

Sourav Nandy

Curriculum Vitae

Contact

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Condensed Matter Division
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Personal Details

Date of birth: April 28, 1991
Nationality: Indian
Sex: Male

Education and Experience

2024-Present	Guest Scientist Condensed Matter Division Max Planck Institute for the Physics of Complex Systems Dresden, Germany
2021-2024	Research Associate Theoretical Physics Department (F1) Jožef Stefan Institute Ljubljana, Slovenia
2019-2021	Project Research Scientist (funded by the Max Planck Partner Group at IITB) Department of Physics Indian Institute of Technology, Bombay Bombay, India
2016-2019	Senior Research Fellow School of Physical Sciences (Department of Theoretical Physics) Indian Association for the Cultivation of Science Kolkata, India
2014-2016	Junior Research Fellow School of Physical Sciences (Department of Theoretical Physics) Indian Association for the Cultivation of Science Kolkata, India
2012-2014	M.Sc. (Masters) in Physics, Indian Institute of Technology, Kharagpur Kharagpur, India
2009-2012	B.Sc. (Honours) in Physics, Serampore College (affiliated to University of Calcutta) Serampore, India

Ph.D. Thesis

Thesis Award Date: 16th September, 2020

Title: Correlations, Dynamics and Entanglement In Strongly Correlated Spin Systems.

Thesis Supervisor: Prof. Arnab Sen (IACS, Kolkata, India.)

Awards and Fellowships

2009-2014	INSPIRE scholarship by DST (Department of Science and Technology, India)
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Research Interests

1. Transport in quantum spin systems.
2. Machine Learning in many-body physics.
3. Quantum many-body scars.
4. Periodically and aperiodically driven quantum spin chains.
5. Quantum Criticality.

List of publications:

1. **Eigenstate Gibbs ensemble in integrable quantum systems**
Sourav Nandy, Arnab Sen, Arnab Das, and Abhishek Dhar
[Physical Review B 94, 245131 \(2016\)](#).
DOI: <https://doi.org/10.1103/PhysRevB.94.245131>
2. **Entanglement generation in periodically driven integrable systems: Dynamical phase transitions and steady state**
Arnab Sen, Sourav Nandy, and Krishnendu Sengupta
[Physical Review B 94, 214301 \(2016\)](#).
DOI: <https://doi.org/10.1103/PhysRevB.94.214301>
3. **Aperiodically Driven Integrable Systems and Their Emergent Steady States**
Sourav Nandy, Arnab Sen, and Diptiman Sen
[Physical Review X 7, 031034 \(2017\)](#).
DOI: <https://doi.org/10.1103/PhysRevX.7.031034>
4. **Periodically driven integrable systems with long-range pair potentials**
Sourav Nandy, Krishnendu Sengupta, and Arnab Sen
[Journal of Physics A: Mathematical and Theoretical 51, 334002 \(2018\)](#).
DOI: [10.1088/1751-8121/aaced6](https://doi.org/10.1088/1751-8121/aaced6)
5. **Steady states of a quasiperiodically driven integrable system**
Sourav Nandy, Arnab Sen and Diptiman Sen
[Physical Review B 98, 245144 \(2018\)](#).
DOI: <https://doi.org/10.1103/PhysRevB.98.245144>
6. **Transport across junctions of pseudospin-one fermions**
Sourav Nandy, Krishnendu Sengupta and Diptiman Sen
[Physical Review B 100, 085134 \(2019\)](#).
DOI: <https://doi.org/10.1103/PhysRevB.100.085134>
7. **Collapse and revival of quantum many-body scars via Floquet engineering**
Bhaskar Mukherjee, Sourav Nandy, Arnab Sen, Diptiman Sen and Krishnendu Sengupta
[Physical Review B 101, 245107 \(2020\)](#).
DOI: <https://doi.org/10.1103/PhysRevB.101.245107>
8. **Dephasing in strongly disordered interacting quantum wires**
Sourav Nandy, Ferdinand Evers and Soumya Bera
[Physical Review B 103, 085105 \(2021\)](#).
DOI: <https://doi.org/10.1103/PhysRevB.103.085105>

