



Akash Shivaji Pawar

PhD Scholar(Physics)

Indian Institute of Technology Madras (IIT Madras)

Research Area: *Condensed Matter Physics, Magnetocaloric Effect in Rare-Earth Magnetic Materials*

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Academic & Online Profiles

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- OSF Preprints: [Akash Shivaji Pawar](#)
- Zenodo: <https://zenodo.org/>
- PhilArchive: <https://philarchive.org/>
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Research Interests

My primary research interest lies in condensed matter physics, with a particular focus on the magnetocaloric effect and magnetic refrigeration based on rare-earth magnetic materials. My work is directed toward understanding magnetic phase transitions, entropy changes, and thermodynamic properties relevant to energy-efficient solid-state cooling technologies.

Alongside my formal doctoral research, I maintain strong independent scholarly interests in mathematics and philosophy, which I pursue as part of my broader intellectual engagement with science. These interests contribute to a deeper conceptual understanding of physical theories and research methodology, although they are pursued independently and not as part of my enrolled doctoral programme.

Education

- **Doctor of Philosophy (PhD) in Physics** **(2025 – Present)**
Indian Institute of Technology Madras (IIT Madras)

CGPA: 7.50 — Status: Ongoing

- **Master of Science (M.Sc.) in Physics** (2022 – 2024)
Indian Institute of Technology Mandi
CGPA: 6.86
- **Bachelor of Science (B.Sc.) in Physics, Chemistry & Mathematics (PCM)** (2019 – 2022)
Rajmata Jijau College, Madalmohi, Georai
Babasaheb Ambedkar Marathwada University
Percentage: 70.59%
- **Higher Secondary Certificate (HSC) — Science (PCM)** (2018 – 2019)
Sundarrao Solunke Mahavidyalay, Majalgaon
Maharashtra State Board
Percentage: 67.38%
- **Secondary School Certificate (SSC) — Semi-English Medium** (2016 – 2017)
St. Xavier's School, Georai
Maharashtra State Board
Percentage: 92.40%

National Level Qualifications

- **CSIR–NET Examination — Mathematics** (June 2025)
Qualified — Qualified Rank: 84
- **CSIR–NET Examination — Physics** (December 2024)
JRF Qualified — Qualified Rank: 260
- **GATE — Mathematics** (2024)
Qualified — Qualified Rank: 245
- **CSIR–NET Examination — Physics** (December 2023)
JRF Qualified — Qualified Rank: 134
- **JEST — Physics** (2023)
Integrated PhD (IPhD) Qualified — Qualified Rank: 127
- **IIT JAM — Physics** (2023)
Qualified — Qualified Rank: 664

- **IIT JAM — Mathematics** (2022)
Qualified — Qualified Rank: 1457

- **IIT JAM — Physics** (2022)
Qualified — Qualified Rank: 994

Research Experience

During my Master of Science (M.Sc.) programme, I carried out my master's thesis on the topic "*Photo-ionization dynamics of atomic systems*" under the supervision of **Prof. Hari Varma**, Department of Physics, Indian Institute of Technology Mandi. This work focused on light-matter interaction and the dynamical response of atomic systems under photo-ionization processes, strengthening my foundation in quantum mechanics and atomic physics.

Subsequently, I undertook a research internship at the **Indian Institute of Technology Hyderabad** under the guidance of **Dr. Alok Kumar Pan**, working in the area of *quantum information and quantum foundations*. This experience involved exploring fundamental conceptual frameworks of quantum theory and their relevance to modern physics.

Currently, as a PhD scholar in the Department of Physics at the **Indian Institute of Technology Madras**, I am pursuing research under the supervision of **Prof. Nirmala R.**. My doctoral research focuses on the magnetocaloric effect in rare-earth based magnetic materials, with the objective of identifying and characterizing materials suitable for efficient magnetic refrigeration through controlled magnetization and demagnetization processes.

Skills

I possess a strong combination of experimental, analytical, and computational skills relevant to condensed matter physics research. I am proficient in scientific writing using $\text{\LaTeX}$ and have working knowledge of programming for data handling and analysis. I have hands-on experience with experimental techniques and instrumentation such as X-ray diffraction (XRD) and Physical Property Measurement System (PPMS) measurements, including magnetization (M-T, M-H), heat capacity, electrical transport, AC susceptibility, and related thermodynamic characterizations. I am also familiar with advanced characterization techniques such as transmission electron microscopy (TEM).

In addition, I am comfortable using modern computational tools, computers, and AI-assisted workflows for research productivity. I am proficient in Marathi, Hindi, and English, with working familiarity in Ghorbuli, Sanskrit, and Bhojpuri. Beyond my core research domain, I maintain interdisciplinary knowledge spanning physics, mathematics, astronomy, philosophy, history of science, environmental science, and geography, which supports a broad and conceptually grounded approach to scientific research.

Academic Activities

I am actively engaged in independent academic research and scholarly development as part of my graduate and doctoral training. My academic activities include continuous literature review, conceptual analysis, and critical engagement with research articles in condensed matter physics and related fields. I disseminate my work through preprint platforms and maintain academic profiles for research visibility, contributing to my ongoing development as an independent researcher.

Publications

- **Akash Shivaji Pawar.** *A Foundational Framework for Understanding the Universe and the Self.* Preprint, 2025. [Zenodo](#) — [PhilArchive](#)
- **Akash Shivaji Pawar.** *A Framework-Guided Conceptual Analysis of Foundational Philosophical Questions.* Preprint, 2025. [Zenodo](#) — [PhilArchive](#)