

Dr. Avijit Misra

Curriculum Vitae

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Personal Information

Date of Birth January 20, 1989
Nationality Indian
Address Ramnagar, Baidyapur, Purba Bardhaman, West Bengal-713122, India

Academic and professional qualifications

Sep 2024–Present **Assistant professor, Department of Physics, IIT (ISM) Dhanbad**, Dhanbad, India.
Dec 2023–Present **Visiting scientist at CQuERE, TCG CREST**, Kolkata, India.
Oct 2018–Sept 2023 **Post-doctoral fellow in the Department of Chemical and Biological Physics, The Weizmann Institute of Science**, Rehovot, Israel
In Prof. Gershon Kurizki's group.
Feb 2018–Mar 2018 **Visiting post-doctoral fellow in the Department of Chemical and Biological Physics, The Weizmann Institute of Science**, Rehovot, Israel
In Prof. Gershon Kurizki's group.
Jan 2017–Sept 2018 **Post-doctoral fellow in the Optics and Quantum Information group, The Institute of Mathematical Sciences**, Chennai, India
Under the mentorship of Prof. Sibasish Ghosh.
2012–2016 **Ph.D. in Physics, Harishchandra Research Institute**, Prayagraj, India
Under the supervision of Prof. Arun Kumar Pati.
Thesis title: Thermodynamic Aspects of Quantum Coherence and Correlations.
2009–2012 **M.Sc. in Physics, 1st Class, Harishchandra Research Institute**, Prayagraj, India
As a part of the integrated Ph.D. program of the institute.
2006–2009 **B.Sc. in Physics, 1st Class, Calcutta University**, Kolkata

Professional responsibilities

2016–Present **Journal Refereeing**; supported by **Web of Science**: APS (PRX Quantum, PRL, PRA, PRB, PRE, PRR- (since 2018)); Quantum (since 2020); Quantum Information Processing (since 2016); Entropy (since 2020).
Dec 2015 **Local Organizing Committee**, Meeting on Quantum Information Processing and Applications, Harish-Chandra Research Institute, Prayagraj, India.
Feb 2015 **Local Organizing Committee**, Young Quantum, Harish-Chandra Research Institute, Prayagraj, India.
Dec 2013 **Local Organizing Committee**, Meeting on Quantum Information and Applications, Harish-Chandra Research Institute, Prayagraj, India.
2023–Present Lifetime member of **American Physical Society (APS)**

Awards and fellowships

- Aug 2024 Assistant professor position at the Jaypee Institute of Information Technology, Noida, India (Forfeited).
- Jun 2023 Research Fellow, Grade 2 at the Centre for Quantum Dynamics, Griffith University, Brisbane, Australia in Prof. Howard Wiseman's group (Forfeited).
- May 2018 Postdoctoral Fellowship at the University of Hong Kong, Hong Kong in Prof. Giulio Chiribella's group (Forfeited).
- Nov 2017 Postdoctoral Fellowship at the University of Warsaw, Poland in Prof. Rafal Demkowicz-Dobrzanski's group (Forfeited).
- Aug 2016 Infosys Prize of HRI for **excellence in research in Quantum Information**.

Teaching experience

- Mar-Sept 2019 Teaching assistant to Prof. Gershon Kurizki and Prof. Ronnie Kosloff - Quantum Thermodynamics and open systems for graduate students.
- Jan-May 2014 Teaching assistant to Prof. Jayanta Kr. Bhattacharjee - Statistical Mechanics for graduate students.
- Aug-Dec 2013 Teaching assistant to Prof. Aditi Sen(De) - Quantum Information for graduate students.

Other achievements

- July 2009 Selected for integrated PhD program in TIFR, Mumbai.
- July 2009 Secured all India rank: 47 in IIT-JAM, 9 in IIT-Geophysics, 10 in Geophysics, ISM, Dhanbad.

