AYUSH SINGH

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EDUCATION

Scuola Internazionale Superiore di Studi Avanzati — 2022–present

PhD in Mathematics (resurgence & quantum invariants of 3-manifolds) — Advisor: Pavel Putrov

Full list of coursework at https://11de784a.github.io/assets/files/coursework.pdf

National Institute of Science Education and Research — 2017–2022

Master of Science & Bachelor of Science in Physics — Advisor: Chethan N. Gowdigere

- Cumulative grade point average: 9.1/10
- Master's thesis on *Loop Calculations and Scattering Amplitudes in Quantum Field Theory*
- DST-INSPIRE Scholarship
- Awarded "Outstanding Performance" for best academic performance in Spring 2019 and Spring 2020

Programming Experience

Fluency in C, Python, Julia, LaTeX, Bash; also some experience with CSS, JavaScript, Django and Flask. See https://github.com/11de784a for a list of projects.

ACADEMIC EXPERIENCE

Master's Thesis on Loop Calculations and Scattering Amplitudes in QFT — Fall 2021, Spring 2022

Learned modern techniques for recursive computation of gauge theory amplitudes, and calculated loop corrections in various 4d quantum field theories. Supervised by Chethan Gowdigere (NISER Bhubaneswar).

Bachelor's Thesis on Cyclic Quantum Heat Engines — Spring 2020

Quantum thermodynamic cycles, and magnetically driven quantum heat engines based on a quantum dot and graphene flake. Supervised by Colin Benjamin (NISER Bhubaneswar).

Reading Project on Lie Groups & Lie Algebras — Summer 2019

Learned to classify irreducible representations of su(2), Clebsch–Gordan coefficients, Baker–Campbell formula. Supervised by Sanjoy Pusti (IIT Bombay).

NIUS Physics: National Initiative on Undergraduate Science — Summer 2018

Attended lectures on quantum mechanics, astronomy, and many-body physics; and completed a laboratory course based on experimental problem solving. Directed by HBCSE Mumbai.

PUBLICATIONS

- Magic angle twisted bilayer graphene as a highly efficient quantum Otto engine. A. Singh and C. Benjamin, 2021, Phys. Rev. B 104, 125445. arXiv:2103.13172.

VOLUNTEERING & WORK EXPERIENCE

NiSERCast (*Producer, Editor, Web Developer*) — 2020–2022

Led the creation of this science communication podcast; was responsible for recording, editing and publishing episodes; and building and maintaining the website.

NISER Coding Club (*Benevolent Dictator*) — 2019–2022

Organized talks, hackathons, and competitive programming contests; founded a Software Development Group; led outreach programs for high school students.