

CONTACT INFORMATION	Department of Physics Pennsylvania State University Osmond Lab, Room 206B University Park, PA 16801 USA	Citizenship: USA Email: marco.stein.muzio@gmail.com
RESEARCH INTERESTS	Astroparticle physics (cosmic ray & multimessenger studies, radio detection of neutrinos)	
CURRENT ACADEMIC APPOINTMENTS	<b>NSF MPS-Ascend Fellow</b> , Pennsylvania State University    October 2021 to present Center for Multimessenger Astrophysics Institute for Gravitation and the Cosmos Department of Physics Department of Astronomy and Astrophysics Supervisor: Stephanie Wissel	
PREVIOUS ACADEMIC APPOINTMENTS	<b>Postdoctoral Researcher</b> , New York University    September 2021 to October 2021 Center for Cosmology and Particle Physics Department of Physics Supervisor: Glennys Farrar	
EDUCATION	<b>New York University</b> , New York, NY Ph.D, Physics, September 2021 <ul style="list-style-type: none"> <li>• Thesis: <i>Ultrahigh energy cosmic ray origins: A multimessenger study</i></li> <li>• Advisor: Glennys R. Farrar</li> </ul> M.Phil., Physics, May 2019 M.S., Physics, September 2017 <b>Northeastern University</b> , Boston, MA B.S., Physics, Mathematics, May 2015	
REFEREED JOURNAL PUBLICATIONS	[1] <b>M. S. Muzio</b> , L. A. Anchorage, M. Unger, “A Peters cycle at the end of the cosmic ray spectrum?”, accepted by Phys. Rev. D, 2023, arXiv:2309.16518. [2] <b>M. S. Muzio</b> , N. Globus, “Neutrino anisotropy as a probe of extreme astrophysical accelerators”, submitted to ApJL, 2023, arXiv:2308.16225. [3] <b>M. S. Muzio</b> , M. Unger, S. Wissel, “Prospects for joint cosmic ray and neutrino constraints on the evolution of trans-GZK proton sources”, Phys. Rev. D 107 (2023) 10, 103030, arXiv:2303.04170. [4] <b>M. S. Muzio</b> , G. R. Farrar, “Constraints on the hosts of UHECR accelerators”, ApJL 942, L39 (2023), arXiv:2209.08068. [5] <b>M. S. Muzio</b> , G. R. Farrar, M. Unger, “Probing the environments surrounding ultrahigh energy cosmic ray accelerators and their implications for astrophysical neutrinos”, Phys. Rev. D 105 (2022) 2, 023022, arXiv:2108.05512. [6] <b>M. S. Muzio</b> , M. Unger, G. R. Farrar, “Progress towards characterizing ultrahigh energy cosmic ray sources”, Phys. Rev. D 100 (2019) 10, 103008, arXiv:1906.06233.	

CONFERENCE  
PROCEEDINGS

- [1] **M. S. Muzio**, N. Globus, “Probing extreme astrophysical accelerators through neutrino anisotropy”, in proceedings of “38th International Cosmic Ray Conference”, PoS(ICRC2023)1049.
- [2] **M. S. Muzio**, L. A. Anchordoqui, M. Unger, “Data-driven analysis for understanding ultrahigh energy cosmic ray source spectra”, in proceedings of “38th International Cosmic Ray Conference”, PoS(ICRC2023)293.
- [3] **M. S. Muzio** for the RNO-G Collaboration, “Multimessenger potential of the Radio Neutrino Observatory in Greenland”, in proceedings of “38th International Cosmic Ray Conference”, PoS(ICRC2023)1485.
- [4] P. Dasgupta, **M. S. Muzio** for the ARA Collaboration, “Progress towards a diffuse neutrino search in the full livetime of the Askaryan Radio Array”, in proceedings of “38th International Cosmic Ray Conference”, PoS(ICRC2023)1226.
- [5] **M. Muzio**, G. R. Farrar, M. Unger, “Constraining the origin of UHECRs and astrophysical neutrinos”, in proceedings of “37th International Cosmic Ray Conference”, PoS(ICRC2021)1021.
- [6] **M. Muzio**, M. Unger, G. R. Farrar, “Constraints on UHECR sources and their environments, from fitting UHECR spectrum and composition, and neutrinos and gammas.”, in proceedings of “36th International Cosmic Ray Conference”, PoS(ICRC2019)364.
- [7] **M. Muzio**, G. R. Farrar, M. Unger, “Detailed simulations of Fermi-LAT constraints on UHECR production scenarios”, in proceedings of “35th International Cosmic Ray Conference”, PoS(ICRC2017)557.

