Brandon Feder

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Education

Penn State (Major: Mathematics) Graduating June 2028

Unweighted GPA: 3.67/4.0

Relevant Coursework

Linear Algebra, Calculus I-III, Special Relativity, Abstract Algebra (graduate), General Topology, Ordinary Differential Equations, Mathematical Coding Theory (audited), Real Analysis I-II, Algebraic Topology (graduate), Algebraic Geometry (graduate), Kolmogrov Complexity

Independent Coursework:

- Category Theory (*Basic Category Theory* by Tom Leinster, *Categories for the Working Mathematician* chapters I-V by Sanders Mac Lane)
- Logic & Computability (*Modern Logic* by Graeme Forbes, *Computability: Computable Functions, Logic, and the Foundations of Mathematics* by Richard L. Epstein and Walter A. Carnielli)
- Differential Geometry & Real Analysis (*Vector Calculus, Linear Algebra, and Differential Forms: A Unified Approach* by John H. Hubbard and Barbara Burke Hubbard)
- Elliptic Curve Theory (*The Arithmetic of Elliptic Curves* chapters 1 - 5 by Joseph H. Silverman)

Awards

3x President Volunteer Service Award
Hubert N. Alyea Award

Skills

Programming Languages: Julia, C/C++, Python, Java, JavaScript, R
Markup Languages: HTML, CSS, Markdown, LaTeX
Tools: Git/GitHub, Unix Shell, ROOT, CUDA, NodeJS, NumPy, SciPy

Experience

Work Experience

Layer Metrics Inc Nov. 2023 – Aug. 2024

- Responsible for implementation of proprietary analysis algorithms for the opto-photonic sensing and metrology of additive metal printing process
- Responsible for review of code and in charge of company codebase
- Work closely with CTO and present progress biweekly

Research Experience

Argonne National Laboratory May. 2024 - present

- Worked for Laboratory for Applied Mathematics, Numerical Software, and Statics researching algorithms for solving linear Bayesian inverse problems using low-rank approximations
- Collaborated with mathematicians and computer scientists across the lab and presented progress weekly to the group

Lehigh University Research Experience for Undergraduates May. 2023 - Aug. 2023

- Collaborated with Lehigh University's Relativistic Heavy-Ion Group in order to investigate the directional-dependence of energy deposition in the sPHENIX experiment
- Wrote analysis packages for the sPHENIX Collaboration in ROOT

- Collaborated with physicists and computer scientists across the North-East and presented progress weekly to Lehigh's Relativistic Heavy-Ion Group
- Only high schooler to participate in Lehigh University's REU

Brookhaven National Laboratory High School Research Program Nov. 2021 - Aug. 2022

- Researched heuristics based on graph optimization for removing ambiguity in the tomographic reconstruction of data relating to neutrinos from the DUNE Experiment
- Used CUDA to implement a package for WireCell Toolkit that performs GPU-accelerated fast Fourier transforms and fast convolutions to be used in the analysis of time-projection chambers
- Presented progress weekly to a subset of Brookhaven's Electronic Detector Group

Brookhaven National Laboratory High School Research Program March. 2020 - Jun. 2020

- Used CUDA to implement GPU-accelerated algorithms for the real-time detection of fast radio bursts for Brookhaven National Laboratory's BMX telescope

Projects

Out-of-Core Convolutions Dev. 2020 - Jan. 2022

- Researched reducing IO in GPU-accelerateed out-of-core convolutions for the high-precision computation of algebraically transcendental constants such as π
- Presented research at IEEE North Jersey Student Conference 2022

References

Dr. Peter Rock peter.rock@cornell.edu
Research Scientist, Metric Geometry and Gerrymandering Group; Cornell University

Dr. Vishwas Rao vhebbur@anl.gov
Computational Mathematician, Argonne National Lab

Dr. Federico Rodriguez Hertz fjr11@psu.edu
Professor of Mathematics, Penn State University