

Sean M. O’Neill

CONTACT INFORMATION

Department of Physics
Rieke 253
Pacific Lutheran University
Tacoma, WA 98447

EDUCATION

University of Minnesota, Department of Astronomy, Minneapolis, MN USA
Ph.D. Astrophysics, 2007

- Thesis Topic: “Three-Dimensional Magnetohydrodynamic Simulations of Interactions between Radio Galaxies and Their Environments”
- Advisor: Thomas W. Jones

University of Chicago, Department of Physics, Chicago, IL USA
B.A. Physics, 2000

- Specialization in Astronomy & Astrophysics
- Thesis Topic: “Trajectories of Ultra High Energy Cosmic Rays in the Galactic Magnetic Field”
- Advisor: Angela V. Olinto

TEACHING EXPERIENCE

Pacific Lutheran University, Tacoma, WA USA **2013 - present**
Visiting/Resident/Assistant Professor

Instructor, “*Astronomy*” **8 sections**
PHYS 110: Introductory algebra-based astronomy.

Instructor, “*Astronomy Lab*” **21 sections**
PHYS 110-L: Introductory astronomy labs.

Instructor, “*College Physics I*” **3 sections**
PHYS 125: Introductory algebra-based mechanics.

Instructor, “*College Physics II*” **2 sections**
PHYS 126: Introductory algebra-based electricity & magnetism/optics.

Instructor, “*General Physics I*” **7 sections**
PHYS 153: Introductory calculus-based mechanics.

Instructor, “*General Physics II*” **4 sections**
PHYS 154: Introductory calculus-based electricity & magnetism/optics.

Instructor, “*College/General Physics Lab*” **37 sections**
PHYS 135/136/163/164: Introductory physics labs.

Instructor, “*Waves and Fluids*” **2 sections**
PHYS 221: Introductory fluid mechanics and wave physics.

Instructor, “*Elementary Modern Physics*” **9 sections**
PHYS 223: Introductory special relativity/quantum mechanics.

Instructor, “*Electromagnetic Waves and Physical Optics*” **1 section**
PHYS 332: Electricity & magnetism/waves for advanced undergraduates.

TEACHING EXPERIENCE (CONT.)	Pacific Lutheran University, Tacoma, WA USA	2013 - present
	Visiting/Resident/Assistant Professor	
	Instructor, “ <i>Engineering Thermodynamics</i> ”	7 sections
	PHYS/ENGR 333: Thermodynamics for advanced undergraduates.	
	Instructor, “ <i>Classical Mechanics</i> ”	1 section
	PHYS 332: Classical mechanics for advanced undergraduates.	
	Instructor, “ <i>Stellar Astrophysics</i> ”	1 section
	PHYS 387: Astrophysics of stars for advanced undergraduates.	
	Instructor, “ <i>Independent Studies</i> ”	9 sections
	PHYS 491: Independent studies on astrophysics theory/computation	
	University of Colorado, Boulder, CO USA	2011
	Postdoctoral Instructor	
	Co-Instructor, “ <i>Numerical Simulations of Disks and Jets</i> ”	1 section
	ASTR 6000: Graduate seminar on astrophysics of disks and jets.	
	University of Minnesota, Minneapolis, MN USA	2001 - 2005
	Graduate Teaching Assistant	
	Lab Instructor, “ <i>Astronomy: Exploring Our Universe</i> ”	6 sections
	AST 1001: Introductory astronomy lab.	
MENTORING EXPERIENCE	Pacific Lutheran University, Tacoma, WA USA	2026
	Co-mentored four undergraduate students on observational astronomy projects using smart telescope.	
	Pacific Lutheran University, Tacoma, WA USA	2024 - 2025
	Served as new faculty mentor to Dr. Abhisek Basu.	
	Pacific Lutheran University, Tacoma, WA USA	2024 - 2025
	Mentored three Pell-eligible engineering/physics students through S-STEM mentoring program.	
Pacific Lutheran University, Tacoma, WA USA	2023	
Co-mentored two undergraduate students on observational astronomy projects involving observations of variable stars and star clusters. Students delivered poster presentation at 2023 Murdock College Science Research Conference.		
Pacific Lutheran University, Tacoma, WA USA	2022 - present	
Served as academic advisor for multiple physics majors		

MENTORING
EXPERIENCE
(CONT.)