CONFERENCE  
TALKS & POSTERS

- [1] M. S. Muzio, N. Globus, “Probing extreme astrophysical accelerators through neutrino anisotropy”, poster, In: *38th International Cosmic Ray Conference (ICRC2023)*, Nagoya, Japan, July 26–August 3, 2023.
- [2] M. S. Muzio, L. A. Anchordoqui, M. Unger, “Data-driven analysis for understanding ultrahigh energy cosmic ray source spectra”, poster, In: *38th International Cosmic Ray Conference (ICRC2023)*, Nagoya, Japan, July 26–August 3, 2023.
- [3] M. S. Muzio, on behalf of the RNO-G Collaboration, “Multimessenger potential of the Radio Neutrino Observatory in Greenland” In: *38th International Cosmic Ray Conference (ICRC2023)*, Nagoya, Japan, July 26–August 3, 2023.
- [4] P. Dasgupta, M. S. Muzio, on behalf of the ARA Collaboration, “Progress towards a diffuse neutrino search in the full livetime of the Askaryan Radio Array” In: *38th International Cosmic Ray Conference (ICRC2023)*, Nagoya, Japan, July 26–August 3, 2023.
- [5] M. S. Muzio, N. Globus, “Probing extreme astrophysical accelerators through large-scale neutrino anisotropy” In: *APS April Meeting 2023*, Minneapolis, MN, USA, April 15–18, 2023.
- [6] M. S. Muzio, on behalf of the ARA Collaboration, “Recent progress towards a 5-station neutrino search with ARA” In: *TeV Particle Astrophysics 2022*, Kingston, ON, Canada, August 8–12, 2022.
- [7] M. Muzio, G. R. Farrar, “Indirect observational constraints on UHECR source environments” In: *APS April Meeting 2022*, New York, NY, USA, April 9–12, 2022.

- [8] M. Muzio, G. R. Farrar, M. Unger, “Constraining the origin of UHECRs and astrophysical neutrinos” In: *37th International Cosmic Ray Conference (ICRC2021)*, Online, Berlin, Germany, July 12–23, 2021.
- [9] M. Muzio, G. R. Farrar, M. Unger, “Constraining the origin of UHECRs and astrophysical neutrinos” In: *APS April Meeting 2021*, Virtual, April 17–20, 2021.
- [10] M. Muzio, G. R. Farrar, M. Unger, “On the possible common origin of the astrophysical neutrino flux & UHECRs: Constraining the source environment” In: *APS April Meeting 2020*, Virtual, April 18–21, 2020.
- [11] M. Muzio, M. Unger, G. R. Farrar, “Constraints on UHECR sources and their environments, from fitting UHECR spectrum and composition, and neutrinos and gammas.” In: *36th International Cosmic Ray Conference (ICRC2019)*, Madison, WI, USA, July 24–August 1, 2019.
- [12] M. Muzio, M. Unger, G. R. Farrar, “Constraints on UHECR sources and their environments, from fitting UHECR spectrum and composition, and neutrinos and gamma-rays.” In: *APS April Meeting 2019*, Denver, CO, USA, April 13–16, 2019.
- [13] M. Muzio, G. R. Farrar, M. Unger, “Diffuse Gamma-ray and Neutrino Constraints on UHECR sources, for realistic UHECR composition” In: *APS April Meeting 2018*, Columbus, OH, USA, April 14–17, 2018.
- [14] M. Muzio, G. R. Farrar, M. Unger, “Detailed simulations of Fermi-LAT constraints on UHECR production scenarios” In: *35th International Cosmic Ray Conference (ICRC2017)*, Busan, South Korea, July 12–20, 2017.

