BHANDARU PHANI PARASAR

Bangalore, India
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EDUCATION

PhD Physics, Indian Institute of Science (IISc), Bangalore. Jan 2023-

- Adviser: Prof. Vijay B. Shenoy, Department of Physics, IISc
- Cumulative GPA: 9.9/10

MS-BS (Research), Indian Institute of Science, Bangalore 2017-2022

- Physics major, Cumulative GPA: 9.2/10

RESEARCH EXPERIENCE

Delicate semimetals 2023
Supervisor: Prof. Vijay B. Shenoy

- Constructed a novel class of semimetals, *Delicate semimetals*, protected by unstable homotopies.
- Demonstrated this with a two-band nodal-line semimetal in four dimensions, carrying a Hopf flux.
- Studied their remarkable Fermi-arc and drumhead surface states and generalized this construction using a three-dimensional example in class AIII.

Fermions coupled to $\mathbb{Z}_2$ gauge fields 2022
Supervisor: Prof. Vijay B. Shenoy

- Studied fermions coupled to $\mathbb{Z}_2$ gauge fields and showed that modulation of fermion hopping realizes many Obstructed Atomic Insulators (OAIs).
- Analyzed the stability of these phases to quantum fluctuations using Mean field and Renormalization techniques.
- Found a rich phase diagram with many superfluids, and their evolution from the BEC regime to BCS regime occurs via a sequence of first order transitions.

Bachelor's thesis, Indian Institute of Science 2021
Supervisor: Prof. Vijay B. Shenoy

- Worked on Phases and Phase Transitions of Fracton models in three dimensions.
- Studied classical and quantum phase transitions in the X-cube and the Checkerboard models using perturabtion theory techniques and variational methods.

PUBLICATIONS

1. **Bhandaru Phani Parasar**, Vijay B. Shenoy, *Delicate semimetals: Protected gapless phases from unstable homotopies* , Phys. Rev. B 109, 155131 (2024)
2. **Bhandaru Phani Parasar**, Vijay B. Shenoy, *Obstructed atomic insulators and superfluids of fermions coupled to $\mathbb{Z}_2$ gauge fields*, Phys. Rev. B 107, 245142 (2023)

WORKSHOPS AND CONFERENCES

- Attended and presented a poster at the workshop **Topological order:Anyons and Fractons**, Les Houches school of Physics, Les Houches, France. April 2024
- Presented my research (virtually) at the **APS March meeting** March 2024
- Attended the workshop **Condensed matter meets Quantum Information** at ICTS, Bangalore. Sep 2023

- Attended the workshop **Physics of Quantum Matter School** at NISER, Bhubaneshwar. May 2023
- Presented a poster at the physics in-house symposium, IISc Bangalore Feb 2023
- Attended the **Vijyoshi Camp**, a National Science Camp in India Dec 2016

TEACHING

- Teaching Assistant for *Quantum Mechanics II*, IISc 2024
  Responsible for taking tutorials and grading.
- Teaching Assistant for *Thermal Physics*, Azim Premji University, Bangalore 2024
  Responsible for weekly interactions and tutorials.
- *Introductory Modern Physics*, Azim Premji University 2023
  Responsible for teaching the material.
- Conducted problem solving sessions at Azim Premji University 2023
  Responsible for mentoring undergraduate students.

ACADEMIC HONOURS AND ACHIEVEMENTS

- **Prime Minister Research Fellowship**, instituted by the Ministry of Education, GoI 2023-
- All India Rank **2** in GATE Physics 2022
- All India Rank **1** in JEST Phyiscs 2022
- All India Rank **5** in CSIR-UGC NET 2021
- **Kishore Vaigyanik Protsahan Yojana** fellowship, instituted by DST, GoI 2017-2022
- All India Rank **293** in JEE Advanced 2017
- All India Rank **164** in KVPY 2016