Publications in peer reviewed journals

- 15. Black-hole Powered Quantum Coherent Amplifier, **A. Misra***, P. Chattopadhyay, A. Svidzinsky, Marlan O. Scully, G. Kurizki, npj Quantum Information (Nature) **10**, 34 (2024)
DOI: <https://doi.org/10.1038/s41534-024-00817-w>
- 14. Nonlinear Coherent Heat Machines, T. Opatrny, Š. Bräuer, A.G. Kofman, **A. Misra***, N. Meher, O. Firstenberg, E. Poem, G. Kurizki, **Science Advances** **9(1)**, eadf1070 (2023)
DOI: <https://www.science.org/doi/10.1126/sciadv.adf1070>
- 13. Work Extraction from Single-mode Thermal Noise by Measurements: How Important is Information?, **A. Misra***, T. Opatrny, G. Kurizki, **Phys. Rev. E** **106**, 054131 (2022)
DOI: <https://doi.org/10.1103/PhysRevE.106.054131>
- 12. Work Generation from Thermal Noise by Quantum Phase-Sensitive Observation, T. Opatrny, **A. Misra***, G. Kurizki, **Phys. Rev. Lett.**, **127** (4), 040602 (2021).
DOI: <https://doi.org/10.1103/PhysRevLett.127.040602>
- 11. Minimal Quantum Heat Manager Boosted by Bath Spectral Filtering, M. T. Naseem, **A. Misra**, O. E. Müstecaplıoğlu, G. Kurizki, **Phys. Rev. Res.**, **2** (3), 033285 (2020).
DOI: <https://doi.org/10.1103/PhysRevResearch.2.033285>
- 10. Two-body Quantum Absorption Refrigerators with Optomechanical-like Interactions, M. T. Naseem, **A. Misra**, O. E. Müstecaplıoğlu, **Quantum Science and Technology**, **5(3)**, 035006 (2020).
DOI: <https://iopscience.iop.org/article/10.1088/2058-9565/ab8d89>

- 9. Necessarily Transient Quantum Refrigerator, S. Das, **A. Misra**, A.K. Pal, A. Sen(De), U. Sen, **Europhysics Letters**, **125**, 20007 (2019).
DOI: <https://iopscience.iop.org/article/10.1209/0295-5075/125/20007>
- 8. Quantum Speed Limit Constraints on a Nanoscale Autonomous Refrigerator, C. Mukhopadhyay, **A. Misra**, S. Bhattacharya, A. K. Pati, **Phys. Rev. E** **97**, 062116 (2018).
DOI: <https://doi.org/10.1103/PhysRevE.97.062116>
- 7. Dynamics and Thermodynamics of a Central Spin Immersed in a Spin Bath, C. Mukhopadhyay, S. Bhattacharya, **A. Misra**, A.K. Pati, **Phys. Rev. A**, **96**, 052125 (2017).
DOI: <https://doi.org/10.1103/PhysRevA.96.052125>
- 6. Exact Master Equation for a Spin Interacting with a Spin Bath: Non-Markovianity and Negative Entropy Production Rate, S. Bhattacharya, **A. Misra***, C. Mukhopadhyay, A.K. Pati, **Phys. Rev. A** **95**, 012122 (2017).
DOI: <https://doi.org/10.1103/PhysRevA.95.012122>
- 5. Complementarity between Tripartite Quantum Correlation and Bipartite Bell Inequality Violation in Three Qubit States, P. Pandya, **A. Misra***, I. Chakrabarty, **Phys. Rev. A** **94**, 052126 (2016).
DOI: <https://doi.org/10.1103/PhysRevA.94.052126>
- 4. Generalized Geometric Measure of Entanglement for Multiparty Mixed States, T. Das, S.S. Roy, S. Bagchi, **A. Misra**, A. Sen De, U. Sen, **Phys. Rev. A** **94**, 022336 (2016).
** Authors list has been decided based on seniority and surname
DOI: <https://doi.org/10.1103/PhysRevA.94.022336>
- 3. Energy Cost of Creating Quantum Coherence, **A. Misra***, U. Singh, S. Bhattacharya, A.K. Pati, **Phys. Rev. A** **93**, 052335 (2016).
DOI: <https://doi.org/10.1103/PhysRevA.93.052335>
- 2. Quantum Rényi Relative Entropies Affirm Universality of Thermodynamics, **A. Misra***, U. Singh, M. N. Bera, A.K. Rajagopal, **Phys. Rev. E** **92**, 042161 (2015).
DOI: <https://doi.org/10.1103/PhysRevE.92.042161>
- 1. Quantum Correlation with Sandwiched Relative Entropies: Advantageous as Order Parameter in Quantum Phase Transitions, **A. Misra**, A. Biswas, A.K. Pati, A. Sen De, U. Sen, **Phys. Rev. E** **91**, 052125 (2015).
DOI: <https://doi.org/10.1103/PhysRevE.91.052125>

