Samuel Vasquez

M.A. Student of Physics

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Education

Stony Brook University Aug. 2024 - May 2026

Master of Arts in Physics *Stony Brook, NY*

Selected Coursework: Statistical Mechanics, Quantum Information, Quantum Programming, Computational Chemistry, Science Communication.

Carnegie Mellon University Aug. 2018 - May 2023

Bachelor of Science in Physics *Pittsburgh, PA*

Selected Coursework: Principles of Imperative Computation (Data Structures), Numerical Methods, Parallel and High-Performance Computing, Laboratory Physics.

Experience

Graduate Research Assistant Jan. 2025 - Present

Stony Brook University *Stony Brook, NY*

Advisors: Benjamin Levine, Thomas Weinacht

Developing an improved computational model describing multiphoton absorption, to better study coherent control in molecules and simulations of molecular orbital decoherence.

Undergraduate Research Assistant Aug. 2022 - June 2023

Carnegie Mellon University *Pittsburgh, PA*

Advisor: Riccardo Penco

Investigated the action of the classical double copy on pure gauge fields and corresponding spacetimes.

- Applied principles of covariant classical field theory to
  - demonstrate failure of the Kerr-Schild prescription to determine a non-trivial single copy field corresponding to an O(N) monopole configuration,
  - determine a general form of a class of solutions to vacuum Maxwell's equations that are compatible with interpretation as a single copy field,

  using a tensor analysis package for Mathematica.

Undergraduate Research Assistant May 2021 - May 2022

Carnegie Mellon University *Pittsburgh, PA*

Advisor: Diana Parno

Modified a data analysis framework for a modelled simulation of a high energy neutrino physics experiment to better characterize radioactive products from beam spills and their contribution to neutrino flux.

- Adapted a simulation built with the Geant4 toolkit for C++ to process ionizing radiation events from the passage of neutrinos through matter.
- Rewrote data structures to extend functionality of the simulation output code to support new simulated processes.
- Analyzed resulting output data using the ROOT data analysis framework.
- Visualized, interpreted, and presented the impact of simulated radioactive processes on neutrino generation.

Undergraduate Tutor Aug. 2022 - Dec. 2022

Carnegie Mellon University *Pittsburgh, PA*

- Led a group tutoring session to provide academic support to physics students for upper division core subjects such as classical mechanics, quantum theory, and statistical physics.
- Assisted 10-20 students twice a week with problem-solving strategies for homework assignments and exam preparation.

Undergraduate Teaching Assistant Aug. 2021 - Dec. 2021

Carnegie Mellon University *Pittsburgh, PA*

Course: Introductory Classical Mechanics

- Collaborated with teaching staff to deliver recitation-style lectures to a class of 30 first-year students.
- Taught and clarified concepts on homework assignments and worksheets.
- Provided feedback and resolved questions about students' work on their activities.

Awards

2021 **Pennsylvania Space Grant Consortium Fellowship,** to support summer research.

Presentation

APS Fall Meeting of the Division of Nuclear Physics Boston, MA (Remote)

Presenter for <Conference Experience for Undergraduates> Poster Session *Oct. 12 2021*

- Poster Title: Neutrino Flux from Beta-Decaying Isotopes at the SNS

Skills

Programming	Python (Scipy, Pandas, Matplotlib), C (MPI, OpenMP), HTML
Scientific Software	Mathematica, LaTeX, Geant4, ROOT, Molden
Quantum Science Software	Qiskit, Pennylane, Psi4, TeraChem
Mathematics	Linear Algebra, Numerical Analysis and Optimization
Unix-like Systems	Basic familiarity with configuration and scripting for personal use, use of HPC clusters.