ZACHARY BALDWIN

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EDUCATION

Carnegie Mellon University | *Pittsburgh, Pennsylvania* *June 2019 - July 2026 (expected)*
- Ph.D. in Nuclear & Particle Physics

The College of William & Mary | *Williamsburg, Virginia* *August 2015 - May 2019*
- B.S. Honors in Physics & Mathematics

RESEARCH EXPERIENCE

Carnegie Mellon University | *Pittsburgh, Pennsylvania* *June 2019 - Present*
- Graduate Research Associate

The University of Glasgow | *Glasgow, Scotland* *May 2018 - August 2018*
- Visiting Researcher

RESEARCH PROJECTS

Carnegie Mellon University – GlueX experiment *Advisor: Curtis Meyer | 2019 - Present*
- An ongoing search for the existence of exotic hybrid mesons, particularly in the $\pi^0\eta$ and $\pi^0\eta'$ systems, is being performed. The interest in these two systems is due to the strong possibility of the presence of exotic J^{PC} (quantum) numbers in their final states. By comparing both systems, the role of flavor symmetry should be illuminated as to allow for a better understanding of meson production mechanisms.
- During this project, a complete partial wave analysis is being implemented.

The College of William & Mary – GlueX experiment *Advisor: Justin Stevens | 2016 - 2019*
- Studied the reaction $\gamma p \to \pi^0\gamma$ alongside an exploratory study of the Compton scattering process $\gamma p \to \gamma p$. This was to aid in the understanding of production mechanisms in high-energy photoproduction. The results provided a stepping stone to ultimately measure the Σ beam asymmetry for large angle Compton scattering.
- During this analysis, a fix to the GlueX calorimeter clustering algorithm was implemented in order to view the separation of small decay angles of $\pi^0 \to \gamma\gamma$.

The University of Glasgow – MAMI experiment *Advisor: Ken Livingston | 2018*
- The project's main goal was to develop a compact pair polarimeter and spectrometer for use in hadronic physics experiments at photon beam facilities. A prototype was developed and tested. New challenging techniques were also employed to observe the degree and angle of polarization from electron and positron separation, along with other polarization observables.
- During this project, a brand new approach using machine learning and neural networks was developed to try and gather the problematic degree of polarization for the photons.

PUBLICATIONS

Search for photoproduction of axion-like particles at GlueX
DOI: Phys. Rev. D 105, 052007 [*Physical Review D* | *arXiv*] *March 2022*

Measurement of Spin Density Matrix Elements in $\Lambda(1520)$ Photoproduction at 8.2 GeV to 8.8 GeV
DOI: Phys. Rev. C 105, 035201 [*Physical Review C* | *arXiv*] *March 2022*

Measurement of beam asymmetry for $\pi^-\Delta^{++}$ photoproduction on the proton at $E_\gamma = 8.5\ GeV$
DOI: Phys. Rev. C 103, L022201 [*Physical Review C* | *arXiv*] *February 2021*

PROCEEDINGS

A multidimensional, event-by-event, statistical weighting procedure for signal to background separation

HONORS & AWARDS

The CFNS-CTEQ School on the Physics of the Electron-Ion Collider | *Stony Brook, New York* *June 2023*

The Open Science Grid User School | *Madison, Wisconsin* *July 2022*

The International HPC School on Challenges in Computational Sciences | *Athens, Greece* *June 2022*

Division of Nuclear Physics Travel Grant *(Unclaimed due to COVID-19)* *February 2020*

SCHOLARSHIPS & FELLOWSHIPS

The William & Mary Honors Fellowship *April 2018 - May 2019*

Howard Hughes Medical Institute Summer Research Fellowship *March 2017 - August 2017*

Howard Hughes Medical Institute Summer STEM Course Scholarship *March 2016 - August 2016*

The Wren Scholarship *August 2015 - May 2019*

INVITED SEMINARS & COLLOQUIA

Physics Colloquium – *Union College*: "Enhancing Scientific Research Utilizing High-Performance & High-Throughput Computing: An Overview With Uses In Nuclear & Particle Physics" *October 2022*

CONFERENCE & WORKSHOP PRESENTATIONS

26th International Conference on Computing in High Energy Physics | *Norfolk, Virginia* *May 2023*

APS Division of Nuclear Physics (Virtual due to COVID-19) | *Boston, Massachusetts* *October 2021*

Topical Group on Hadronic Physics (Virtual due to COVID-19) | *Sacramento, California* *April 2021*

APS Division of Nuclear Physics (Virtual due to COVID-19) | *New Orleans, Louisiana* *October 2020*

American Physics Society (Virtual due to COVID-19) | *Washington, D.C.* *April 2020*

APS Division of Nuclear Physics Fall Joint Meeting | *Island of Hawai'i, Hawaii* *October 2018*

Zone 4 SPS Meeting | *College Park, Maryland* *April 2018*

American Physics Society | *Columbus, Ohio* *April 2018*

ADMINISTRATIVE EXPERIENCE

AI Super-Resolution Simulations: From Climate Science to Cosmology *February 2022*
- Helped organize conference meeting.

OUTREACH

Pittsburgh Regional Science and Engineering Fair *March 2022*
- Presented concepts and research on nuclear and particle physics to high school teachers.