* denotes the articles corresponded by me.

Preprints and submitted

- 7. Towards Nonlinear Quantum Thermodynamics, G. Kurizki, N. Meher, **A. Misra**, D.B.R. Dasari, T. Opatrny Submitted to **EPJ-ST**

- 6. Sensing Multiatom Networks in Cavities via Photon-induced Excitation Resonance, P Chattopadhyay, **A. Misra**, S Sur, D Petrosyan, G Kurizki, (PC, SS and AM contributed equally), arXiv:2411.09465 (2024); Submitted to **Quantum Science and Technology**
- 5. Many-body Quantum Thermal Machines in a Lieb-Kagome Hubbard Model, S. Sur, P. Chattopadhyay, M. Karmakar, **A. Misra***, arXiv:2404.19140 (2024); Submitted to **Phys. Rev. B**.
- 4. Reversible Work Extraction from a Single-mode Hot Beam, **A. Misra***, T. Opatrny, G. Kurizki, To be resubmitted to **Entropy** after revision
- 3. Thermodynamics of Computation and Information Theory: Recent Progress, P. Chattopadhyay, **A. Misra**, G. Paul, (PC and AM contributed equally), To be resubmitted to **Reports on Progress in Physics** after revision
- 2. Quantum Nonlocality does not Demand All-out Randomness in Measurement Choice, M. Banik, S. Kunkri, **A. Misra**, S.S. Bhattacharya, A. Roy, A. Mukherjee, S. Ghosh, G. Kar, arXiv:1707.05339 (2017); Under revision
DOI: <https://arxiv.org/abs/1707.05339>
- 1. Erasing Quantum Coherence: An Operational Approach, U. Singh, M. N. Bera, **A. Misra**, A.K. Pati, arXiv:1506.08186 (2015); To be submitted to **Quantum Science and Technology**.
DOI: <https://arxiv.org/abs/1506.08186>

Google scholar profile link: <https://scholar.google.co.in/citations?user=7IDkF8gAAAAJ&hl=en>

Edited special issue in Entropy

Oct 2022- A Special Issue "Quantum Thermodynamics: Fundamentals and Applications" in Entropy as a Guest Editor: https://www.mdpi.com/journal/entropy/special_issues/B1967Q60N1, along with **Prof. Tapio Ala-Nissila** from Aalto university, Finland <https://scholar.google.co.in/citations?user=t7IMCI4AAAAJ&hl=en>, and Loughborough University, UK <https://www.lboro.ac.uk/departments/maths/staff/tapio-ala-nissila/>

Presentations at conferences, workshops, and academic visits

Jun 2023 *Invited* oral presentation titled *Nonlinear coherent heat machines*, at the **Quantum Information and Quantum Technology (QIQT) conference -2023**, IISER-Kolkata, Kolkata, India.

Feb 2023 *Invited* oral presentation titled *Work extraction from thermal noise by measurements and nonlinear interactions in quantum optical setups*, at the **Quantum Optics and Information Meeting-7 (KOBIT-7)-2023**, Eskisehir, Turkey.

Jun 2022 *Invited* oral presentation titled *Work Extraction from Single-mode Thermal Noise by Measurements: How Important is Information?*, at the **Quantum Information and Quantum Technology (QIQT) -2022**, IISER-Kolkata, Kolkata, India.

May 2022 Seminar titled *Work Extraction from Single-mode Thermal Noise by Measurements: How Important is Information?*, at **IIT-Gandhinagar**, India.

