Fabrizio Vassallo

Argentine · 7975 Slayter Union, Granville, Ohio, USA 43023
vassal_f1@denison.edu · www.vassalloef.com

Education

2024 – Present: **PhD in Physics**
University of Wisconsin, Madison

2020 – 2024: **BS in Physics and BA in Mathematics**
Denison University
GPA: 4.00/4.00

Research experience

Jun 2023 – Present: **Summer Research & Senior Thesis (HEP Theory)**
Advisor: Christopher Verhaaren
Brigham Young University and Denison University

- Wrote a senior thesis on rotating Q-balls, which are nontopological solitons with applications, for instance, in dark matter theories.
- Explored a new model for rotating Q-balls that would lead to new solutions. Used perturbative methods and recast system using Green's functions for numerics.
- Steered investigation down the new route of $(2+1)$ Q-vortices, which are largely unexplored and could significantly simplify the problem.
- Found analytical solutions for non-rotating Q-disks.

May 2021 – May 2023: **Undergraduate Research Assistant (AMO Experiment)**
Advisor: Wesley Walter
Denison University

- Contributed during the school year to the writing, editing, and revision process of the Phys. Rev. A paper about lead we published in 2022 and led the writing process of the article about lanthanum we are preparing for submission soon.
- Worked at the DESIREE experiment of Stockholm University on measuring the lifetime of certain excited states of La^- to test its potential as the first anion used in laser cooling.
- Researched the energy spectrum of Pb^-, measuring the electron affinity of the main isotopes of lead with unprecedented precision and resolving a previous controversy.
- Redesigned various LabVIEW programs from scratch to implement a new laser and a new section of the apparatus.
- Led the data analysis process with Origin in all the projects I was involved in.

Publications

Physics research:

1. Measurement of the electron affinity of lead and its isotope shifts.
   Walter, C. W., Vassallo, F. E., & Gibson, N. D.
   Physical Review A, Volume 106, Issue 1, 2022.
2. Measurement of lanthanum anion excited-state lifetimes.
   Walter, C. W., Vassallo, F. E., Gibson, N. D., *et al.*
   Manuscript in preparation.

History of science research:

3. Powerful math: What biology's modern synthesis reveals about the twofold influence of numbers.
   Vassallo, F. E.
   Synthesis, Harvard University, Volume 1, Issue 7, 2023.

Others:

4. Science comes to life at PhysCon: Scholarly adventures in Washington, DC.
   Vassallo, F. E.
   Radiations, American Institute of Physics, Volume 29, Issue 2, 2023.
5. The calm amidst the storm: A literary nonfiction tale.
   Vassallo, F. E.
   Exile Magazine, Denison University, Volume 68, Issue 1, 2022.

Presentations at scientific conferences

2023:

1. *Slowly-Rotating Q-Balls.*
   Speaker. APS Eastern Great Lakes Meeting. Cleveland, Ohio, USA.
2. *Slowly-Rotating Q-Balls.*
   Poster presentation. Denison University Symposium. Granville, Ohio, USA.

2022:

3. *Lifetime measurements of excited states of La^-.*
   Poster presentation. Optica FiO+LS Symposium. Rochester, New York, USA.
4. *Lifetime measurements of excited states of La^-.*
   Poster presentation. PhysCon 2022. Washington DC, USA.
5. *Lifetime of excited states of La^- at DESIREE.*
   Poster presentation. Denison University Symposium. Granville, Ohio, USA.

2021:

6. *Measurement of the isotope shifts in the electron affinity of lead.*
   Speaker. Optica FiO+LS Symposium. Online.
7. *Measurement of the isotope shifts in the electron affinity of lead.*
   Poster presentation. Denison University Symposium. Granville, Ohio, USA.

Teaching and mentoring

Teaching assistant:

1. *"Principles of Physics: Quarks to Cosmos,"* Fall 2023.
2. *"Modern Physics,"* Spring 2023.
3. *"Applied Mathematics for Physical Systems,"* Spring 2023.
4. *"Darwin and Darwinism,"* Fall 2022.
5. *"Introduction to Proofs,"* Fall 2022.
6. *"Linear Algebra & Differential Equations,"* Spring 2022.

Tutoring:

7. *"Principles of Physics: Quarks to Cosmos,"* Fall 2021.
8. *"Multi-Variable Calculus,"* Fall 2021.

Leadership and Involvement

2021 – 2022:

Society of Physics Students
Co-president, Denison University
Organized events to bring the physics community together with fun activities, from decorating the building for Halloween to coordinating a stargazing night with faculty. Recognized by the American Institute of Physics as a Distinguished Chapter.

Honors and Awards

2024:

Valedictorian of the Class of 2024
Provost's Academic Excellence Award
John L. Gilpatrick Award in Mathematics
Mike Michelson Research Award in Physics
Ronald R. Winters Graduate School Award in Physics

2023:

Membership of the Phi Beta Kappa Honor Society (Junior Early Inductee)
Membership of the Pi Mu Epsilon Honor Society
Membership of the Sigma Xi Honor Society
Ben Leslie Experimentalist Award
Senior Fellow of the Mathematics Department

	Senior Fellow of the Physics Department
2022:	Chosaburo Kato Memorial Award
	Forbes B. Wiley Award
	Junior Fellow of the Physics Department
	Membership of the Sigma Pi Sigma Honor Society
2021:	Membership of the Phi Honor Society
	Forbes B. Wiley Award
	Introductory Physics Award

Various skills

Theoretical Skills:	Study of partial differential equations; numerical analysis in Mathematica; and analytical perturbative methods.
Lab skills:	Designing and building electrical and electronic circuits; DAQ interfacing; analyzing and interpreting large data sets; running and planning experiments; and working with Ultra-High Vacuum (UHV) systems.
Programming:	Python, R, and Mathematica.
Software:	Office Suite, AutoCAD, Autodesk Inventor, Origin, LabVIEW, and LaTeX.
Languages:	Spanish (native), English (C2, proficient), and German (A2, basic).