Eliza Hahn Neights

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Education

2021-present	**George Washington University**	Ph.D in Physics (*in progress*)
2021-2024	**George Washington University**	M.Phil in Physics M.S. in Physics
2017-2021	**Pennsylvania State University**	B.S. in Astronomy & Astrophysics B.S. in Physics Minor in Mathematics

Research Experience

2022-present **Evaluating Gamma-Ray Burst Science Capabilities of COSI**
Studying the abilities of the Compton Spectrometer & Imager (*COSI*) to constrain gamma-ray burst (GRB) prompt emission models based on polarization measurements and spectroscopy. Investigating the likelihood of a joint *COSI*-detected GRB and gravitational wave event by quantifying *COSI*'s sensitivity to short GRBs. Leading the development of *COSI*'s open-source spectral and polarization analysis software to be used by the scientific community.
Advisors: Dr. Carolyn Kierans & Dr. Sylvain Guiriec

2020-2021 **Archival Coincidence Analysis**
Conducted archival coincidence analysis for the Astrophysical Multimessenger Observatory Network (AMON). Studied coincident IceCube cascade neutrino events and GRBs to determine the likelihood of a common astrophysical source.
Advisor: Dr. Doug Cowen

2019-2021 **Photomultiplier Tube Testing & Pulse Pair/Timing Resolution**
Investigated photomultiplier tube (PMT) damage mitigation in the Water Cherenkov Monitor for Anti-Neutrinos (WATCHMAN) detector. Simulated single and multiple photoelectron waveforms to determine the accuracy of differentiation in the WATCHMAN detector. Analyzed how timing resolution is affected by the presence of multiple photoelectrons.
Advisor: Dr. Doug Cowen

2018 **Binary Neutron Star Mergers**
On a NASA Space Undergraduate Research Experience Grant, identified sub-threshold events for AMON using binary neutron star merger data from the Laser Interferometer Gravitational-Wave Observatory (LIGO).
Advisor: Dr. Miguel Mostafá

Teaching & Leadership Experience

2024-present **Burst Advocate for Fermi-GBM**
I volunteer for 6-8 shifts per month as a burst advocate for the *Fermi Gamma-ray Space Telescope*'s Gamma-ray Burst Monitor. I promptly analyze triggered observations, ensure good data quality, check for joint observations with other instruments, and send alerts to the scientific community.

2023-present **Technical Lead for COSI's GRB Science Team**
Planning and running monthly meetings for the > 50 person group. Managing tasks within the team. Leading the creation of instrument simulations of *COSI* transient observations, which are used to develop analysis software, test the onboard transient trigger algorithm, estimate GRB detection rates and make GRB science predictions. Leading the development of simulation and analysis software for GRB populations.

Teaching & Leadership Experience (continued)

2023-present **COSI Diversity, Equity, & Inclusion Team Member**
Member of working group aiming to address issues of diversity, equity, inclusion, and accessibility within the *COSI* collaboration.

2021-2022 **Graduate Teaching Assistant**
Graded and assisted in teaching for introductory undergraduate physics classes of 25-50 students.
Courses: University Physics I, University Physics II

Scholarships & Awards

2025 **Gus W. Weiss Prize (Honorable Mention)**
George Washington University Physics department award celebrating a graduate student's research contributions and dedication to the department and larger physics community.

2022-2025 **John Mather Nobel Scholar**
Awarded travel allowances from the John and Jane Mather Foundation for Science and the Arts towards the cost of presenting research papers at professional conferences.

2017-2021 **Braddock Scholarship**
Four-year academic merit scholarship awarded by the Eberly College of Science at the Pennsylvania State University.

2019-2021 **M. Dean and Jean L. Underwood Scholarship in Physics**
Academic merit scholarship awarded for junior and senior years by the Eberly College of Science at the Pennsylvania State University.

2019-2020 **Eberly College of Science Undergraduate Research Award**
Awarded funding from the Office of Science Engagement in the Eberly College of Science to do physics research with Dr. Doug Cowen.

2017-2020 **Dean's List**
Maintained a GPA of above 3.5.

2018 **NASA Pennsylvania Space Grant**
Awarded a Women in Science and Engineering Research (WISER) undergraduate research experience scholarship to do astrophysics research with Dr. Miguel Mostafá.

