Nandan Pakhira

Personal Information

Date of Birth 22 April, 1977
Citizenship Indian

Designation

Assistant Professor
Department of Physics,
Kazi Nazrul University,
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Research Positions

2016 - 2018 **Post Doctoral Fellow**
Indian Institute of Technology, Kharagpore
Kharagpore, West Midnapore, West Bengal, Pin - 721302
(*October, 2016 – May, 2018*)

2016 **Visiting Research Associate**
S. N. Bose national center for basic scieces
Block-JD, Sector-III, Salt Lake, Kolkata, West Bengal 700098.
Host : Dr. Manoranjan Kumar
(*May, 2016 – August, 2016*)

2013 - 2015 **Post-Doctoral Research Fellow**

School of Mathematics & Physics,
The University of Queensland,
St Lucia, Brisbane, QLD 4072, Australia.
Advisor: Professor Ross H. McKenzie
(*September, 2013 – April, 2016*)

2013 **Visiting Research Scientist**
Department of Applied Physics.
Stanford University,
Stanford, USA
Host: Prof. Thomas P. Devereaux
(*February 2013 - June 2013*)

2009 - 2013 **Post-Doctoral Research Fellow**
Department of Physics,
Georgetown University,
Washington DC, USA.
Advisor: Professor James K. Freericks
(*June 2009 - January 2013*)

Education

2009 **PhD**
Department of Physics,
Indian Institute of Science,
Bangalore, India.
Thesis Title: *Spectral and transport properties of Falicov-Kimball Related Models and their application to Manganites*
Thesis Advisors: **Professor H. R. Krishnamurthy**
Professor T. V. Ramakrishnan

2000 **MS (Physics)** (Integrated PhD Programme)
Department of Physics,
Indian Institute of Science,
Bangalore, India.
CGPA: 6.6 out of 8.0
MS Thesis Title: *Magnetic field dependence of vortex core radius in type-II s-wave superconductor*
Thesis Advisor: **Professor T. V. Ramakrishnan**

1997 **BSc (Hons) in Physics**
Department of Physics,
Jadavpur University,
Kolkata, India

73.1%; First Class; University Rank: 4

Research Interests

Quantum transport in strongly correlated electron systems

dc and optical conductivity in transition oxide materials like doped manganites and cuprates. Hall conductivity and thermo-power in doped manganites and organic superconductors.

Holographic duality based approach to quantum transport

Quantum many body approach to X-ray spectroscopy

Resonant and non-resonant spectroscopic methods like RIXS, NIXS etc. using many-body diagrammatic approach.

Dynamical mean field theory and numerical renormalization group

Study of strongly correlated electronic systems using dynamical mean field theory (DMFT). Also, development of numerical renormalization group as impurity solver for various single-site and lattice problems.

Teaching Experience

2018- Teaching post graduate courses in Physics at the Department of Physics, Kazi Nazrul University, Asansol, W.B.

2017-2018 Teaching assitant for the course *Oscillations and Waves*(PH11001) IIT, Kharagpur. Gave tutorials, graded class tests and checked answer sheets for midterm and final term and assigned 20% of the total marks alloted for gradation of students.

2013 Mini course on the Green's function method in many-body systems at the Department of Physics, Indian Institute of Science, Bangalore, India.

2009-2013 Graduate school Quantum Mechanics and Solid State Physics at the Department of Physics, Georgetown University, Washington DC, USA.

2000-2008 Teaching Assistant to several courses during my doctoral studies at the Department of Physics, Indian Institute of Science, Bangalore, India.

Publications

Published

1 *X-ray Photoemission Spectroscopy in the Falicov-Kimball model*
Nandan Pakhira, A. M. Shvaika, and J. K. Freericks
Physical Review B 99, 125137 (2019)

2 *Shear viscosity in strongly interacting fermionic quantum fluid*
Nandan Pakhira and Ross H. McKenzie.
Physical Review B 92, 125103 (2015) **(Editor's Suggestion)**

3 *Absence of a quantum limit to charge diffusion in bad metals*
Nandan Pakhira and Ross H. McKenzie.
Physical Review B 91, 075124 (2015)

4 *Resonant inelastic X-ray scattering in a Mott insulator*
Nandan Pakhira, J. K. Freericks, and A. M. Shvaika
Physical Review B 86, 125103 (2012)

5 *Optical conductivity of perovskite manganites*
Nandan Pakhira, H. R. Krishnamurthy, and T. V. Ramakrishnan
Physical Review B 84, 085115 (2011)

6 *Theory of unusual doping and temperature dependence of photo-emission spectra in manganites*
P. Sanyal, S. SenGupta, **Nandan Pakhira**, H. R. Krishnamurthy, D. D. Sarma, and T. V. Ramakrishnan
Europhysics Letters 82, 47010 (2008)

arXiv preprints (under referee review)

7 *Electronic structures of metallic tetra-boride TmB_4 : An LDA+DMFT study*
Nandan Pakhira, Jyoti Krishna, Tulika Mitra and Arghya Taraphder.
arXiv:1807.05388 (submitted to Physical Review B).

