Samuel Vasquez

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Education

Carnegie Mellon University — Pittsburgh, PA

Bachelor of Science in Physics w/ Computational Physics Track — *Aug. 2018 - Dec. 2022*

- GPA: 3.11

Experience

Carnegie Mellon University — Pittsburgh, PA

Undergraduate Researcher — *Aug. 2022 - Present*

Advisor: Riccardo Penco

Investigated the mathematical properties of a gravitational model of the global O(3) monopole and its electromagnetic dual through the classical double copy.

- Analyzed the nonlinear differential equation for the isoscalar field monopole configuration using perturbative techniques to determine its gravitational coupling to higher order.
- Calculated the single copy gauge field corresponding to the spacetime far outside the monopole and demonstrated that the Kerr-Schild prescription fails in this limit.

Carnegie Mellon University — Pittsburgh, PA

Undergraduate Tutor — *Aug. 2022 - Dec. 2022*

- Led a group tutoring session to provide academic support to undergraduate physics students of all years for a variety of subjects.
- Assisted 10 students per week with homework assignments, exam preparation, and coursework.

Carnegie Mellon University — Pittsburgh, PA

Undergraduate Researcher — *May 2021 - May 2022*

Advisor: Diana Parno

Modified the data analysis framework of a simulation of a neutrino physics experiment to characterize radioactive products from beam spills and their contribution to neutrino flux.

- Adapted models used by a simulation built with the Geant4 toolkit for C++ to process radioactive decay.
- Extended functionality of the simulation output code to export additional data from the new simulated processes.
- Analyzed output data using the ROOT data analysis framework for C++ and generated visualizations through a command line interface.
- Interpreted the impact of simulated radioactive processes on neutrino generation through collaboration with research advisor.

Carnegie Mellon University — Pittsburgh, PA

Undergraduate Teaching Assistant — *Aug. 2021 - Dec. 2021*

First Year Mechanics

- Collaborated with teaching staff to deliver recitation-style mechanics lectures to a class of 30 students.
- Clarified material on assigned homework and worksheets for students
- Provided feedback and resolved questions about students' work on 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)

Conference Experience for Undergraduates — *Oct. 12 2021*

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

Skills

Courses	Statistical Mechanics, Particle Physics, Field Theory, Differential Geometry, Computational Physics, Imperative Computation, Functional Programming
Programming	Python, C, C++, OpenMP, Standard ML, HTML, Mathematica, LaTeX