Samuel Vasquez

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Education

Carnegie Mellon University Aug. 2018 - Dec. 2022

Bachelor of Science in Physics w/ Computational Physics Track *Pittsburgh, PA*

Relevant Coursework: Imperative Programming, Functional Programming, Advanced Computational Physics, Modern Physics Lab

Experience

Undergraduate Research Assistant May 2021 - May 2022

Carnegie Mellon University *Pittsburgh, PA*

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.

Undergraduate Research Assistant Aug. 2022 - Present

Carnegie Mellon University *Pittsburgh, PA*

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.

Undergraduate Tutor Aug. 2022 - Dec. 2022

Carnegie Mellon University *Pittsburgh, PA*

- 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.

Undergraduate Teaching Assistant Aug. 2021 - Dec. 2021

Carnegie Mellon University *Pittsburgh, PA*

- 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.

Honors & Awards

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

Presentation

APS Fall Meeting of the Division of Nuclear Physics Oct. 12 2021

Conference Experience for Undergraduates *Boston, MA (Remote)*

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

Skills

Programming Python, C, C++, OpenMp, Standard ML, HTML, Mathematica, LaTeX