Pacific Lutheran University, Tacoma, WA USA **2020**

Mentored two undergraduate students on computational research project focused on modeling of solar system interlopers. Students delivered online poster presentation at 2020 Murdock College Science Research Conference.

Pacific Lutheran University, Tacoma, WA USA **2019 - 2020**

Mentored undergraduate student on computational modeling of photon/particle scattering in astrophysical media. Work was accepted for publication in Journal of Undergraduate Reports in Physics.

Pacific Lutheran University, Tacoma, WA USA **2018**

Co-mentored two undergraduate students on observational astronomy research project that analyzed images of Jupiter and Saturn. Students delivered oral presentation at 2018 Murdock College Science Research Conference and public presentation to Tacoma Astronomical Society.

Pacific Lutheran University, Tacoma, WA USA **2016**

Co-mentored undergraduate student on astronomy research project that analyzed observed sizes/temperatures of sunspots. Student delivered oral presentation at 2016 Murdock College Science Research Conference.

University of Colorado, Boulder, CO USA **2010 - 2013**

Co-advised graduate student on computational research project that simulated the Kelvin-Helmholtz instability.

GRANTS
AWARDED

- PLU Natural Sciences Summer Undergraduate Research Program (NSSURP) stipend & funding for two students 2025
- PLU Natural Sciences Summer Undergraduate Research Program (NSSURP) stipend (split w/ Dr. Katrina Hay) & funding for two students 2023
- PLU Natural Sciences Summer Undergraduate Research Program (NSSURP) stipend & funding for two students 2020
- PLU Natural Sciences Summer Undergraduate Research Program (NSSURP) stipend (split w/ Dr. Katrina Hay) & funding for two students 2018
- PLU Natural Sciences Summer Undergraduate Research Program (NSSURP) stipend (split w/ Dr. Katrina Hay) & funding for two students 2016
- XSEDE Supercomputing Grant: 3.0 million CPU hours 2012
- Janus (UCB) Supercomputing Grant: 4.9 million CPU hours 2012
- Fermi Space Telescope Grant: \$85 k 2012

AWARDS & HONORS	<ul style="list-style-type: none"> • PLU Faculty Excellence Award in Teaching 2022 • University of Minnesota Doctoral Dissertation Fellowship 2006-2007 • University of Minnesota Graduate School Fellowship 2001-2002
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RESEARCH INTERESTS	Astronomy & astrophysics; Astrophysical jets; Black hole accretion disks; Fluid instabilities; Numerical magnetohydrodynamics (MHD); N-body simulations of orbital systems; Orbital dynamics, Solar system observational astronomy; Sunspots; Visualization of 3D data;
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RESEARCH POSITIONS	<p>JILA/University of Colorado, Boulder, CO USA 2010 - 2013 Research Associate <i>Supervisor:</i> Mitchell C. Begelman Conducted numerical simulations to explore current-driven instabilities and magnetized Kelvin-Helmholtz instability in astrophysical jets.</p>
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<p>University of Maryland, College Park, MD USA 2007 - 2010 Research Associate <i>Supervisors:</i> Christopher S. Reynolds/M. Coleman Miller Modified and tested a numerical scheme to simulate astrophysical accretion disks. Introduced viscosity model to explore physical mechanism behind quasi-periodic oscillations. Simulated full MHD disks to study diskoseismic modes and circumbinary disk response to a binary black hole merger.</p>

