Hiranmay Das

School of Physical Sciences
National Institute of Science Education and Research – Bhubaneswar, India

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Final year Integrated M.Sc at NISER Bhubaneswar pursuing a major in Physics with minor in Mathematics

Education

Undergraduate

School of Physical sciences, *2017-now*
National Institute of Science Education and Research, Bhubaneswar
Overall CGPA 8.67/10.

Intermediate/+2

Mogra Uttamchandra High School, West Bengal (WBCHSE) *2016*
Overall 91% in board exam

Research interest

Broadly I am interested at the interface of condensed matter physics and quantum information. I am currently involved in developing approximation scheme for many-body Green's function using singular value decomposition. I am also interested in systems that are relevant to quantum computation such as superconducting qubits and Majorana bound state. Other academic interests include topological materials and many-body physics.

Internships and Projects

Entanglement in interacting fermion system in real and Fock spaces
Guide: Dr. Anamitra Mukherjee, SPS, NISER Bhubaneswar *Master Thesis (Current)*

- Approximation scheme in many-body Green's function using SVD.
- Entanglement in non-interacting 2d electron gas.
- Entanglement entropy in 1d tight-binding model.
- Study of entanglement in interacting systems using many body Green's function.
- Entanglement in the Fock space lattice.

Magnonic Squeezed State Picture of the Antiferromagnetic Spin Waves on the Square Lattic
Guide: Dr. V. Ravi Chandra, SPS, NISER Bhubaneswar *6-th sem Project*

- Representation of Antiferromagnetic(AFM) Ground State as Squeezed Fock state.
- Deriving the sublattice magnetization of AFM ground state using magnonic squeezed state.
- Study of AFM Ground State using Exact Diagonalization for Small 2d Lattice.

Percolation Problem
Guide: Dr. Sumedha, SPS, NISER Bhubaneswar *Summer 2019*

- Determination of the percolation threshold in 2 and 3 dimensional lattice.
- Study of bootstrap percolation in 2 dimension lattice.

Molecular dynamics simulation
Guide: Dr. B. L. Bhargava, SCS, NISER Bhubaneswar *Summer 2018*

- Simulation of liquid Argon.
- Simulation of Water, Methanol and Phenol system at their liquid state.
- Study of Hydrogen bond formation in Water, Methanol and Phenol system.

Key course projects

Direct Measurement of the Density Matrix of a Quantum System
Course instructor: Dr. Kush Saha,SPS, NISER Bhubaneswar *7th semester*

Floquet-engineered topological flat bands in irradiated twisted bilayer graphene
Course instructor: Dr. Colin Benjamin,SPS, NISER Bhubaneswar *8th semester*

Kondo effect on the surface of three-dimensional topological insulators
Course instructor: Dr. Kush Saha, NISER Bhubaneswar *9th semester*

Advanced Courses completed/attending

- Special topics in Quantum Mechanics
- Quantum Field Theory I and II
- Magnetism and Superconductivity
- Physics of Mesoscopic System
- Introduction to Phase transition
- Introduction to general relativity
- Quantum Information and Quantum Computation
- Advanced Solid State Physics

Computational Skills

- C++
- Python
- MATLAB
- Mathematica

Scholarship

Innovation in Science Pursuit for Inspired Research (INSPIRE) Scholarship since July 2017 for extraordinary performance in National Eligibility Screening Test.

Participation in Academic programs

- Represented India in **International Physicist Tournament** 2019, Lausanne, Switzerland.
- Visited ALICE and STAR detector of CERN in 2019.
- Participated in NGPA-UGCP Winter Science Camp 2019
- Participated in National Science Camp(Vijyoshi) 2017.

Academic Achievements

- AIR 350 (98 percentile) in GATE 2021
- National topper of NGPE(B.Sc Level) 2020
- Center and National topper of NGPE (B.Sc Level) 2019
- Center and State(Odisha) topper of NGPE (B.Sc Level)2018
- AIR 3700 (97.6 percentile) in JEE Advanced 2017
- AIR 4017 (99.7 percentile) in JEE mains 2017
- NEST (National Eligibility Screening Test) Rank 238 (99.6 percentile)