Rishik Perugu

UG Fourth Year
Indian Institute of Science
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Education

Indian Institute of Science — Bangalore
B.S.(Research) in Physics, CGPA: 9/10 — 2019–2023

Sri Chaitanya Narayana Jr College — Hyderabad
Intermediate/+2, Marks: 980/1000 — 2017–2019

Shine High School — Warangal
Matriculation, CGPA: 9.8/10 — 2016-2017

Projects

Measures of quantum non-markovianity — Nov 2022 - Mar 2023
Guide: *Kanupriya Sinha, Arizona State University*

- Studied basics of Open quantum systems upto Lindblad master equation formalism and measures of non-markoviantiy of open quantum dynamics
- Attempted to quantify non-markovianity in a system of artifical atom in a leaky cavity, relevant in Quantum Optics

DMRG study of the one dimensional extended Bose-Hubbard model — May 2022 - Apr 2023
Guides: *Dr. Andreas Haller and Prof. Thomas Schmidt, DPhyMS, University of Luxembourg* (Bachelor's thesis)

- Implemented Zero-site density matrix renormalisation group in ITensors library
- Obtained the phase diagram in the parameter regime exhibiting the supersolid phase using zero-site DMRG algorithm
- Characterised superfluid, charge density wave, supersolid phases of the 1D extended Bose-Hubbard model using correlation functions, density profile, quantum state tomography

Molecular Aggregate Photophysics — June 2021 - May 2022
Guide: *Dr. Jayashree Nagesh, IISc Bangalore*

- Investigated the effects of inter-molecular charge transfer, vibrations, finite temperature, disorder in molecular aggregates using the Holstein Hamiltonian framework
- Using this framework, investigating the aggregation effects in DPP core molecules to gain insights about the packing aspects, the type of interaction etc that gave rise to the observed spectra

Plasma Physics — Feb 2021 - Sept 2021
Guide: *Prof. Animesh Kuley, IISc Bangalore*

- Studied basics of plasma physics and analytically solved for the trajectories of charged particles in electromagnetic field in various configurations
- Studied and implemented numerical methods to solve for the trajectories of charged particle in electromagnetic field such as Euler method, RK methods, Borish Push method

Positions of Responsibility

Decoherence Coordinator Pravega '21
Among a group of 45 people of Science and Tech Pravega '21 team July 2020 - August 2021

- **Spooky Quizzes**
  Organized two rounds of quizzes spanned over 6 weeks where about 200+ high school and UG students participated in these physics based quizzes
- **Coherence Lecture Series**
  Organized 10 lectures where eminent physicists from all over the world talked about their research work and/or their areas of expertise
- **Decoherence 2021**
  Organized the physics flagship event of Pravega for the year 2021. There were about 700 registrations across India, few from universities abroad. I was involved with the organization and question making for the competition.

Scholastic Achievements

- Recipient of the prestigious **KVPY Fellowship and Scholarship** by DST, Govt. of India 2019–Current
- Secured **ALL INDIA RANK 135** in **JEE ADVANCED** examination among 0.16 million candidates 2019
- Secured **ALL INDIA RANK 147** in **JEE Mains** examination among 1.2 million candidates 2019
- Bagged **37th rank** in **TS EAMCET** examination among 0.14 million candidates across TS and AP 2019
- Bagged **62th rank** in **AP EAMCET** examination among 0.18 million candidates across TS and AP 2019
- Achieved **AIR 8 (NISER)** in **NEST** examination among 0.04 million candidates 2019
- Achieved **AIR 12 (UM-DAE CEBS)** in **NEST** examination among 0.04 million candidates 2019

Techanical Skills

- **Programming:** Python, Julia, MATLAB, Mathematica, C
- **Packages and Tools:** LaTeX, Matplotlib, NumPy, ITensors

Key Courses Undertaken

- **Maths:** Real analysis, Linear Algebra, Multivariable Calculus, Probability and Statistics, Introduction to Dynamical Systems Theory
- **Physics:** Mechanics, Electricity and Magnetism, Thermal and Modern Physics, Intermediate Mechanics, Oscillations and Waves, Intermediate Electromagnetism and the Quantum Physics of Radiation, Intermediate Thermal Physics and the Physics of Materials, Introduction to Quantum Measurement and Control, Classical Mechanics, Quantum Mechanics 1, Mathematical Methods of Physics, Nuclear and Particle Physics, Quantum Mechanics 2, Statistical Mechanics, General Relativity, Condensed Matter Physics 1, Introduction to Materials for Quantum Technologies, Electromagnetic Theory, Topological Phases of Matter
- **Misc:** Computers in Chemistry

Extracurricular Activities

- Volunteered for an event called Exhibition in Pravega '20, Annual Cultural, Science and Tech fest of Indian Institute of Science, Bangalore
- Demonstrated Chladni plates experiment during Open Day 2020, Indian Institute of Science, Bangalore. Approximate footfall was 50k
- Participated in many Annual Science Fairs during my schooling