

Sudeshna Sen, Curriculum Vitae |

Personal Details

Nationality : Indian

Gender: Female

Current affiliation : Assistant Professor, Indian Institute of Technology (Indian School of Mines) (IIT(ISM)) Dhanbad

Contact Details

Office address : Academic Complex, 6th Floor, Department of Physics, IIT(ISM) Dhanbad, Dhanbad, Jharkhand, Pin-826004

email : sudeshna@iitism.ac.in

Graduation/University Education

Bachelor of Science (B.Sc.) in Physics

2004–2007

- o Name of the University : Jadavpur University, Kolkata, West Bengal, India
- o Honors in Physics, Passed in First Class with distinction and 77.4% Marks
(Subsidiary subjects : Mathematics, Chemistry, Computer Science)

Master of Science (M.Sc.) in Physics (Discontinued)

2007–2008

- o Name of the University : Jadavpur University, Kolkata, West Bengal, India (left to join Integrated PhD scholarship at JNCASR, Bangalore, India)

Master of Science (M.S.) in Materials Science (by Research)

2008–2011

- o Name of the Institute: Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore, Karnataka, India
- o Passed with 7.26/8.0 CGPA
- Thesis Title:** "*Theoretical Studies of Transport at the Nanoscale*"
- Thesis Advisor: Prof. N. S. Vidhyadhiraja

Doctoral Thesis (PhD)

Research Scholar

2011–2016

- o Institute: Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore 560064, Karnataka, India
- o **Thesis Title:** "*Emergent phenomena in spatially and energetically inhomogeneous strongly correlated model electron systems*"
- o Thesis Advisor: Prof. N. S. Vidhyadhiraja
- o Thesis Submitted : March, 2016 Defended: July 2016 Degree Awarded: September 28, 2016

Professional Experience

(I) Assistant Professor, Department of Physics

July, 2021 – Present

- o Institute: IIT(ISM) Dhanbad

(II) Postdoctoral Fellow, (Research Group: Dr. Andrew Mitchell)

November, 2018 – June-2021

- o Institute: School of Physics,
Science Centre North, Belfield, Dublin-4, Ireland

(III) Postdoctoral Fellow, (Research Group: Prof. Wei Ku)

September, 2016 – 2018

- o Institute: Tsung-Dao Lee Institute & Shanghai Jiao Tong University,

800 Dongchuan Road, Minhang, Shanghai-200240, China

(IV) Research Associate

(Research Group: Theoretical Sciences Unit)

May, 2016 – September, 2016

- o Institute: JNCASR, Jakkur Post, Bangalore-560064, India

Other academic visits

(I) Visiting Scholar

(Collaborator: Prof. Vladimir Dobrosavljevic)

February, 2017

- o Institute: National High Magnetic Field Laboratory, Tallahassee, Florida, USA

(II) Visiting Scholar

(Collaborator: Prof. Mark Jarrell)

December, 2013–August, 2014

- o Institute: Louisiana State University, Baton Rouge, Louisiana, USA

Research Publications

Online link : Web-link of up-to-date list of publications:

- o in arXiv: (https://arxiv.org/a/sen_s_3.html)
- o in Google Scholar: (https://scholar.google.com/citations?user=N7v_G08AAAAJ&hl=en)

1. “Relevance of long-range screening in Mott transition examined via a hydrogen lattice”
Zi-Jian Lang, **Sudeshna Sen**, Pak Ki Henry Tsang, Kristjan Haule, Vladimir Dobrosavljevic, and Wei Ku
arXiv:2308.14053 (Submitted) (2024)
2. “Many-Body Quantum Interference Route to the Two-Channel Kondo Effect: Inverse Design for Molecular Junctions and Quantum Dot Devices”
Sudeshna Sen, and Andrew K. Mitchell
Physical Review Letters **133**, 076501 (2024)
(Selected as Editors’ Suggestion)
3. “Emergent soft-gap Anderson models at quantum criticality in a lattice Hamiltonian within dynamical mean field theory”
Sujan Bhadraraj, Vinayak Kulkarni, N S Vidhyadhiraja, **Sudeshna Sen***
Phys. Rev. B **107**, 205104 (2023)
4. “The Mott transition as a topological phase transition”
Sudeshna Sen, Patrick Wong, Andrew Mitchell,
Phys. Rev. B (Rapid Comm.) **102**, 081110(R) (2020) **Selected as Editors’ Suggestion**
5. “Fragility of the Kondo insulating gap against disorder: relevance to recent puzzles in topological Kondo insulators”
Sudeshna Sen*, N. S. Vidhyadhiraja, Eduardo Miranda, Vladimir Dobrosavljevic, Wei Ku,
Phys. Rev. Research **2**, 033370 (2020)* *Corresponding author*
6. “Emergence of non-Fermi liquid dynamics through non-local correlations in an interacting disordered system”
Sudeshna Sen, N. S. Vidhyadhiraja, Mark Jarrell,
Phys. Rev. B **98**, 075112 (2018)
7. “Pressure-induced melting of magnetic order and emergence of new quantum state in α -RuCl₃”
Zhe Wang, Jing Guo, F. F. Tafti, Anthony Hegg, **Sudeshna Sen**, Vladimir A Sidorov, Le Wang, Shu Cai, Wei Yi, Yazhou Zhou, Honghong Wang, Shan Zhang, Ke Yang, Aiguo Li, Xiaodong Li, Yanchun Li, Jing Liu, Youguo Shi, Wei Ku, Qi Wu, Robert J Cava, Liling Sun,
Phys. Rev. B **97**, 245149 (2018) **(Selected as Editors’ Suggestion)**
8. “Local theory for Mott-Anderson localization”
Sudeshna Sen, Hanna Terletska, Juana Moreno, N. S. Vidhyadhiraja, Mark Jarrell
Phys. Rev. B **94**, 235104 (2016)
9. “Quantum critical Mott transitions in a bilayer Kondo insulator -metal model system”
Sudeshna Sen and N. S. Vidhyadhiraja
Phys. Rev. B **93**, 155136 (2016)
10. “Spectral changes in layered f-electron systems induced by Kondo hole substitution in the boundary layer”