<p>University of Minnesota, Minneapolis, MN USA 2001 - 2007 Research Assistant <i>Supervisor:</i> Thomas W. Jones Conducted and analyzed large-scale simulations of supersonic MHD jets propagating through galaxy cluster environments. Characterized the importance of jet energy flow in cluster reheating, explored the morphology and evolution of jet-blown structures, constructed synthetic observations of radio jets, and developed strategies for visualization of complex 3D data sets.</p>
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<p>University of Chicago, Chicago, IL USA 2000 - 2001 Research Assistant <i>Supervisor:</i> Angela V. Olinto Developed code to simulate ultra high energy cosmic ray propagation through a realistic model of the Galaxy.</p>
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REFEREED JOURNAL PUBLICATIONS	<p><i>Mapping Out the Puzzles of Nucleosynthesis</i>, O'Neill, S., 2026, The Physics Teacher, <i>accepted to The Physics Teacher</i>.</p> <p><i>Theoretical and computational models for Saturn's co-orbiting moons, Janus and Epimetheus.</i>, O'Neill, S., Hay, K., deMattos, J., 2024, Celestial Mechanics and Dynamical Astronomy, 136, 28.</p>
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Quantifying Energetics and Dissipation in Magnetohydrodynamic Turbulence, Salvesen, G., Beckwith, K., Simon, J. B., **O’Neill, S. M.**, & Begelman, M. C., 2014, *Monthly Notices of the Royal Astronomical Society*, 438, 1355.

Local Simulations of Instabilities in Relativistic Jets I: Morphology and Energetics of the Current-Driven Instability, **O’Neill, S. M.**, Beckwith, K., & Begelman, M. C., 2012, *Monthly Notices of the Royal Astronomical Society*, 422, 1436.

Low-Frequency Oscillations in Global Simulations of Black Hole Accretion, **O’Neill, S. M.**, Reynolds, C. S., Miller M. C., & Sorathia, K., 2011, *The Astrophysical Journal*, 736, 107.

Synthetic Observations of Simulated Active Galactic Nucleus Jets: X-ray Cavities, Mendygral, P. J., **O’Neill, S. M.**, & Jones, T. W., 2011, *The Astrophysical Journal*, 730, 100.

Three-dimensional Simulations of Bi-directed Magnetohydrodynamic Jets Interacting with Cluster Environments, **O’Neill, S. M.** & Jones, T. W., 2010, *The Astrophysical Journal*, 710, 180.

Reaction of Accretion Disks to Abrupt Mass Loss During Binary Black Hole Merger, **O’Neill, S. M.**, Miller, M. C., Bogdanović, T., Reynolds, C. S., & Schnittman, J., 2009, *The Astrophysical Journal*, 700, 859.

Three-dimensional Magnetohydrodynamic Simulations of Buoyant Bubbles in Galaxy Clusters, **O’Neill, S. M.**, De Young, D. S., & Jones, T. W., 2009, *The Astrophysical Journal*, 694, 1317.

On the Time Variability of Geometrically-Thin Black Hole Accretion Disks II: Viscosity-Induced Global Oscillation Modes in Simulated Disks, **O’Neill, S. M.**, Reynolds, C. S., & Miller, M. C., 2009, *The Astrophysical Journal*, 693, 1100

FieldVis: A Tool for Visualizing 3D Scalar and Vector Fields in Astrophysical Magnetohydrodynamic Flow, Field, B., **O’Neill, S.**, Urness, T., Interrante, V., & Jones, T. W., 2007, *IEEE Computer Graphics and Applications*, 27(1), 9.

Strategies for the Visualization of Multiple 2D Vector Fields, Urness, T., Interrante, V., Longmire, E., Marusic, I., **O’Neill, S.**, & Jones, T. W., 2006, *IEEE Computer Graphics and Applications*, 26(4), 74.

3D MHD interactions of jets with cluster media, **O’Neill, S. M.**, Jones, T. W., Tregillis, I. L., & Ryu, D., 2006, *Astronomische Nachrichten*, 327, 535.

Three-dimensional Simulations of MHD Jet Propagation through Uniform and Stratified External Environments, **O’Neill, S. M.**, Tregillis, I. L., Jones, T. W., & Ryu, D., 2005, *The Astrophysical Journal*, 633, 717.