9. **From dissipationless to normal diffusion in easy-axis Heisenberg spin chain**
Peter Prelovšek, Sourav Nandy, Zala Lenarčič, Marcin Mierzejewski and Jacek Herbrych
[Physical Review B 106, 245104 \(2022\)](#).
DOI: <https://doi.org/10.1103/PhysRevB.106.245104>
10. **Spin diffusion in perturbed isotropic Heisenberg spin chain**
Sourav Nandy, Zala Lenarčič, Enej Ilievski, Marcin Mierzejewski, Jacek Herbrych, and Peter Prelovšek
[Physical Review B 108, L081115 \(2023\)](#).
DOI: <https://doi.org/10.1103/PhysRevB.108.L081115>
11. **The spin-1/2 XXZ chain coupled to two Lindblad baths: Constructing nonequilibrium steady states from equilibrium correlation functions**
T. Heitmann, J. Richter, Fengping Jin, **S. Nandy**, Z. Lenarčič, J. Herbrych, K. Michielsen, H. D. Raedt, Jochen Gemmer, R. Steinigeweg
[Physical Review B 108, L201119 \(2023\)](#).
DOI: <https://doi.org/10.1103/PhysRevB.108.L201119>
12. **Quantum state complexity meets many-body scars**
Sourav Nandy, Bhaskar Mukherjee, Arpan Bhattacharyya, Aritra Banerjee
[Journal of Physics: Condensed Matter 36, 155601\(2024\)](#).
DOI: [10.1088/1361-648X/ad1a7b](https://doi.org/10.1088/1361-648X/ad1a7b)
13. **Reconstructing effective Hamiltonians from nonequilibrium (pre-)thermal steady states**
Sourav Nandy, Markus Schmitt, Marin Bukov, Zala Lenarčič
[arXiv: 2308.08608\(2023\)](#)
14. **Weak universality, quantum many-body scars and anomalous infinite-temperature autocorrelations in a one-dimensional spin model with duality**
Adithi Udupa, Samudra Sur, **Sourav Nandy**, Arnab Sen, Diptiman Sen
[Physical Review B 108, 214430 \(2023\)](#).
DOI: <https://doi.org/10.1103/PhysRevB.108.214430>
15. **Emergent dipole moment conservation and subdiffusion in tilted chains**
S. Nandy, J. Herbrych, Z. Lenarčič, A. Głódkowski, P. Prelovšek, M. Mierzejewski
[Physical Review B 109, 115120 \(2024\)](#).
DOI: <https://doi.org/10.1103/PhysRevB.109.115120>
16. **Lindblad dynamics from spatio-temporal correlation functions in nonintegrable spin-1/2 chains with different boundary conditions**
T. Heitmann, J. Richter, Fengping Jin, **S. Nandy**, J. Herbrych, K. Michielsen, H. D. Raedt, Jochen Gemmer, R. Steinigeweg
[arXiv:2402.18177\(2024\)](#)
17. **Einstein relation for subdiffusive relaxation in Stark chains**
Peter Prelovšek, **Sourav Nandy**, Marcin Mierzejewski
[arXiv:2403.18906\(2024\)](#)

Google Scholar Page:

The url address of my google scholar page is : <https://scholar.google.co.in/citations?user=zyfSSfcAAAAJ&hl=en>

Computational Skills:

Algorithms: I am familiar with Numerical Solution of Differential Equations, Exact Diagonalization, kernel polynomial method (KPM), Krylov space techniques Lanczos method) for time evolution of many-body quantum systems, matrix product state technique such as time evolving block decimation (TEBD) for both open and closed systems, density matrix renormalization group (DMRG) and unsupervised machine learning using Autoencoder (AE) neural network.

Languages: I am familiar with Python, PyTorch, Julia, C.

Packages: I am familiar with packages such as QuSpin, TenPy, ITensor (Julia Version).

Teaching Experience

- Teaching Assistant for the course 'Statistical Mechanics-I' (meant for MSc. students), Indian Association for the Cultivation of Science, Kolkata, 2019.
- Lecturing on "Open quantum systems" at "Specialistični seminar teoretične fizike" at Faculty for mathematics and physics, University of Ljubljana, April 2022.

Participation in Schools, Conferences and Workshops

1. **School on Topological Quantum Matter organized by HRI, Allahabad.**
Harish Chandra Research Institute, Allahabad, India
9th to 21st February, 2015
2. **School On Current Frontiers in Condensed Matter Research organized by ICTS, Bangalore**
International Centre for Theoretical Sciences, Bangalore, India
20th to 29th June, 2016
3. **Indian Statistical Physics Community Meeting organized by ICTS, Bangalore**
International Centre for Theoretical Sciences, Bangalore, India
17th to 19th February, 2017
4. **School and Conference on Frustrated Magnetism organized by IMSc, Chennai**
Institute of Mathematical Sciences, Chennai
3rd to 12nd April, 2017
5. **School and Conference on Open Quantum Systems organized by ICTS, Bangalore**
International Centre for Theoretical Sciences, Bangalore, India
17th July to 4th August, 2017
6. **School and Conference on Driven Quantum Systems organized by IACS, Kolkata**
Indian Association for the Cultivation of Science, Kolkata, India
12 to 21 February, 2018
7. **National Conference On Quantum Condensed Matter organized by IISER Mohali**
Indian Institute of Science Education and Research, Mohali, India
25th to 27th July, 2018
8. **Summer School on Collective Behaviour in Quantum Matter organized by ICTP, Trieste**
The Abdus Salam International Centre for Theoretical Physics, Trieste, Italy
27th August to 14th September, 2018
9. **Novel phases of quantum matter**
ICTS, Bangalore
23 December 2019 to 02 January 2020
10. **School on algorithms in lattice gauge theory and spin systems**
Indian Association for the Cultivation of Science, Kolkata
27th January to 1st February, 2020
11. **Young Investigators Meet on Quantum Condensed Matter Theory-2020**
National Institute of Science Education and Research , Bhubaneswar, India (online mode)
15th to 18th December, 2020

