Abhishek Chilampankunnel Prasannan

(Abhishek C P)

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Education

Ph.D. in Theoretical Condensed Matter Physics, Wayne State University, Detroit, MI — Expected July 2026

M.S. in Physics, Wayne State University, Detroit, MI — 2021 – 2024

M.Sc. in Physics, Mahatma Gandhi University, Kerala, India — 2018 – 2020

B.Sc. in Physics, Mahatma Gandhi University, Kerala, India — 2014 – 2017

Skills

Academic research | LaTeX typesetting and publishing | Python (Kwant, NumPy, SciPy) | Data visualization (Matplotlib) | Lecture delivery | Active learning strategies (peer instruction) | Lab facilitation | LMS-Canvas |

Teaching Experience

Lecturer, Physics – Wayne State University, Detroit, MI — May 2026 – July 2026

- Selected as **Instructor of Record** for Physics for Life Sciences I, an introductory physics course for non-majors, reflecting strong teaching performance and departmental trust in independent course delivery.

Teaching Assistant, Physics – Wayne State University, Detroit, MI — Aug 2021 – April 2026

- Led discussion sections for **300+ students** in Physics for Life Sciences I & II, incorporating **active learning strategies** and collaborative problem-solving.
- Delivered lectures and facilitated problem-solving sessions for **125+ students** in University Physics I & II (calculus-based), enhancing conceptual understanding through structured worksheets and guided discussions.
- Designed and conducted **exam review sessions**, helping students identify key concepts and improve performance.
- Evaluated assignments and exams, ensuring **fair and consistent grading** aligned with university standards.

Lab Instructor, Physics – Wayne State University, Detroit, MI — Aug 2024 – July 2026

- Instructed laboratory courses in Physics for Life Sciences and Descriptive Astronomy, guiding students through experimental procedures and data analysis, and consistently receiving outstanding student evaluations, with feedback highlighting clarity, approachability, and ability to create an inclusive learning environment.
- Managed course logistics using **Canvas**, including assignments, grading, and student communication, ensuring efficient course delivery.

Relevant Coursework

- **GS 7900: Introduction to College Teaching and Learning**, Wayne State University, Detroit, MI
  Studied evidence-based teaching methods, course design, and assessment strategies, with emphasis on **inclusive and student-centered pedagogy**.
- **Peer Instruction: A User's Manual** (Eric Mazur)
  Applied principles of **active learning and peer instruction** to improve student engagement and conceptual understanding.

Research/Technical Experience

Graduate Student, Group of Dr. Alex Matos-Abiague – Dept. of Physics and Astronomy, Wayne State University, Detroit, MI — Jan 2022 – July 2026

- **Thesis:** *Non-reciprocal effects in gated superconductor/semiconductor planar Josephson junctions*
- Developed **tight-binding quantum transport simulations** using **Kwant** to study planar Josephson junctions in proximitized two-dimensional electron gases (2DEGs).

- Investigated the **superconducting diode effect (SDE)** by analyzing the interplay of **spin-orbit coupling (Rashba and Dresselhaus)**, **Zeeman fields**, and **junction geometry**.
- Derived **analytical models for current-phase relations** and validated them against numerical simulations, achieving strong agreement across parameter regimes.
- Explored the role of **crystalline anisotropy** and magnetic field orientation in generating non-reciprocal supercurrents.

Lab Assistant, Materials Science Research Lab, Dept. of Physics, St. Thomas College Aug 2020 – July 2021
Palai, Kerala, India.

- Performed **structural characterization of nanomaterials** using Rigaku Miniflex 600 Powder X-ray Diffractometer (XRD), including phase identification and analysis of crystallographic properties.

Technical Supervisor, R & D Department, MRF Pvt Ltd, Trichy, Tamil Nadu, India. Dec 2017 – Aug 2018

- Supervised manufacturing processes and conducted **material quality control and failure analysis** in tire production.
- Collaborated with R&D teams to ensure compliance with **performance and safety standards**, improving production reliability.

Publications

[1] Signatures of Topological Superconductivity and Josephson Diode Effects on the Magnetocurrent-Phase Relation of Planar Josephson Junctions

B. Pekerten, ***A. C. Prasannan***, A. Matos-Abiague, arXiv:2603.07638, 2026

[2] Crystalline Anisotropic Josephson Diode Effect *(Manuscript in preparation)*

A. C. Prasannan, B. Pekerten, A. Matos-Abiague

Awards and Presentations

- Recipient of the **Alburuj R. Rahman Prize for the Best Ph.D. Dissertation -2026**, Department of Physics and Astronomy, Wayne State University, Detroit, MI.
- Recipient of the **Summer Dissertation Award—2025**, Graduate School, Wayne State University, Detroit, MI.

Oral Presentations

- ABC Seminar, "Josephson Diode Effect in Gated Planar Josephson Junction", Wayne State University, Detroit, MI, 02/20/2024.
- APS March Meeting 2024, "Superconducting diode effect in top-gated Josephson junctions", Minneapolis, MN, 03/08/2024
- 13th Graduate Research Day," Superconducting diode effect in top-gated Josephson junctions", Wayne State University, Detroit, MI, 04/18/2024.

Poster Presentations

- AVS Michigan Chapter Spring Symposium, "Superconducting diode effect in top-gated Josephson junctions", College of Engineering, Wayne State University, Detroit, MI, 05/05/2024
- 12th Graduate Research Day, " Superconducting diode effect in gated Josephson junctions", Department of Physics and Astronomy, Wayne State University, Detroit, MI, 04/20/2023

References