RESEARCH
PRESENTATIONS

- 2025 American Association of Physics Teachers Winter Meeting 01/2025
–St. Louis, MO (*contributed talk*)
- 2023 American Association of Physics Teachers Winter Meeting 01/2023
–Portland, OR (*contributed poster*)
- Thompson Hall Science/Math Seminar, University of Puget Sound 09/2022
–Portland, OR (*invited talk*)
- American Geophysical Union Fall Meeting 12/2021
–New Orleans, LA/online (*contributed poster*)
- 19th Meeting of the NW Section of the American Physical Society 06/2018
–Tacoma, WA (*contributed talk*)
- Nonthermal Processes in Astrophysical Phenomena 06/2015
–Minneapolis, MN (*invited talk*)
- Physics Seminar, University of Puget Sound 10/2012
–Tacoma, WA (*invited talk*)
- 2nd ICM Theory and Computation Workshop, U. Michigan 08/2012
–Ann Arbor, MI (*invited talk*)
- CASA/JILA Astrophysics Lunch Seminar, CU-Boulder 03/2012
–Boulder, CO (*contributed talk*)
- CASA/JILA Astrophysics Lunch Seminar, CU-Boulder 02/2011
–Boulder, CO (*contributed talk*)
- The 217th Meeting of the American Astronomical Society 01/2011
–Seattle, WA (*contributed talk*)
- The 11th Meeting of the High Energy Astrophysics Division (AAS) 03/2010
–Big Island, HI (*contributed poster*)
- Probing Strong Gravity Near Black Holes 02/2010
–Prague, Czech Republic (*contributed talk*)
- The 215th Meeting of the American Astronomical Society 01/2010
–Washington D. C. (*contributed poster*)
- Astrophysics Seminar, Rutgers University 11/2009
–New Brunswick, NJ (*invited talk*)
- Astronomy Special Seminar, Columbia University 11/2009
–New York, NY (*invited talk*)
- CGWP Seminar, Pennsylvania State University 10/2009
–State College, PA (*invited talk*)
- The Monster’s Fiery Breath: Feedback in Galaxies, Groups,
and Clusters, UW-Madison 06/2009
–Madison, WI (*contributed poster*)

RESEARCH PRESENTATIONS (CONT.)	• Astro Lunch Seminar, Carnegie Mellon University/Pitt University –Pittsburgh, PA (<i>invited talk</i>)	02/2009
	• The 213th Meeting of the American Astronomical Society –Long Beach, CA (<i>contributed poster</i>)	01/2009
	• Putting Gravity to Work, University of Cambridge –Cambridge, UK (<i>contributed poster</i>)	07/2008
	• ASD Colloquium, Goddard Space Flight Center –Greenbelt, MD (<i>invited talk</i>)	12/2007
	• The 209th Meeting of the American Astronomical Society –Seattle, WA (<i>contributed poster</i>)	01/2007
	• The 23rd Texas Symposium on Relativistic Astrophysics –Melbourne, Australia (<i>contributed talk</i>)	12/2006
	• The 206th Meeting of the American Astronomical Society –Minneapolis, MN (<i>contributed talk</i>)	05/2005
	• The 3rd Korean Astrophysics Workshop on Cosmic Rays and Magnetic Fields in Large Scale Structure –Busan, Republic of Korea (<i>contributed poster</i>)	08/2004
	• The 203rd Meeting of the American Astronomical Society –Atlanta, GA (<i>contributed poster</i>)	01/2004
	• The 27th International Cosmic Ray Conference –Hamburg, Germany (<i>contributed talk</i>)	08/2001
UNIVERSITY SERVICE	• PLU Society of Physics Students Advisor	2025-present
	• PLU Faculty Affairs Committee Member	2025-present
	• PLU Astronomy Club Advisor	2024-present
	• PLU Rachel Carson Planning Committee Member	2024-present
	• PLU Physics Contingent Faculty Search Committee Member	2024
	• PLU Sustainability Committee Member	2024-present
	• PLU Chemistry Faculty Search Committee Member	2024-2025
	• PLU Computer Science Faculty Search Committee Member	2023-2024
	• PLU Human Participant Review Board Member	2023-present
	• PLU Scholarship Weekend Interviewer	2023-2025
	• PLU Computer Science Faculty Search Committee Member	2022-2023
	• PLU Preview Day Speaker	2022-2023
• PLU NatSci Fellows Great Grad Gathering Grad School Panelist	2022	