12. **Non-equilibrium Quantum Workshop**
Krvavec, Slovenia
12th to 16th December, 2021

13. **Quantum Many-Body Physics in the presence of an environment (openqmbp2022)**
University of Cergy, Neuville sur Oise, France
7th to 9th June, 2022

14. **SPICE-Workshop on Non-Equilibrium Emergence in Quantum Design**
Ingelheim, Germany
21st to 23rd June, 2022

15. **Many-body systems out of equilibrium: recent advances and future directions, 2022**
Logarska Dolina, Slovenia
19th to 23th September, 2022

16. **New Perspective in the out-of-equilibrium dynamics of open many-body quantum systems (open-qmbp2023)**
Institut Pascal (Saclay), France
12th to 30th June, 2023

17. **School on Quantum Many-Body Phenomena out of Equilibrium: from Chaos to Criticality**
ICTP, Trieste, Italy
21st August to 1st September, 2023

Academic Visits

1. **Max Planck Institute for the Physics of Complex Systems, Dresden, Germany**
1st to 30th September, 2017

2. **Indian Institute of Technology, Kanpur, India**
6th to 13th April, 2018

3. **Indian Institute of Technology, Bombay, India**
January, 2023

4. **Karlsruhe Institute of Technology, Germany**
20-22 November, 2023

5. **Max Planck Institute of Quantum Optics, Garching, Germany**
November, 2023

6. **Budapest University Of Technology and Economics, Budapest, Hungary**
January, 2024

7. **Indian Association for the Cultivation of Science, Kolkata, India**
March, 2024

Contributed Presentations

1. School and Conference on Driven Quantum Systems, IACS, Kolkata, India, 2018
Title: Aperiodically Driven Integrable Systems and Their Emergent Steady States
2. Indian Institute of Technology, Kanpur, India, 2018
Title: Some Aspects of Driven Integrable Quantum Systems: Entanglement Generation, Dynamical Transitions and Emergent Steady States
3. National Conference On Quantum Condensed Matter, IISER, Mohali, India, 2018
Title: Aperiodically Driven Integrable Systems and Their Emergent Steady States
4. Young Investigators Meet on Quantum Condensed Matter Theory-2020, organised by National Institute of Science Education and Research , Bhubaneswar, India (online mode)
Title: Dephasing in strongly disordered interacting quantum wires.
5. Non-equilibrium Quantum Workshop, Krvavec, Slovenia, 2021
Title: Study of critical dynamics close to the many-body localisation transition.
6. Many-body systems out of equilibrium: recent advances and future directions, 2022, Logarska Dolina, Slovenia, 2022
Title: Autoencoder-assisted learning of Hamiltonians.
7. Indian Institute of Technology, Bombay, India, 2023
Title: Spin Transport in Perturbed Integrable Quantum Chains.
8. Ljubljana-Trieste-Zagreb meeting, March 2023, Jožef Stefan Institute
Title: Spin Transport in Perturbed Integrable Quantum Chains.
9. Openqmbp2023, Institut Pascal (Saclay), France
Title: Spin Transport in Perturbed Integrable Quantum Chains.
10. Department of physics, Karlsruhe Institute of Technology, Germany
Title: Transport in Perturbed Integrable Quantum Spin Systems.
11. School of Physical Science, Indian Association for the Cultivation of Science, Kolkata, India
Title: Anomalous Spin Transport in Quantum Spin Systems.

Contributed Posters

1. Indian Statistical Physics Community Meeting, ICTS, Bangalore, India, 2017
Title: Eigenstate Gibbs ensemble in integrable quantum systems
2. Summer School on Collective Behaviour in Quantum Matter, ICTP, Trieste, Italy, 2018
Title: Aperiodically Driven Integrable Systems and Their Emergent Steady States
3. Quantum Many-Body Physics in the presence of an environment (openqmbp2022), CY Advanced Studies, University of Cergy, Neuville sur Oise, France, 2022
Title: From dissipationless to normal diffusion in easy-axis Heisenberg spin chain.
4. SPICE-Workshop on Non-Equilibrium Emergence in Quantum Design, Ingelheim, Germany, 2022
Title: From dissipationless to normal diffusion in easy-axis Heisenberg spin chain.