Sudeshna Sen, Juana Moreno, Mark Jarrell, N. S. Vidhyadhiraja

Phys. Rev. B **91**, 155146 (2015)

11. "Protocols for Characterising Quantum Transport through Nano-structures"

Sudeshna Sen and N. S. Vidhyadhiraja

Applied Physics Letters, **101**, 133106 (2012)

12. "Low Frequency Electrical Noise Thermometry for Micro- and Nano-scale devices"

R. A. Sayer, J. D. Engerer, **Sudeshna Sen**, N. S. Vidhyadhiraja and T. S. Fisher

ASME International Mechanical Engineering Congress and Exposition (Denver, CO, 2011), pp. IMECE2011-63586

Awards

- MATRICS Grant (2022)
- SERB Start-up Research Grant (2022)
- IIT-ISM Dhanbad, Faculty Research Scheme Initiation Grant
- ICAM Junior Travel Award (2014)
- Department of Science and Technology, Government of India, International Travel Fellowship award (January 2013)
- Best Poster Award, JNC In-House Symposium, JNCASR, Bangalore, India (2012)
- Poster Award, JNC Research Conference, Kerala, India (30 September 2012 - 2 October 2012)
- December, 2010 Awarded *Junior Research Fellowship* and *Eligibility for Lectureship* by Council of Scientific and Industrial Research (CSIR), Government of India (All India rank - 23)
- Babu Mathru Prasad Scholarship: Best Integrated PhD Student, JNCASR Bangalore, India (2009)

Teaching Experience

- Instructor: Engineering Physics (Classical Mechanics) (Course offered to First year Under-Graduate students (BTech Engg. Phys.); IIT(ISM) Dhanbad (Monsoon Semester (2024-2025)
- Instructor: Computation and Simulation Lab (Course offered to MSc Physics students; IIT(ISM) Dhanbad (Monsoon Semester (2021-2022, 2022-2023)
- Instructor: Nuclear Physics and Engineering (Course offered to Under-Graduate students (BTech Engg. Phys.); IIT(ISM) Dhanbad (Winter Semester (2021-2022, 2022-2023)
- Instructor: Physics of Phase Transformations (Course offered to Graduate students (JRF); IIT(ISM) Dhanbad (Monsoon Semester (2021-2022, 2022-2023)
- Instructor: Research Methodology and Statistics (Course offered to Graduate students (JRF); IIT(ISM) Dhanbad (Winter Semester (2021-2022, 2022-2023)
- Instructor: Electricity and Magnetism Lab, (Course offered to Under-Graduate students (BTech Engg. Phys.); IIT(ISM) Dhanbad (Winter Semester (2021-2022)
- Instructor: Quantum Mechanics (Course offered to Integrated Mtech Students; IIT(ISM) Dhanbad (Monsoon Semester (2021-2022)
- Guest Lecturer in Advanced Condensed Matter Physics (Graduate Students, SJTU); Instructor: Prof. Wei Ku; Semester: February-June 2017

PhD students under supervision

- Ankur Majumder (Awarded PMRF)
- Aminul Hussain (under DST-SERB SRG project)
- Prithwish Karak
- Tirthankar Ghosh

Recent Invited Talks

- "EQCMP 2024 conference" at IoP, Bhubaneswar (2024)
- "Young Investigators Meet Quantum Condensed Matter Theory", (IISER Bhopal, 2023)
- National Conference on Quantum Condensed Matter, QMAT 2023 (NISER)
- "Physics of Strongly Correlated Systems", IISER Pune (March 2023)
- "Evolution of Electronic Structure Theory and Experimental Realization", SRM University Chennai and IIT Madras, Delivered 2 lectures (January 2023)
- "Young Investigators Meet Quantum Condensed Matter Theory", (NISER, November 2022)
- National Conference on Quantum Condensed Matter, QMAT 2021 (IIT Bombay and TIFR, Mumbai)