ABHINOVE NAGARAJAN S

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(He/Him)

EDUCATION

Indian Institute of Technology, Guwahati *September 2020 - June 2022 (Expected)*
2nd Year MSc Physics As of Fall 2021 GPA: 8.12/10

Loyola College (University of Madras) *2017-2020*
BSc 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

RESEARCH EXPERIENCE

Indian Institute of Technology Guwahati Guwahati, India
Department of Physics *July 2021 - April 2022*

MSc Dissertation advised by Dr. Sayan Chakrabarti

· Explored black hole superradiance in the case of charged static backgrounds (RN spacetime), rotating backgrounds (Kerr spacetime) 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.
· Thesis available here

Institute of Mathematical Sciences Chennai, India
Advisor: Dr. Sitabhra Sinha, Department of Physics *June 2021-February 2022*

· Investigated ordering in the empirical brain network of the Macaque monkey, using the Ising model of statistical mechanics
· Assessed whether communication between areas of the connectome depend on the dynamics (such as ordering or diffusion) or is a property of the community structure, by comparing ordering in the empirical network to that in randomzied networks.
· Found that global convergence to a steady state is the 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 Bengaluru, India
Advisor: Dr. Arvind Ayyer, Department of Mathematics *April 2019 - July 2019*

· Selected as an Indian Academy of Science Summer Fellow.
· Studied the mathematics of card shuffling and how riffle shuffles are an example of Markov Chains.
· Reviewed a paper on card shuffling and developed a computer program using Python and SageMath to simulate all possible permutations of a deck of cards after a riffle shuffle.

Indian Institute of Technology, Madras   Chennai, India
Advisor: Dr. Rajesh Narayanan, Department of Physics   *May 2015 - June 2015*

· Selected as a summer intern of the Research Science Initiative at IIT-M
· Explored the idea of finite size scaling, for magnetic phase transitions between ferromagnetic and paramagnetic phases.
· Studied the behavior of various thermodynamic quantities in the critical regime and determined the critical exponents in the power laws they obeyed using finite size scaling.

CONFERENCES AND SUMMER SCHOOLS

· Participant at Indian Strings Meeting 2021, Organised by IIT Roorkee
· 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

· All India Rank 211 - IIT JAM 2020
· Selected as an Indian Academy of Sciences, Summer Research Fellow 2019
· Loyola Physics Association - Merit Scholarship
· Best All Rounder, High School Graduating Class 2016
· Selected as Research Science Initiative Summer Intern - IIT Madras 2015 (Summer of Junior Year of High School)

TEACHING AND WORK EXPERIENCE

Warhorse Innovations Private Limited   October 2018 - March 2020

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

RELEVANT COURSEWORK

Core Courses

· Gravitation and Cosmology, Quantum Computation and Quantum Information, High Energy Physics, Quantum Field Theory, Classical Electrodynamics, Classical Mechanics, Statistical Mechanics, Math Methods (Linear Algebra, Complex Analysis, Group Theory and Tensor Analysis), Computer Programming

Online/Supplementary Courses

· Data Structures and Algorithms - CMI, NPTEL

SKILLS

Programming Skills

· Python - NumPy, Matplotlib, Seaborn, Pandas
· Mathematica
· Julia
· LaTex