Junaid Majeed Bhat, Ph.D.

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Education

Aug 2018 – June 2023 — Ph.D. in Non-equilibrium Quantum Physics, **International Centre for Theoretical Sciences, TIFR, Bengaluru, India**
Thesis title: *Nonequilibrium Green's function formalism for topological materials and some applications*

2013 – 2018 — Integrated Master's in Physics, **National Institute of Technology, Rourkela, India** **CGPA**: *8.9/10.*

Employment History

Aug 2023 – Present — Post-doctoral Fellow, **University of Ljubljana, Slovenia**

Awards, Achievements

2022 — **Prof. S. Naranan Memorial Research Award** given by the Tata Institute of Fundamental Research (TIFR) for *"outstanding research contributions in the physics of transport in linear chain systems"*.

2018 — **Council of Scientific and Industrial Research-Junior Research Fellowship** with all India **rank 9**

2014-2016 — National Institute of Rourkela-**Institute Academic Awards of Excellence** for the Academic years 2014, 2015, and 2016

2013 — **JEE Main** with state **rank 7**

Research Interests

Broad research interests — Quantum and classical transport, Open quantum systems, and Non-equilibrium quantum many-body physics

Current research interests — Return probability in interacting quantum systems, Transfer matrix approach to quantum dephasing models

Skills

Analytical and Numerical Methods — Non-equilibrium Green's functions, Transfer matrix methods, Exact diagonalization, Lindblad Master Equation, Monte Carlo, Tensor networks(TEBD, TRG), Stabilizer circuits

Coding — Python, Mathematica, Matlab, Julia, LaTeX

Languages — English, Urdu, Kashmiri and Arabic.

Research Publications

*Single Author Publications

1. **J. M. Bhat**, "Topologically protected subdiffusive transport in two-dimensional fermionic wires," *Physical Review B, American Physical Society*, vol. 109, p. 125 415, 12 2024, https://link.aps.org/doi/10.1103/PhysRevB.109.125415.

2. **J. M. Bhat**, "Super-diffusive transport in two-dimensional fermionic wires," *Physical Review B, American Physical Society*, 2024, https://doi.org/10.1103/PhysRevB.110.115405.

*Publications in Collaborations

1. **J. M. Bhat** and A. Dhar, "Transport in spinless superconducting wires," *Physical Review B, American Physical Society*, vol. 102, p. 224 512, 22 Dec. 2020, https://link.aps.org/doi/10.1103/PhysRevB.102.224512.
2. **J. M. Bhat**, G. Cane, C. Bernardin, and A. Dhar, "Heat transport in an ordered harmonic chain in presence of a uniform magnetic field," *Journal of Statistical Physics, Springer*, vol. 186, no. 1, pp. 1–15, 2022, https://link.springer.com/article/10.1007/s10955-021-02848-5.
3. G. Cane, **J. M. Bhat**, A. Dhar, and C. Bernardin, "Localization effects due to a random magnetic field on heat transport in a harmonic chain," *Journal of Statistical Mechanics: Theory and Experiment, IOP Publishing*, vol. 2021, no. 11, p. 113 204, 2021, https://iopscience.iop.org/article/10.1088/1742-5468/ac32b8.
4. S. Pandey, **J. M. Bhat**, A. Dhar, *et al.*, "Boltzmann entropy of a freely expanding quantum ideal gas," *Journal of Statistical Physics, Springer*, 2023, https://link.springer.com/article/10.1007/s10955-023-03154-y.
5. M. Sedik, **J. M. Bhat**, A. Dhar, and B. S. Shastry, "Yang-lee zeros of certain antiferromagnetic models," *Physical Review E, American Physical Society*, vol. 110, p. 014 117, 1 Jul. 2024, https://link.aps.org/doi/10.1103/PhysRevE.110.014117.
6. **J. M. Bhat**, R. Shankar, and A. Dhar, "Quantized two terminal conductance, edge states and current patterns in an open geometry 2-dimensional chern insulator," *preprint arXiv:2309.07640*, 2023, https://arxiv.org/abs/2305.07640.
7. **J. M. Bhat** and A. Dhar, "Equivalence of negf and scattering approaches to electron transport in the kitaev chain," *arXiv-2101.06376*, 2021, https://arxiv.org/abs/2101.06376.
8. **J. M. Bhat**, J. Bensa, and M. Žnidarič, "Boom and bust cycles due to pseudospectra of matrices with unimodular spectra," *preprint arXiv:2402.19201*, 2024, https://arxiv.org/abs/2402.19201.
9. **J. M. Bhat** and M. Znidaric, "Transfer matrix approach to quantum systems subject to certain lindblad evolution," *arXiv*, 2025, https://arxiv.org/abs/2501.13560.

Conferences and Invited Talks

Invited Talks

- Transport in superconducting wires, Inhouse seminar-2020, ICTS, Bengaluru
  YouTube Link
- Transport in harmonic oscillator chain in the presence of a disordered magnetic field
  Young Physics Meet, Physical Research Laboratory, Ahemdabad, 2022
  From Information to Control and Non-Equilibrium, Université Côte d'Azur, France, 2022
  Department of Physics, IISER Pune-2022

Conferences

- Conference on Advances in Topological Condensed Matter Nov 2024, The "Abdus Salam" International Centre for Theoretical Physics, Trieste, Italy
- Quantum Dynamics: From Electrons to Qbits-Aug 2022, The "Abdus Salam" International Centre for Theoretical Physics, Trieste, Italy
- From Information to Control And Non-Equilbrium June 2022, Université Côte d'Azur, Nice, France
- Statistical Physics Kolkata XI-March 2022, Kolkata, India
- Bengaluru School on Statistical Physics-Jun 2021, International Centre for Theoretical Sciences, Bengaluru