan Majhi, Dr. Sayan Chakrabarti, Department of Physics September 2022 - Present

- Exploring thermodynamics in scalar tensor gravity from a fluid dynamics perspective
- Investigating the differences in physics between the Jordan and the Einstein frame descriptions of the theory
- Utilizing Eckart’s thermodynamics to provide an equivalent physical picture across both frames, from thermodynamic arguments

University of Edinburgh

Research Intern (Working Remotely)

PI: Dr. Suddhasattwa Brahma, School of Physics and Astronomy

June 2022 - Present

- Investigated quantum mechanical aspects of gravitational interaction for massive particles in de Sitter backgrounds using tools from quantum field theory in curved spacetime and quantum information theory
- Determined the entanglement entropy and concurrence between harmonic oscillators in de Sitter, generated due to gravity and compared this against oscillators in Minkowski
- *Manuscript in preparation*

Indian Institute of Technology Guwahati

M.Sc. Dissertation

PI: Dr. Sayan Chakrabarti, Department of Physics

July 2021 - April 2022

- Explored black hole superradiance in various backgrounds and derived the amplification factors analytically and numerically (using Mathematica)
- Investigated superradiance in rotating Ashtekar, Olmedo Singh black holes which include quantum corrections inspired by loop quantum gravity

- Discovered that for small black holes with very high angular momenta, scalar field superradiant amplification in AOS can exceed that of Kerr **Preprint submitted to Classical and Quantum Gravity** for review can be found [here](#) and thesis available [here](#)

Institute of Mathematical Sciences

PI: Prof Sitabhra Sinha, Department of Physics

Research Intern

June 2021 - February 2022

- Investigated ordering in the empirical brain network of the Macaque monkey, using the Ising model
- Implemented single spin and clustering algorithms using Monte Carlo methods on Python and Julia to simulate Ising dynamics
- Found that global convergence to a steady state is slowest for the empirical network, as compared to that in randomized networks, suggesting that global ordering is not desirable. A report can be found [here](#)

Indian Institute of Science

PI: Dr. Arvind Ayyer, Department of Mathematics

Indian Academy of Science Summer Research Fellow

April 2019 - July 2019

- Developed a computer program using Python and SageMath to simulate Markov chains and all permutations of a deck of cards after a riffle shuffle

Indian Institute of Technology, Madras

PI: Dr. Rajesh Narayanan, Department of Physics

Research Science Initiative Summer Intern

May 2015 - June 2015

- Studied various thermodynamic quantities in the critical regime and determined critical exponents using finite size scaling

CONFERENCES AND SUMMER SCHOOLS

- Winter School on Physics of the Early Universe, ICTS Bengaluru, Jan 2022
- Kavli Asian Winter School on Strings, Particles and Cosmology, Jan 2022

ACADEMIC ACHIEVEMENTS AND HONORS

- Junior Research Fellow - Indian Institute of Technology, Guwahati
- All India Rank 211 among 17000 test takers in IIT JAM 2020
- Selected as an Indian Academy of Science, Summer Research Fellow 2019
- Loyola Physics Association - Merit Scholarship

TEACHING AND WORK EXPERIENCE

Ashwa Education

Formerly Warhorse Innovations Private Limited

Content Development and Facilitator Intern

October 2018 - March 2020

- Designed and conducted an experimental science class for a class of 25+ high school students
- Researched and designed course content on scientific thinking, social welfare policy, debate and argumentation
- Contributed to building a gamified program for students at a prominent management institute

SKILLS

Programming Skills

- Python - NumPy, Matplotlib, Seaborn, Pandas
- Mathematica
- Julia
- \LaTeX