

ABHIRUP MUKHERJEE

Doctoral Researcher

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RESEARCH EXPERIENCE

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

Mott Criticality as the Confinement Transition of a Pseudogap-Mott Metal <i>Abhirup Mukherjee, S. R. Hassan, Anamitra Mukherjee, N. S. Vidhyadhiraja, A. Taraphder, Siddhartha Lal</i>	July 2005 arXiv:2507.17201
Revealing the magnetic dimensional crossover in the Heisenberg ferromagnet CrSiTe₃ through picosecond strain pulses <i>Anjan Kumar N M, Soumya Mukherjee, Abhirup Mukherjee, Ajinkya Punjal, Shubham Purwar, Thirupathaiah Setti, Shriganesh Prabhu S., Siddhartha Lal, N. Kamaraju</i>	April, 2025 Phys. Rev. B 111, L140414
Holographic entanglement renormalisation for fermionic quantum matter: geometrical and topological aspects <i>Abhirup Mukherjee, Siddhartha Patra, Siddhartha Lal</i>	June 2024 J. Phys. A: Math. Theor. 57 275401
Kondo frustration via charge fluctuations: a route to Mott localisation <i>Abhirup Mukherjee, N. S. Vidhyadhiraja, A. Taraphder, Siddhartha Lal</i>	November 2023 New J. Phys. 25 113011
Frustration shapes multi-channel Kondo physics: a star graph perspective <i>Siddhartha Patra, Abhirup Mukherjee, Anirban Mukherjee, N. S. Vidhyadhiraja, A. Taraphder, Siddhartha Lal</i>	May 2023 J. Phys.: Condens. Matter 35 315601
Unveiling the Kondo cloud: Unitary renormalization-group study of the Kondo model <i>Anirban Mukherjee, Abhirup Mukherjee, N. S. Vidhyadhiraja, A. Taraphder, Siddhartha Lal</i>	February 2022 Phys. Rev. B 105, 085119

ONGOING PROJECTS

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

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
- *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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