Publications

E. Neights, E. Burns, C. L. Fryer, *et al.*, "GRB 250702B: discovery of a gamma-ray burst from a black hole falling into a star," *MNRAS*, vol. 545, no. 2, Jan. 2026. DOI: 10.1093/mnras/staf2019,
Featured as a Research Highlight in *Nature Astronomy* in Feb 2026.

N. Parmiggiani, A. Bulgarelli, G. Panebianco, *et al.*, "COSI Short Gamma-Ray Burst Localization Using BGO Shield Data," *ApJ*, vol. 997, no. 2, p. 135, Feb. 2026. DOI: 10.3847/1538-4357/ae25fc.

E. Burns, J. Andrews, R. Szabo, *et al.*, "The Heavy Element Enrichment History of the Universe from Neutron Star Mergers with Habitable Worlds Observatory," *arXiv e-prints*, Jul. 2025. DOI: 10.48550/arXiv.2507.09778.

E. Burns, C. L. Fryer, I. Agullo, *et al.*, "Multidisciplinary Science in the Multimessenger Era," *arXiv e-prints*, Feb. 2025. DOI: 10.48550/arXiv.2502.03577.

A. C. Trigg, E. Burns, M. Negro, *et al.*, "From Rare Events to a Population: Discovering Overlooked Extragalactic Magnetar Giant Flare Candidates in Archival Fermi Gamma-ray Burst Monitor Data," *arXiv e-prints*, Oct. 2025. DOI: 10.48550/arXiv.2510.23367.

H. Yoneda, T. Siegert, I. Martinez-Castellanos, *et al.*, "Enhancing Compton telescope imaging with maximum a posteriori estimation: A modified Richardson–Lucy algorithm for the Compton Spectrometer and Imager," *A&A*, vol. 697, A117, May 2025. DOI: 10.1051/0004-6361/202453528.

H. Yoneda, T. Siegert, I. Martinez-Castellanos, *et al.*, "Imaging MeV Gamma-ray Lines with Advanced Image Reconstruction Framework for COSI," in *39th International Cosmic Ray Conference*, Dec. 2025, p. 891. URL: https://pos.sissa.it/501/891/pdf.

H. C. Gulick, **E. Neights**, S. Al Nussirat, *et al.*, "Across the soft gamma-ray regime: utilizing simultaneous detections in the Compton Spectrometer and Imager (COSI) and the Background and Transient Observer (BTO) to understand astrophysical transients," in *Space Telescopes and Instrumentation 2024: Ultraviolet to Gamma Ray*, vol. 13093, Aug. 2024. DOI: 10.1117/12.3020606.

J. Tomsick, S. Boggs, A. Zoglauer, *et al.*, "The Compton Spectrometer and Imager," in *38th International Cosmic Ray Conference*, Sep. 2024, p. 745. DOI: 10.22323/1.444.0745.

I. Martinez-Castellanos, S. Gallego, C.-Y. Huang, *et al.*, "The cosipy library: COSI's high-level analysis software," *arXiv e-prints*, Aug. 2023. DOI: 10.48550/arXiv.2308.11436.

T. Akindele, T. Anderson, E. Anderssen, *et al.*, "A Call to Arms Control: Synergies between Nonproliferation Applications of Neutrino Detectors and Large-Scale Fundamental Neutrino Physics Experiments," *arXiv e-prints*, Feb. 2022. DOI: 10.48550/arXiv.2203.00042.

T. Grégoire, H. Ayala Solares, S. Coutu, *et al.*, "Model independent search for transient multimessenger events with AMON using outlier detection methods," in *37th International Cosmic Ray Conference*, Mar. 2022, p. 934. DOI: 10.22323/1.395.0934.