- Feb 2020 Oral presentation titled *Work Generation from Thermal Noise by Quantum Phase-Sensitive Observation*, at the **Young Quantum-2020**, Harish-Chandra Research Institute, Prayagraj, India.
- Oct 2019 Oral presentation titled *Minimal Quantum Heat Manager Boosted by Bath Spectral Filtering*, at the Conference on **Quantum Foundations, Technology and Applications**, IISER-Mohali, Mohali, India.
- Jun 2019 Poster presentation titled *Energy cost of creating coherence*, at the **Masterclass: Quantum Communication and Computation with Continuous Variables**, Centre for the Mathematics of Quantum Theory, University of Copenhagen, Copenhagen, Denmark.
- Jan-Feb 2018 Oral presentation titled *Quantum speed limit constraints on a nanoscale autonomous refrigerator*, at the **International Symposium on New Frontiers in Quantum Correlations**, S. N. Bose National Centre for Basic Sciences, Kolkata, India.
- Dec 2017 Presented poster titled *Entanglement vs. Bell nonlocality in genuinely entangled multipartite systems*, at the **International Conference on Quantum Foundations**, National Institute of Technology, Patna, India.
- Sept 2017 Oral presentation titled *Energy cost of creating quantum coherence*, at the **Advanced School and Workshop on Quantum Science and Quantum Technologies**, ICTP, Trieste, Italy.
- Mar 2017 Oral presentation titled *Role of quantum coherence and correlations in thermodynamics*, at the **Physics and Applied Mathematics Researchers' Meet**, Indian Statistical Institute, Kolkata, India.
- Feb 2017 Oral presentation titled *Complementarity between tripartite quantum correlation and bipartite Bell-inequality violation in three-qubit states* at the **Young Quantum**, Harish Chandra Research Institute, Prayagraj, India.
- Jun 2016 **Seminar** titled *Multipartite quantum entanglement vs. Bell nonlocality*, at the Institute for Quantum Optics and Quantum Information, Vienna, Austria.
- Feb 2015 Presented poster titled *Geometric measure of entanglement*, at the **Young Quantum**, Harish Chandra Research Institute, Prayagraj, India.
- Dec 2014 **Seminar** titled *Quantum Correlation with Generalized Relative Entropies: Advantageous to Study Quantum Phase Transitions*, at the Institute of Physics, Bhubaneswar, India.
- Nov 2014 Oral Presentation titled *Quantum Correlation with Sandwiched Relative Entropies: Advantageous as Order Parameter in Quantum Phase Transitions*, at the **One-Day with Quantum Information, Workshop**, Harish-Chandra Research Institute, Prayagraj, India.
- Jul 2014 **Seminar** titled *Quantum Correlation with Sandwiched Relative Entropies*, at the Indian Institute of Information Technology, Hyderabad, India.
- Feb 2014 Presented poster titled *Predictive Information for Driven Quantum Systems*, at the **International Program on Quantum Information**, Institute of Physics, Bhubaneswar, India.
- Jan 2013 Presented poster titled *Remote state preparation in relativistic scenario*, at the **International Conference on Quantum Information and Quantum Computing**, Indian Institute of Science, Bangalore, India.
- Dec 2011 Presented poster titled *Evolution of quantum discord*, at the **International School and Conference in Quantum Information**, Institute of Physics, Bhubaneswar, India.
- Feb 2011 Presented poster titled *Generalized Geometric Measure for mixed states*, at the **Quantum Information Processing and Applications**, Harish-Chandra Research Institute, Prayagraj, India.

References

- **Prof. Gershon Kurizki**

(Postdoc mentor)

Recipient of the W.E. Lamb Award (2008) and the Humboldt-Meitner Award (2009).

Fellow of the Optical Society of America, the American Physical Society, and the UK Institute of Physics.

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- **Prof. Özgür E. Müstecaplıoğlu**

Recipient of Distinguished Young Scientist Award of Turkish Academy of Sciences and TÜBİTAK Encouragement Award, Vice-President of International Commission for Optics, Turkey Chapter.

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- **Prof. Tomáš Opatrný**

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