PRIYO ADHIKARY

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POSITIONS

Post Doctoral Position	Department of physics**,** Indian Institute of Technology Madras	2022 (JAN)-

EDUCATION

Ph. D	Department of physics**,** Indian Institute of Science, Bangalore, India. **Thesis advisor- Dr. Tanmoy Das**	2015- 2021
Project Associate	Indian Institute of Science Education and Research (IISER)- Kolkata, India.	2013- 2014
M. Sc	Department of physics, Indian Institute of Technology Kanpur India.	2011-2013
B. Sc	Department of physics, Asutosh college**,** Calcutta University, West Bengal, India. **Physics honors**.	2008- 2011

RESEARCH INTEREST

I am interested in the physics of strongly correlated electron systems, especially those that exhibit unconventional superconductivity. My research interests include superconducting properties of high-temperature cuprates e.g. YBCO, recently discovered over-doped $Ba_2CuO_{3.25}$ and infinite layer nickelates, heavy fermions ($CeCu_2Si_2$, $CeCoIn_5$).

I have always been interested in the field of strongly correlated electron systems and their applications to novel materials. I want to explore the BdG method in heterostructures, especially concerning the study of competing quantum phases. I am also interested in comprehensively studying Mott phases in real materials, specifically using DMFT and its cluster extension models.

My work on orbital dependence superconductivity in nickelate was validated by scanning tunnelling measurements.

During my PhD, I work in close collaboration with different experimental groups focusing on transport and superconducting properties, e.g. graphene, $PdTe_2$.

TEACHING ASSISTANT

1. I was a teaching assistant of statistical mechanics (PH-202) taught by Prof. Justin David. It was a compulsory course for undergraduate students. (2018 Jan-Apr).

2. I worked as a teaching assistants of the course Quantum Stat Field Theory (PH340) taught by Prof. Tanmoy Das. (2021 Jan- Apr).

3. I worked as a teaching assistant of PH1030 B.Tech laboratory course (2022 July-Nov and 2023 Jan-Apr).

Journal Publications::

1. **Priyo Adhikary**, M. G, A. C, Sashi Satpathy, Shantanu Mukherjee, B. R. K. Nanda, ***Unique d_{xy}-wave superconductivity in $Ba_2CuO_{3.25}$,***

   Phys. Rev. B 109, L020505(2024).

2. **Priyo Adhikary**, M. G, B. R. K. Nanda, Shantanu Mukherjee, ***Doping induced singlet to triplet superconducting transition in $Ba_2CuO_{3+\delta}$***

   Phys. Rev. B 109, 224503(2024).

3. B. D, A.D, **Priyo Adhikary**, Shantanu Mukherjee**,** ***Signatures of orbital selective Mott state in doped Sr_3Ru_2O7,***

   Phys. Rev. Materials 7, 035001 (2023).

4. **Priyo Adhikary**, Tanmoy Das, ***Novel attractive pairing interaction in strongly correlated superconductors***,

   SciPost Phys. 7, 078 (2019).

5. **Priyo Adhikary**, Tanmoy Das, ***Prediction of f-wave pairing symmetry in $YBa_2Cu_3O_{6+x}$ cuprates***.

   Phys. Rev. B 101, 214517(2020).

6. **Priyo Adhikary**, S. B, Tanmoy Das, Indra Dasgupta, Tanusri Saha-Dasgupta, ***Orbital Selective Superconductivity in a Two band Model of Infinite-Layer Nickelates***,

   Phys. Rev. B 102, 100501(R)(2020).

7. S. B, **Priyo Adhikary**, Tanmoy Das, Indra Dasgupta, Tanusri Saha-Dasgupta, ***Superconductivity in Infinite-layer Nickelates: Role of f orbital***,

   Phys. Rev. B 102, 220502(R)(2020).

8. C. K, S. K. S, **Priyo Adhikary**, Sumilan Banerjee, Tanmoy Das, and Anindya Das, ***Localization physics in graphene moire' superlattices***,

   Phys. Rev. B 98, 155408,(2018).

9. A. S, S. D. , **Priyo Adhikary**, R. R. C, A. V, Y. S, S. G, Tanmoy Das, Goutam Sheet, ***Mixed type I and type II superconductivity due to intrinsic electronic inhomogeneities in the type II Dirac semimetal*** $PdTe_2$,

   J. Phys. Condens. Matter 31, 085701 (2019).

10. S. Poudyal, M. Deka, **Priyo Adhikary**, R. Ranju, P. K. Barman, R. Yadav, B. Biswal, R. Rajarapu, S. Mukherjee, B. R. K. Nanda, A. Singh, and A. Misra***, Room Temperature, Twist Angle Independent, Momentum Direct Interlayer Excitons in van der Waals heterostructures with Wide Spectral Tunability,*** Nano Letters, submitted.[08-May-2024]

Invited Poster presentations

1. Superconductivity from valence fluctuations., Priyo Adhikary, National Conference on Quantum Condensed Matter , IISER Mohali, India(2018).

2. f-wave pairing symmetry in cuprates, Priyo Adhikary, National Conference on Electronic Structure : NCES- S. N. Bose National Centre for Basic Sciences, Kolkata, India(2019) .

3. Superconducting pairing symmetry in $Ba_2CuO_{3.25}$ using first principles, Priyo Adhikary, 4th PRL CONFERENCE ON CONDENSED MATTER PHYSICS (PRL CCMP 2023).

COMPUTER SKILLS

Programming: My coding experience is mainly related to my research on strongly correlated systems such as heavy fermions and transition metal oxide systems. I have implemented the multiband RPA spin-fluctuation method to calculate the momentum dependence of superconducting order-parameter in YBCO, Infinite-Layer Nickelates.

I use the slater-koster tight binding method and the Lowdin downfolding procedure to obtain an effective five-orbital model of $Ba_2CuO_{3.25}$ from first-principles DFT calculations.

I also use the real space BDG formalism to study the superconducting order parameter in proximity to a ferromagnetic system.

I code in C++, Fortran, Python, MATLAB, Mathematica, Julia and use parallel computing techniques to speed up the calculations.

Packages : **DFT:** VASP, Wien2k, Quantum Espresso, EPW, wannier90.
Machine Learning : scikit-learn, Keras.