

ABHIRUP MUKHERJEE

Doctoral Researcher

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RESEARCH EXPERIENCE

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|---|-------------------------------------|
| Indian Institute of Science Education and Research Kolkata, India Prof. Siddhartha Lal <i>Study of Mott transitions and non-Fermi liquids through Kondo breakdown</i> | Doctoral Research 2021 - ongoing |
| Indian Institute of Science Education and Research Kolkata, India Prof. Siddhartha Lal <i>Unitary renormalisation group study of an extended Anderson impurity model</i> | M.Sc. Thesis 2020 - 2021 |
| Ramakrishna Mission Vidyamandira, India Prof. Pushpajit Halder <i>The EPR paradox: Entangled states</i> | B.Sc. Final Year Project 2018 |

PUBLICATIONS AND PREPRINTS

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| Mott Criticality as the Confinement Transition of a Pseudogap-Mott Metal Abhirup Mukherjee, S R. Hassan, A Mukherjee, N S. Vidhyadhiraja, A Taraphder, S Lal | July 2025 arXiv:2507.17201 |
| Revealing the magnetic dimensional crossover in the Heisenberg ferromagnet CrSiTe_3 through picosecond strain pulses A Kumar N M, S Mukherjee, Abhirup Mukherjee, A Punjal, S Purwar, T Setti, S Prabhu S., S Lal, N Kamaraju | April 2025 Phys. Rev. B 111, L140414 |
| Holographic entanglement renormalisation for fermionic quantum matter Abhirup Mukherjee, S Patra, S Lal | June 2024 J. Phys. A: Math. Theor. 57 275401 |
| Kondo frustration via charge fluctuations: a route to Mott localisation Abhirup Mukherjee, N S Vidhyadhiraja, A Taraphder, S Lal | November 2023 New J. Phys. 25 113011 |
| Frustration shapes multi-channel Kondo physics: a star graph perspective S Patra, Abhirup Mukherjee, A Mukherjee, N S Vidhyadhiraja, A Taraphder, S Lal | May 2023 J. Phys.: Condens. Matter 35 315601 |
| Unveiling the Kondo cloud: Unitary renormalization-group study of the Kondo model A Mukherjee, Abhirup Mukherjee, N S. Vidhyadhiraja, A Taraphder, S Lal | February 2022 Phys. Rev. B 105, 085119 |

ONGOING PROJECTS

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| Punctured-Chern invariant at IQHE plateau-to-plateau transitions: A unitary RG study Abhirup Mukherjee, S Pujari, S Lal |
| Some universal features of Kondo breakdown: Insights into Mott criticality D Debata, Abhirup Mukherjee, S Lal |
| Kondo breakdown as a measurement-driven entanglement transition D Debata, Abhirup Mukherjee, S Lal |
| Quantum criticality in a three-orbital impurity model D Debata*, A Kumar*, Abhirup Mukherjee, S Lal |

EDUCATION

Indian Institute of Science Education and Research (IISER) Kolkata, India
CGPA: 9.61

M.Sc. + Ph.D. in Physics
2018 - ongoing

Ramakrishna Mission Vidyamandira (Autonomous), University of Calcutta, India
CGPA: 9.22

B.Sc. in Physics (Hons.)
2015 - 2018

TECHNICAL SKILLS

- Field theory-based techniques (unitary renormalisation group method) and *low-energy Hamiltonian* methods
- Computation of two-point and multi-point *correlation functions and entanglement measures* in fermionic systems
- Numerical computation of dynamical correlations (spectral function, self-energy, etc) using exact diagonalisation
- Julia and python for numerical computation

TALKS AND POSTER PRESENTATIONS

- Poster: 7th Annual Conference on Quantum Condensed Matter — December 2024, IIT Guwahati
- Poster: Young Investigators Meet on Quantum Condensed Matter Theory — December 2023, IISER Bhopal
- Poster: Conference on Emergent phenomena in Quantum MATerials — October 2022, IIT Roorkee
- Talk on *Insights On The Pseudogap In 2D From An Impurity Model* at DPS Day, Department of Physical Sciences — June 2025, IISER Kolkata
- Talk on *Kondo Effect and Its Breakdown: Interplay of Fluctuations in Zero Dimensions* at PP65: Physics Trends at IISER Kolkata — June 2023, IISER Kolkata

TEACHING EXPERIENCE

Teaching Assistantship at IISER Kolkata

- Condensed Matter Physics II (2022). Instructor: Prof. Siddhartha Lal
- Quantum Mechanics. (2023) Instructor: Prof. Siddhartha Lal
- Computational Physics (2024). Instructor: Prof. Rangeet Bhattacharyya

AWARDS AND HONOURS

- Qualified CSIR-UGC NET with All India Rank (AIR) 59 (Dec 2018)
- Gold medallist, National Graduate Physics Examination (NGPE) - 2018
- Qualified JAM (AIR 10) and JEST (AIR 21) — national-level entrance exams for M.Sc/Ph.D. in India
- Silver medallist, B.Sc. (Hons.), Ramakrishna Mission Vidyamandira, University of Calcutta, (2015-2018)

REFERENCES

Prof. Siddhartha Lal (*Ph.D. advisor*)
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