

Dr. Rahul Shastri

Curriculum Vitae

Palacký University Olomouc
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Current Position and Responsibilities

I am currently a postdoctoral researcher at Palacký University Olomouc at Czech Republic working on quantum thermodynamics.

Research Interests

Open quantum systems, Quantum thermodynamics, Non-equilibrium statistical mechanics, Quantum Optics

Education

2018-2023 **Ph.D. Physics, IIT Gandhinagar, India.**

Thesis: *Optimisation of Quantum Thermal Machines and Batteries* In my thesis I have explored several problems focusing on optimizing and bringing out unique quantum features of quantum heat engines and quantum batteries. Developed analytical models and performed numerical simulations using framework of *open quantum systems* and *quantum thermodynamics*.

2015-2017 **M.Sc. Physics, IIT Gandhinagar, India.**

Thesis: *Gauge-Higgs Unification models* Investigated models where the Higgs boson arises from extra-dimensional gauge fields by symmetry breaking mechanisms. Explored phenomenological implications of the model.

Internship/Work Experience

Jan-Jun 2018 **Project Assistant, IIT Gandhinagar, India.**

Project: *Zero-Carbon Solar-powered Hydrogen Production via Plasmonic Nano-antenna Enhanced Photo-catalytic Water-splitting* Working on this project I have gained proficiency in COMSOL Multiphysics and similar simulation techniques for modeling EM absorption/scattering properties of nonmaterial.

Jun-Aug 2016 **Summer Internship, Physical Research Laboratory, Ahmadabad, India.**

Project: *Non-equilibrium statistical mechanics and Langevin equation* During this project I have encountered the Langevin equation for the first time, which sparked my interest in non-equilibrium thermodynamics, a field I later pursued during my Ph.D.

Selected Publications/Pre-prints

- (1) **Dephasing enabled fast charging of quantum batteries**, *Rahul Shastri, Chao Jiang, Guo-Hua Xu, B. Prasanna Venkatesh, and Gentaro Watanabe*, [npj Quantum Information](#) 11,9 (2025).

- (2) **Controlling Work Output and Coherence in Finite Time Quantum Otto Engines Through Monitoring**, *Rahul Shastri and B. Prasanna Venkatesh*, [Phys. Rev. E 109, 014102 \(2024\)](#).
- (3) **Optimization of asymmetric quantum Otto engine cycles**, *Rahul Shastri and B. Prasanna Venkatesh*, [Phys. Rev. E 106, 024123 \(2022\)](#).

Academic Achievements

- 2018 **JEST(Joint Entrance Screening Test)**, Conducted by Science Engineering Research Board (SERB) for admission in Ph.D/Int. Ph.D in physics, Secured all India rank 59.
- 2017 **Batch Topper**, Secured highest CPI in M.Sc physics 2015 batch at IIT Gandhinagar.
- 2015 **JAM(Joint Admission Test)**, conducted for admission in PG at IITs and Integrated Ph.D at IISc, Secured all India rank 180.

Teaching Assistance

- 2023 Graduate Teaching Fellow (Mathematical Methods of Physics-I) at IIT Gandhinagar
- 2023 TA (Quantum Mechanics II) at IIT Gandhinagar
- 2022 TA (Quantum Mechanics I) at IIT Gandhinagar
- 2020 TA (Statistical Mechanics) at IIT Gandhinagar

Conference and Workshops

- 7-10 Nov 2023 **Conference**, *EQUS, Quantum Thermodynamics Down Under 2023*, Brisbane, Queensland, Australia.
- 8-11 Jun 2023 **Summer School**, *IIT Kharagpur, School on Nonlinear Physics and Statistical Physics*.
- 5-7 Jun 2023 **Conference**, *IIT Kharagpur, Meeting On Statistical Physics and Complex Systems*.
- 8-11 Dec 2019 **Conference**, *IIT Jodhpur, Quantum Information and Computation*.
- Feb 2016 **GIAN Course**, *IIT Gandhinagar*, Course title *Tunable Diode Laser Spectroscopy for Sensing - Principles and Applications* by Prof Walter Johnston.

Talk/Poster

- 16 Mar 2024 **Physics Symposium**, *IIT Gandhinagar*, Talk titled *Quantum Thermodynamics of Quantum Thermal Machines and Quantum Batteries*.
- 7-10 Nov 2023 **Conference talk**, *Quantum Thermodynamics Down Under 2023, Brisbane, Queensland, Australia, EQUS*, Talk titled : *Controlling coherence in finite time Quantum Otto engine through monitoring*.
- June 2023 **Conference poster**, *MeetStatphysIndia 2023, Meeting On Statistical Physics and Complex System, IIT Kharagpur*, Poster presentation titled: *Optimization of asymmetric quantum otto engine cycles*.

28-29 Dec **YOUNG PHYSICISTS MEET 2022 (Online)**, *Invited Talk, Organized by Students*, Talk title: *Quantum Heat Engines*.

Computer Skills

Languages Python, \LaTeX , Wolfram Mathematica, C, C++, Origin
Libraries NumPy, Pandas SciPy, matplotlib, Qiskit, Qutip
OS Linux, MacOS, Windows
Languages English, Hindi, Gujarati

References

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