UNIVERSITY SERVICE (CONT.)	• Co-hosted PLU NatSci Fellows Observatory Night	2022
	• PLU Rieke Open Lab Renovation Meeting Participant	2022
	• PLU NSCI Opportunity Fair Volunteer	2021-present
	• Delivered PLU observatory tours to various student groups	2015-present
	• PLU Contingent Faculty Statement Task Force Representative	2016
	• UMN Instructional Computing Committee Representative	2004-2007
	• UMN Astronomy Department Webmaster	2001-2003
PROFESSIONAL SERVICE	• MESA Science Fair Judge	2021-2022
	• Murdock College Science Research Conference Poster Judge	2016, 2020
	• Challenge Academy Science Fair Judge	2014-2019
	• Referee, The Astrophysical Journal	
	• Referee, Monthly Notices of the Royal Astronomical Society	
	• Proposal Reviewer, Murdock College Research Program for Natural Sciences	
PUBLIC OUTREACH	• PLU STEM Fair Volunteer Demonstrated infrared camera for students and campus visitors	2026
	• Tech Trek Science Camp Facilitated solar observing and astronomy activities for middle school girls at science camp	2025
	• Federal Way High School STEM Night Conducted physics demonstrations for students and families	2025
	• Tech Trek Delivered interactive lessons on astronomical distances	2024-2025
	• Tacoma Astronomical Society Student Group Presentation Delivered presentation to student organization	2023
	• Tacoma Public Library Presentation Delivered presentation on eclipses to library patrons	2023
	• PLU Observatory Open House Conducted public tours of campus observatory	2023
	• Tacoma Astronomical Society Presentations Delivered four public presentations on topics in astrophysics	2014, 2015, 2019, 2023
	• Lake Tapps Cub Scouts observatory visit Conducted tours of the campus observatory	2023
	• Jazz Under the Stars Conducted public tours of the campus observatory	2016-2022

PUBLIC
OUTREACH
(CONT.)

- Tech Trek Science Camp Observatory Tours 2019
Gave tours of campus observatory to middle school girls at science camp
- PLU Solar Eclipse Event 2017
Delivered a presentation on solar eclipses and conducted public viewing of the eclipse
- Yuri's Night 2017
Delivered a short presentation on the life of Yuri Gagarin and conducted a public tour of the campus observatory
- PLU Physics Demo Nights 2014-2016
Conducted demonstrations of physics principles for the public
- Seattle Astronomical Society Presentation 2014
Delivered public presentation on black holes
- Boeing Employee Astronomical Society Presentation 2014
Delivered public presentation on black holes
- Astronomy Day Presentation 2011
Delivered public presentation on black holes in Fiske Planetarium, conducted demonstrations at Summers-Bausch Observatory
- National Capital Astronomers Presentation 2010
Delivered public presentation on black holes
- University of Maryland Observatory Open House 2008-2009
Delivered astronomy presentations to the general public
- Pocatello High School Q & A 2008-2009
Answered high school student questions about black holes, cosmology, and general astronomy
- Bell Museum of Natural History Overnight Programs 2005-2006
Gave multiple educational presentations to scout groups and conducted night sky viewing
- Minnesota Universe in the Park Program 2001-2006
Delivered astronomy presentations to the general public and conducted night sky viewing at regional state parks
- Public Observing Nights 2001-2002
Facilitated public night sky viewing on campus