Resume Ethan Ragbir

# Ethan Ragbir

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## Education

#### The College of New Jersey (TCNJ)

Expected Graduation: 2028

B.S. in Mathematics and Physics

Relevant Coursework: Classical Mechanics, Electromagnetism, Quantum Physics, Statistical Mechanics, Multivariable Calculus, Differential Equations, Abstract Algebra, Numerical Analysis, Discrete Structures, Machine Learning.

## Experience

### Undergraduate Researcher

Jun 2025 - Present

CERN, Compact Muon Solenoid (CMS) Experiment

Developing a neural-network-based machine learning algorithm to analyze CMS detector data. Enhancing supersymmetry search capabilities beyond 275 GeV. Collaborating with the Rutgers High Energy experiment (HEX) group to establish a research team at TCNJ.

Skills: Particle Physics, Deep Learning, ROOT

#### Undergraduate Researcher

Apr 2025 - Present

The College of New Jersey

Studying ice crystal morphology using scanning electron microscopy (SEM) under Dr. Nate Magee. Investigating behavior in extreme environments to improve climate modeling.

Skills: SEM, Image Analysis, Climate Physics

Research Intern

Apr 2025 - Present

General Dynamics

Applied machine learning and retrieval-augmented generation (RAG) to optimize jet propulsion dynamics. Integrated real-world datasets with physical models to improve system performance.

Skills: Machine Learning, Computational Modeling

#### Machine Learning Engineer Intern

Jan 2025 - May 2025

Stealth Startup

Contributed to large language model (LLM) NLP systems under non-disclosure agreement. Supported model training and deployment pipelines.

Skills: Natural Language Processing, Python, Production ML

#### Matroid Theory Researcher

 $Jun\ 2024\ -\ Sep\ 2024$ 

Princeton University

Analyzed matroid structures in discrete mathematics for optimization and network reliability. Applied concepts to theoretical computer science problems.

Skills: Discrete Math, Optimization, Proof Techniques

#### Software Engineer Intern

Apr 2023 - Dec 2023

New Jersey Institute of Technology (NJIT)

Maintained backend systems and contributed to scalable application development. Built RESTful APIs under faculty supervision.

Skills: Software Engineering, Python, Git

# Technical Skills

Languages: Python, C++, Java, MATLAB, LaTeX

Tools / Libraries: Git, TensorFlow, PyTorch, CERN ROOT, OpenCV, LangChain, VS Code, Firebase, PostgreSQL, Linux, Bash, Docker, Conda, Jupyter, Pandas, NumPy

Ethan Ragbir Resume

## **Projects**

#### Particle Detection with Neural Networks

CERN, 2025

Built a classifier to identify particle interactions in CMS detector data. Integrated CERN ROOT preprocessing and TensorFlow training workflows.

#### Geophysical Ice Imaging Toolkit

TCNJ. 2025

Automated extraction of morphological features of ice crystals using SEM. Developed batch-processing pipeline to support climate model research.

#### Monte Carlo Jet Propulsion Simulator

General Dynamics, 2025

Simulated jet propulsion dynamics with Monte Carlo methods. Integrated physics-informed ML to analyze flow stability.

#### Matroid Optimizer

Princeton University, 2024

Developed Python tool for evaluating matroid rank, closure, and independence properties. Used in optimization and graph theory research.

### Extracurricular Activities

### **Putnam Competition Team**

Since Fall 2024

The College of New Jersey

Compete in the William Lowell Putnam Mathematical Competition with intensive problem-solving training in advanced mathematics.

#### Mathematical Olympiad Prep Team

Fall 2022 - June 2024

Frankloing

Weekly sessions in number theory, combinatorics, and geometry to prepare for national mathematical competitions.

Chess Club Since Fall 2024]

The College of New Jersey

Participate in weekly tournaments and rated practice. Studying classical openings and tactics.

# Volunteer Experience

#### **Bonner Community Scholar**

Aug 2024 - Present

The College of New Jersey

Complete 300+ community service hours per academic year. Engage in social justice education, civic engagement, and public service projects.

#### Red Cross Volunteer Representative

2024 - Present

American Red Cross

Serve as a youth representative for disaster relief coordination and public outreach campaigns.

# Professional Memberships

Institute of Electrical and Electronics Engineers (IEEE)

Feb 2025 - Present

American Physical Society (APS)

2025 - Present

Society for Industrial and Applied Mathematics (SIAM)

2025 - Present