Presentations

Invited Talks

Mar 2026	**Discovery of a Gamma-Ray Burst from a Black Hole Falling into a Star** American Physical Society Global Physics Summit (*Denver, CO*)
Jul 2024	**GRB Polarization with COSI** GRB Forum (*Athens, Greece*)

Contributed Talks

Oct 2025	**COSI GRB Group Update** *COSI* Collaboration Meeting (*St. Louis, MO*)
	GRB Localizations and Polarimetry with COSI "Exploring the MeV Gamma-ray Sky with *COSI*" Special Session at the High Energy Astrophysics Division Meeting (*St. Louis, MO*)
Jan 2025	**Gamma-Ray Burst Polarization with COSI** American Astronomical Society Meeting (*National Harbor, MD*)
Oct 2024	**COSI's Spectral Analysis Software** *COSI* Collaboration Meeting (*Berkeley, CA*)
Oct 2024	**GRB Polarization with COSI** *COSI* Collaboration Meeting (*Berkeley, CA*)
Aug 2024	**Studying GRBs Using COSI's Polarization Measurements** AstroCon DC (*Washington, DC*)
Jun 2024	**Studying GRBs Using COSI** *Fermi* Summer School (*Lewes, DE*)
May 2024	**GRB Science Using COSI** Seminar at Oregon State University (*Corvallis, OR*)
Apr 2024	**The COSI GRB Science Goals** "Exploring the MeV Gamma-ray Sky: The Past, Present, and Future" Special Session at the High Energy Astrophysics Division Meeting (*Horseshoe Bay, TX*)
Apr 2024	**Studying Gamma-Ray Bursts Using COSI** High Energy Astrophysics Division Meeting (*Horseshoe Bay, TX*)
Aug 2023	**Using COSI to Study GRBs** DMV Consortium Graduate Student Astrophysics Conference (*Washington, DC*)
Aug 2022	**Scientific Pipeline Development for COSI** NASA Goddard Space Flight Center Astrophysics Summer Intern Symposium (*Virtual*)
Sep 2020	**Archival Coincidence Analysis for IceCube Cascade Events & GRBs** IceCube Collaboration Meeting (*Virtual*)

Presentations (continued)

Posters

Oct 2025 **Gamma-Ray Observations of GRB 250702B: Gamma-Ray Burst from a Black Hole Falling into a Star** High Energy Astrophysics Division Meeting (*St. Louis, MO*)

Mar 2023 **Introduction to COSI Data Analysis** High Energy Astrophysics Division Meeting (*Waikoloa, HI*)

May 2020 **Photomultiplier Tube Pressure Testing for WATCHMAN** Pennsylvania State University Undergraduate Exhibition (*State College, PA*)

Nov 2018 **The Study of Binary Neutron Star Mergers from Simulations** Pennsylvania State University Undergraduate Research Symposium (*State College, PA*)

Selected Press

2026 **BBC Sky at Night**
https://www.skyatnightmagazine.com/news/grb-250702b-study-interview

2025 **National Geographic**
https://www.nationalgeographic.com/science/article/gamma-ray-burst-black-hole-eats-star

NASA
https://science.nasa.gov/science-research/black-hole-eats-star

Sky and Telescope
https://skyandtelescope.org/astronomy-news/black-hole-eats-through-star-explodes-it-from-within

GW Today
https://gwtoday.gwu.edu/black-hole-eats-star-student-charts-record-blast

Skills

Coding Python, C++, Mathematica, R, Unix

Software & Tools MEGAlib, ROOT, LaTeX, Jupyter Notebooks, AstroImageJ, SAOImageDS9, Avizo, ImageJ, GitHub

Languages English (fluent), Spanish (intermediate proficiency), Portuguese (intermediate proficiency)

Other Experience

Leadership & Outreach

2023-2024 **COSI Collaborations Connections Team**
Group addressing issues of diversity, equity, inclusion, and accessibility in order to foster a safe and healthy environment for every *COSI* collaboration member.

2019-2021 **PSU Social Dance Club Safety Liaison**
Ensured that members of the Social Dance Club were comfortable and safe at all events, and handled cases of misconduct when they occurred.

2017-2021 **Penn State Dance Marathon**
Through Penn State Club Gymnastics, fundraised for the Penn State Dance Marathon (THON), which raises money to fight pediatric cancer.

2018, 2020 **Penn State AstroFest**
Presented to and answered questions from community members about the solar system, stars, galaxies, and cosmology.

Other Experience (continued)

2019-2020 **Penn State Club Gymnastics Social Chair**
Planned team bonding and other social events for the club gymnastics team.

Extracurricular Activities

2005-present **Harpist**

2017-2021 **Society for Physics Students**

2019-2021 **Pennsylvania State University Social Dance Club**

2009-2019 **Competitive Gymnastics**