INVITED TALKS

- [1] *Bartol Research Institute, University of Delaware*, Seminar, September 22, 2023.
- [2] *Inter-University Institute for High Energies, ULB/VUB*, Seminar, June 14, 2023.
- [3] *Institute for Advanced Study*, Talk, May 19, 2023.
- [4] *Perimeter Institute for Theoretical Physics*, Seminar, May 16, 2023.
- [5] *Karlsruhe Institute of Technology*, Seminar, October 25, 2022.
- [6] *Norwegian University of Science and Technology*, Seminar, October 13, 2022.
- [7] *Global Cosmic Ray Observatory (GCOS) Workshop 2022*, Talk, July 13, 2022.
- [8] *NASA PhysPAG Cosmic Ray Science Interest Group at AAS*, Talk, January 18, 2022.
- [9] *Pennsylvania State University*, Seminar, January 11, 2022.
- [10] *Wisconsin IceCube Particle Astrophysics Center (WIPAC), University of Wisconsin-Madison*, Seminar, February 12, 2021.
- [11] *Norwegian University of Science and Technology*, Seminar, January 22, 2021.
- [12] *National Institute for Subatomic Physics Nikhef*, Seminar, December 17, 2020.
- [13] *Goddard Space Flight Center Fermi Lunch Talk*, Talk, October 8, 2020.

TEACHING  
EXPERIENCE

New York University, New York, NY

Lecturer

September 2020 to December 2020

- Practicum in Teaching
  - Fall 2020 (1 section, blended virtual & in-person)
  - Wrote the course syllabus, designed the curriculum for, and led a discussion- and presentation-based course to introduce graduate students to teaching generally and teaching physics in particular. Some of the topics covered include ethics in teaching, goals & successes in teaching, gender & race discrimination in physics, and how to prepare and conduct physics lectures & labs.

Teaching Assistant

January 2016 to December 2020

- PHYS-UA 12 General Physics II Laboratory
  - Spring 2016 (2 sections)
- PHYS-UA 12 General Physics II Recitation
  - Summer 2020 (1 section, virtual)
- PHYS-UA 120 Dynamics
  - Fall 2018 (1 section), Fall 2017 (2 sections), Fall 2016 (2 sections)
- PHYS-UA 20 20th Century Concepts in Space, Time, and Matter
  - Spring 2017 (2 sections)
- PHYS-UA 93 Physics II
  - Spring 2018 (2 sections)
- PHYS-UA 150 Astrophysics
  - Fall 2020 (1 section, blended virtual & in-person), Fall 2018 (1 section)

SOFTWARE SKILLS

- *Fluent:* C++, UNIX shell scripting, Python, numpy, scipy, matplotlib
- *Experienced User:* FORTRAN, GSL, CRMC, CRPropa, ELMAG, SOPHIA, ROOT, emcee
- *Basic Knowledge:* TensorFlow, Keras, pandas

AWARDS

New York University

- NYU Physics Department Outstanding Graduate Student Instructor Award, 2019–2020
- Ted Keuseff Fellow, 2019–2020
- James Arthur Graduate Award, 2019
- Dean’s Outstanding Graduate Student Teaching Award, 2019
- Henry M. MacCracken Fellow, 2015–2019

GRANTS

*NSF* Collaborative Research: WoU-MMA, Awards #2310122, 2310123, 2310124, 2310125, 2310126, 2310127, 2310128, & 2310129, 2023-2025, \$1.53M

*NSF* MPS-Ascend Postdoctoral Fellowship, Award 2138121, 2021-2024, \$300k

PROFESSIONAL  
DEVELOPMENT

Inclusive STEM Teaching Project, Spring 2023, edX (online)

International School of Cosmic Ray Astrophysics (ISCRA), August 1–7, 2018, Erice, Sicily, Italy

PROFESSIONAL  
MEMBERSHIPS

Radio Neutrino Observatory in Greenland (RNO-G), Member, 2021 to present

- 2023 Penn State Collaboration Meeting Local Organizing Committee Member

Askaryan Radio Array (ARA), Member, 2021 to present

- Analysis Coordinator, 2022 to present

Pierre Auger Observatory, Member, 2019 to 2023

American Physical Society (APS), Member, 2015 to present

MENTORSHIP

**Graduate Students**

- Bryan Hendricks, PhD candidate, Penn State, 2022-2023, Source of Perseus-Pisces supercluster UHECR excess
- Dhara Mungra, Data Science & Software Services (DS3), NYU, 2020, ML-based analysis of CR-induced air showers

