

Akshay Shankar

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Research Interest: Investigating the exotic phases of ultra-cold matter using numerical simulations.

Education

Ghent University

DOCTORAL DEGREE IN PHYSICS

- Supervised by Prof. Jutho Haegeman and Prof. Karel Van Acoleyen.

Gent, Belgium

Oct. 2023 - Present

Indian Institute of Science Education and Research (IISER), Mohali

BS-MS INTEGRATED DEGREE (MAJOR IN PHYSICS)

- Cumulative Performance Index (CPI): 10.0/10.0

Punjab, India

Aug. 2018 - June. 2023

Skills

Scientific Programming

Julia, Python, Fortran90, C++

Front-end development

HTML, CSS, JavaScript

Other software

Blender (3D modelling), GAMESS (Quantum Chemistry)

Experience

Master's thesis with Dr. Sanjeev Kumar, in collaboration with Prof. Dr. Tilman Pfau

IISER Mohali | University of Stuttgart

JULIA, PYTHON

June 2022 - Apr. 2023

- Implemented quantum many-body algorithms (MFT, CMFT) to qualitatively predict the exotic phases exhibited in the 2D - Bose Hubbard Model.
- This was done to assist the planning of an experimental quantum simulator setup using an optical lattice loaded with dipolar dysprosium atoms.
- Initiated attempts to utilize Quantum Monte Carlo (QMC) algorithms to precisely locate the phases of the system.

Research Internship with Dr. Vishwanath Shukla

IIT Kharagpur (Remote)

JULIA, FORTRAN90

May 2021 - Aug. 2021

- Explored concepts of parallel computing by learning elementary MPI and OpenMP.
- Read about superfluidity in BECs and implemented methods to simulate the 1D GPE to study ground state dynamics in harmonic traps.
- Continued to develop an interest in supersolidity in dipolar BECs and attempted to simulate the system.

Research Internship with Dr. P. Balanarayan

IISER Mohali (Remote)

PYTHON (NUMPY, SCIPY)

May 2020 - July 2020

- Explored simulation methods to study the behaviour of 1D quantum wave packets in a potential.
- Implemented algorithms to solve the time (in)dependent schrodinger equation and perform transfer matrix-based calculations to study scattering from potential barriers.

Research Internship with Dr. Prafulla Kumar Behera

IIT Madras

ROOT (C++ FRAMEWORK)

May 2019 - July 2019

- Learnt elementary particle physics and neutrino detection methods.
- Analyzed various aspects of the muon response of the proposed Indian Neutrino Observatory's ICAL detector using simulated data.

Other Projects

The Physics Hub

Remote

HTML, JAVASCRIPT

May 2020 - June 2021

- Helped set up and develop content for an open source repository hosting interactive physics simulations.
- Created by the cumulative effort of a group of undergraduates across various STEM disciplines.
- Currently not being actively maintained, but served as a great experience in working as part of a team.

Awards & Achievements

2023 **President's Gold Medal**, for the best academic performance in the class of 2023.

IISER Mohali

2019 **CNR Rao Foundation Award**, for obtaining 10.0 SPI in the 2nd semester.

IISER Mohali

2018 **Innovation in Science Pursuit for Inspired Research - Scholarship for Higher Education (INSPIRE-SHE)**, for top 1% performance in AISSCE.

DST India