Fabrizio Vassallo

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Education

2024–present **Doctor of Philosophy in Physics**
University of Wisconsin–Madison and WIPAC
Advised by Dan Hooper and Joshua Foster.

2020–2024 **BS in Physics and BA in Mathematics**
Denison University
Advised by Wes Walter (first projects) and Chris Verhaaren (senior thesis).

Research interests

My research focuses on understanding the nature of dark matter by exploring its astrophysical, gravitational, and particle signatures. Alongside studying these potential signals, I develop research pipelines that connect theoretical predictions with experimental searches, drawing on modern statistical methods and machine learning to help identify signals and understand what they can tell us.

Publications and preprints

7. *Cosmic-Ray Signals from Dark Matter Annihilation into Scalars with Baryon Number.* — Submitted to Phys. Rev. D, arXiv:2611.03785
M. Di Mauro, C. Gemmell, D. Hooper, and **F. Vassallo**.

6. *Projecting the ultimate pulsar timing sensitivity to dark matter substructure in a stochastic gravitational wave background.* — Submitted to Phys. Rev. D, arXiv:2606.18329
J. W. Foster, T. Trickle, and **F. Vassallo**.

5. *Dark Matter, Baryon Number, and Cosmic-Ray Antinuclei.* — Phys. Rev. Lett. **137**, 171802 (2026), arXiv:2603.12314
C. Gemmell, D. Hooper, S. Koren, and **F. Vassallo**.

4. *Understanding the quantized angular momentum of rotating Q-balls.* — JHEP **08**, 108 (2026), arXiv:2602.15196
B. DeVries, C. V. Verhaaren, and **F. Vassallo**.

3. *Searching for dark matter annihilating in the Sun with the IceCube Upgrade.* — Phys. Rev. D **112**, 035014 (2025), arXiv:2505.06734
D. Hooper and **F. Vassallo**.

2. *Lifetimes of bound excited states of the lanthanum negative ion and implications for laser cooling.* — Phys. Rev. A **112**, 052801 (2025)
C. W. Walter, **F. Vassallo**, J. Karls, et al.

1. *Measurement of the electron affinity of lead and its isotope shifts.* — Phys. Rev. A **106**, L010801 (2022)
C. W. Walter, **F. Vassallo**, and N. D. Gibson.

Other publications

Powerful math: What biology's modern synthesis reveals about the twofold influence of numbers. Synthesis, Harvard University (2023).

Science comes to life at PhysCon: Scholarly adventures in Washington, DC. Radiations, American Institute of Physics (2023).

The calm amidst the storm: A literary nonfiction tale. Exile, Denison University (2022).

Contributed talks

2026 **Enhancing cosmic-ray antinuclei fluxes from dark matter using baryon number**
Pheno 2026, Pittsburgh, PA.

2025 **Searching for dark matter annihilation in the Sun with the IceCube Upgrade**
Lepton Photon 2025, Madison, WI.
Intersections of Particle and Nuclear Physics, Madison, WI.

2023 **Slowly-rotating Q-balls**
APS Eastern Great Lakes Meeting, Cleveland, OH.

2021 **Measurement of the isotope shifts in the electron affinity of lead**
Optica FiO+LS Symposium, online.

Teaching experience

2024–2026 **Graduate Teaching Assistant, University of Wisconsin–Madison**
Led discussions and laboratories for Physics 207 (introductory mechanics) and Physics 115 (energy and climate). Appointments: Fall 2024; Spring 2025 and 2026.

2022–2023 **Undergraduate Teaching Assistant, Denison University**
Assisted with seven courses, including Modern Physics, Applied Mathematical Methods, and Introduction to Proofs.

Service and leadership

2026–present Member of the physics colloquium committee at the University of Wisconsin–Madison

2025 Session convener at Lepton–Photon 2025

2021–2022 Co-president of the Society of Physics Students at Denison University

Selected honors and awards

2024 **Denison University**
Valedictorian of the Class of 2024
Provost's Academic Excellence Award
John L. Gilpatrick Award in Mathematics
Mike Mickelson Research Award in Physics

2023 **Phi Beta Kappa**
Elected as a junior at Denison University