**Undergraduate Students**

- Ethan Skeens, REU Program, Penn State, 2022, UHECR excess from the Perseus-Pisces supercluster

**High School Students**

- Sebastian Ross, 2021, Cosmic rays & Earth's magnetic field
- Robert Avram, 2020, Black holes & gravitational lensing

PROFESSIONAL  
SERVICE

**International**

Journal of Cosmology and Astroparticle Physics (JCAP)

- Referee, December 2023 to present

ARENA 2022 Editorial Board

**National**

Snowmass 2021 Cosmic Frontier White Papers

- Editor, "Advancing the Landscape of Multimessenger Science in the Next Decade" White Paper, August 2021 to July 2022
- Contributor, Multimessenger Science Task, Ultrahigh Energy Cosmic Ray White Paper, September 2021 to July 2022

APS Division of Particles and Fields (DPF) Program Committee

- Member, September 2020 to present
- Organizer, "Rethinking the Culture of (Nuclear and Particle) Physics" Invited Session, APS April Meeting 2023

Snowmass 2021 Early Career

- Member, June 2020 to July 2022

**Pennsylvania State University**, University Park, PA

Penn State Postdoctoral Research Symposium Organizing Committee

- Member, July 2023 to December 2023

Gravity, Astroparticle, and Particle Physics (GAPP) Seminar Postdoc Committee

- Member, January 2023 to present

SEA-Change Committee

- Postdoc Representative, October 2022 to present

APS Site Visit Local Organizing Committee

- Postdoc Representative, October 2022 to present

CUWiP Penn State Site, Local Organizing Committee

- Member, September 2022 to January 2023

Climate, Inclusion, and Diversity Committee, Physics Department

- Member, September 2022 to present

Physics Department Chair Search Committee, Physics Department

- Postdoctoral Representative, November 2021 to March 2022

IGC Postdoc Council, Institute for Gravitation and the Cosmos

- Member, January 2022 to September 2023

Postdoctoral Professional Development Committee, Physics Department

- Member, October 2021 to September 2023

APS Inclusion, Diversity, and Equity Alliance (APS-IDEA), Penn State Chapter

- Member, September 2021 to present

**New York University**, New York, NY

NYU Graduate Physics Organization for Research, Culture, and Education (G-PHORCE)

- Founder
- Chair, November 2019 to March 2021

NYU Research Technology Peer Benchmarking 2020, Artificial Intelligence

- Member, June 2020 to September 2020

OUTREACH

- Physicist, APS Physicists To-Go, St. Michael School, Lowell, MA, December, 2022
- Speaker, seminar on reading journal articles, Graduate Research Experience and Transitioning to Grad School (GREaT GradS Program), Penn State, July 27th, 2022
- Physicist, APS Physicists To-Go, B.M.C. Durfee High School, Fall River, MA, May, 2022
- Science Ambassador, City of Science, Bronx, NY, February 9th, 2020
- Science Ambassador, City of Science, Brooklyn, NY, December 15th, 2019
- NYU Physics Undergraduate Research Seminar, October 4th, 2019

REFERENCES  
AVAILABLE TO  
CONTACT

**Stephanie Wissel, Ph.D.**

Email: [wissel@psu.edu](mailto:wissel@psu.edu)

- Downsbrough Early Career Assistant Professor of Physics,
- ◇ Departments of Physics and Astronomy & Astrophysics, Penn State University, University Park, PA

**Glennys R. Farrar, Ph.D.**

Email: [gf25@nyu.edu](mailto:gf25@nyu.edu)

- Professor,
- ◇ Department of Physics, New York University, New York, NY

**Michael Unger, Ph.D.**

Email: [Michael.Unger@kit.edu](mailto:Michael.Unger@kit.edu)

- Science Coordinator, Pierre Auger Observatory,
- ◇ Institute for Nuclear Physics, Karlsruhe Institute of Technology, Karlsruhe, Germany

**Frank Moscatelli, Ph.D.**

Email: [frank.moscatelli@nyu.edu](mailto:frank.moscatelli@nyu.edu)

- Clinical Professor,
- ◇ Department of Physics, New York University, New York, NY
- Professor Emeritus,
- ◇ Department of Physics, Swarthmore College, Swarthmore, PA
- ★ *I have worked as Professor Moscatelli's Teaching Assistant and he is very familiar with my ability to teach.*