Major Invited Talks

- *Shear viscosity of strongly interacting fermionic fluid*, Indian Institute of Technology, Kharagpur, India (August, 2015).
- *Are there quantum limits to transport in quantum many-body systems?*, S. N. Bose National Centre for Basic Sciences, Kolkata, India (July, 2015).
- *Are there quantum limits to charge diffusion in quantum many-body systems?*, School of Physical Sciences, Jawaharlal Nehru University, New Delhi, India (April 2015).
- *Are there quantum limits to charge diffusion in quantum many-body systems?*, International Center for Theoretical Sciences (ICTS-TIFR), Bangalore, India (November 2014).
- *Are there quantum limits to charge diffusion in quantum many-body systems?*, Indian Institute of Technology, Kharagpur, India (September 2014).
- *Resonant inelastic X-ray scattering in a Mott insulator*, Argonne National Laboratory (ANL), Chicago, Illinois, USA (April 2013).
- *Core-hole propagator in the Falicov-Kimball model*, Stanford Linear Accelerator Centre (SLAC), Stanford University, USA (February 2013).

Major Conferences Attended

- Young Investigators Meeting on Quantum Comdensed Matter Theory, S. N. Bose National Centre for Basic Sciences, Kolkata. (20-22 November, 2018)
  Invited talk : *Electronic strucutres of metallic tetra-boride TmB_4 : An LDA+DMFT study*
- Australian Workshop on Emergent Quantum matter, Brisbane, Queensland, Australia, (November, 2014).
  Poster: *Are there quantum limit to charge diffusion in quantum many-body systems?*
- March APS meeting, Boston, Massachusetts, USA, (February – March, 2012).
  Talk: *Core-hole propagator in the Falicov-Kimball model*
- International Workshop on Strong Correlations and Angle-Resolved Photo-emission Spectroscopy, Lawrence Berkley National Laboratory (LBNL), USA, (July, 2011).

Poster: *Resonant inelastic X-ray scattering in a Mott insulator*

- March APS meeting, Dallas, Texas, USA, (March, 2011).
  Poster: *Resonant inelastic X-ray scattering in a Mott insulator*
- March APS meeting, Portland, Oregon, USA, (March, 2010).
  Talk: *f-electron spectral function in the Weiner-Hopf sum equation approach*
- Workshop and meeting on Strong Correlations in Materials and Atom Traps, International Center for Theoretical Physics (ICTP), Trieste, Italy, (August, 2008).
  Poster: *Non-Fermi liquid to Fermi liquid cross-over in Falicov-Kimball model with hybridization*

Major Schools & Workshops

- Winter School on Low-dimensional Mesoscopic Physics, Harishchandra Research Institute, Allahabad, India (2008).
- Correlated Electrons and Frustrated Magnetism, International Center, Goa, India (2007).
- Numerical Quantum Many-Body Physics and Chemistry, Jawaharlal Nehru Center for Advanced Scientific Research, Bangalore, India (2007).
- Field Theories in Condensed Matter Systems, Harishchandra Research Institute, Allahabad, India (2000).

Awards & Fellowships

- Institute post doctoral fellowship (2016 - 2018), I.I.T Kharagpore.
- Australian Research Council Fellowship (2013 - 2015), Australia.
- Department of Energy Fellowship (2009 - 2013), USA.
- UGC-CSIR Senior Research Fellow (2002 - 2004), India.
- UGC-CSIR Junior Research Fellow (2000 - 2002), India.
- National Merit Scholar (1992)

Computational skills

Dynamical Mean-Field Theory and Numerical Renormalization Group
C, C++, Fortran 77 and Fortran 90 based computer programming
Matlab, Mathematica and other softwares

References

Professor T. V. Ramakrishnan
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Varanasi - 221 005, India.
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Professor Ross H. McKenzie
School of Mathematics & Physics,

Professor J. K. Freericks
Department of Physics,

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http://www.smp.uq.edu.au/node/106/347
http://condensedconcepts.blogspot.com.au/
(Personal blogs in condensed matter)

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http://physics.georgetown.edu/∼jkf/index.html

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