

ROMILA GARGESHWARI

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EDUCATION

University of Wisconsin - Madison

Sep 2022 - Dec 2025

Bachelor of Science, Physics and Mathematics

Relevant Coursework: Mechanics, Electromagnetic Fields, Modern Physics I–III, Intermediate & Advanced Lab, Atomic & Quantum Physics I–II, Thermal Physics, Linear Algebra, Differential Equations, Applied Mathematical Analysis I–II, Numerical Linear Algebra, Theory of Probability, Analysis of PDEs, Programming I

PROJECTS

A Search for CPT and Lorentz Invariance Violations using Neutrinos at NOvA Near Detector

Jan 2025 – May 2026

UW-Madison Neutrino Physics Research Group

- Applied FFT-based methods and a Rayleigh distribution model to investigate limits on Standard Model Extension framework coefficients using sidereal modulations in the neutrino-event rate (Jan 2025 – May 2025)
- Designed Python data matching framework organizing event–spill matching, including corresponding proton-on-target calculations and local sidereal phases (June 2025 – Aug 2025)
- Performed tests using the framework to identify data anomalies and improved framework to correct for these anomalies (Sep 2025 – May 2026)
- Presented research findings at NOvA Collaboration Meetings (Jun. 2025, Nov. 2025)

Energy Estimation for Neutral-Current Selected Events at NOvA Near Detector

Jan 2024 – Dec 2024

UW-Madison Neutrino Physics Research Group

- Developed an improved bias-correction method using ROOT fitting in C++, reducing systematic biases in reconstructed neutrino energy (Jan 2024 – May 2024)
- Authored a formal technical note documenting the new methodology and demonstrating improvement (June 2024 – Dec 2024)
- Presented research findings at NOvA Collaboration Meeting (Aug. 2024)

Neutrino Physics Research Paper

Sep 2023 – Dec 2023

- Researched neutrino physics theory and experimental history and authored paper detailing findings

EXPERIENCE

Undergraduate Researcher, UW-Madison Neutrino Physics Research Group

Sep 2023 – May 2026

Supervisor: Prof. Brian Rebel

- Analyzed NOvA experiment neutrino physics data using ROOT in Python and C++ to execute the following projects
 - Collaborated with another undergraduate to perform a search for CPT and Lorentz invariance violations using neutrinos at NOvA Near Detector
 - Improved the existing energy estimation method for neutral current events at the NOvA Near Detector
- Presented progress update slideshows at weekly research group meetings and NOvA Collaboration Meetings (Aug. 2024, Jun. 2025, Nov. 2025)
- Gained a strong understanding of experimental and theoretical neutrino physics through literature and research applications
- Part time during academic year with increased commitment during Summer 2024, Summer 2025, and Spring 2026

DUNE Detector Production Assistant, Physical Sciences Lab (PSL)

Jan 2025 – Dec 2025

Supervisors: Prof. Brian Rebel, Pam Marr-Laundrie, Mary Severson

- Conducted quality control testing of G-Bias Boards and Charge Readout (CR) Boards via visual inspection and automated electronic testing
- Maintained component quality information documentation in PSL database

- Laser marked G-Bias Boards and CR Boards to ensure traceability throughout production
- Supported cleaning, packing, and organization of detector components to prepare them for shipment and installation
- Gained familiarity with the structure and engineering of neutrino experiments

Undergraduate Researcher, UW-Madison CMS Research Group

Jan 2023 – Aug 2023

Supervisor: Prof. Abdollah Mohammadi

- Attained foundational programming proficiency in C++, Python, and bash
- Applied ROOT software to plot particle physics data
- Part time during academic year with increased commitment during Summer 2023

TECHNICAL SKILLS

- Programming: Python, C++, ROOT, MATLAB, Excel/Sheets, GitHub
- Analysis: statistical data fitting, bias-correction techniques, FFT-based analysis
- Data Handling: event-matching algorithms, Quality Assurance (QA) database documentation and entry
- Instrumentation: DUNE detector component QA using optical metrology technology and laser marking for component serialization and traceability