Sean M. O'Neill

CONTACT INFORMATION

Department of Physics
Pacific Lutheran University
Rieke 202-A
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**

Instructor, *"Astronomy"* **3 sections**
PHYS 110: Introductory algebra-based astronomy.

Instructor, *"Astronomy Lab"* **7 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"* **3 sections**
PHYS 153: Introductory calculus-based mechanics.

Instructor, *"General Physics II"* **1 section**
PHYS 154: Introductory calculus-based electricity & magnetism/optics.

Instructor, *"College/General Physics Lab"* **17 sections**
PHYS 135/136/163/164: Introductory physics labs.

Instructor, *"Elementary Modern Physics"* **4 sections**
PHYS 223: Introductory special relativity/quantum mechanics.

Instructor, *"Engineering Thermodynamics"* **3 sections**
PHYS 333: Thermodynamics for advanced undergraduates.

Instructor, *"Fluid Dynamics and Instabilities"* **2 sections**
PHYS 491: Independent study on theory/simulation of fluids.

Instructor, *"Theoretical and Numerical Astrophysics"* **2 sections**
PHYS 491: Independent study on astrophysics theory and computation.

Teaching Experience (cont.)

University of Colorado, Boulder, CO USA **2011**

Co-Instructor, *"Numerical Simulations of Disks and Jets"* **1 section**
ASTR 6000: Graduate seminar on astrophysics of disks and jets.

University of Minnesota, Minneapolis, MN USA **2001 - 2005**

Teaching Assistant, *"Astronomy: Exploring Our Universe"* **6 sections**
AST 1001: Introductory astronomy lab.

Professional Service

- Murdock College Science Research Conference Poster Judge 2016
- Contingent Faculty Statement Task Force Representative 2016
- Challenge Academy Science Fair Judge 2014-present
- UMN Instructional Computing Committee Representative 2004-2007
- UMN Astronomy Department Webmaster 2001-2003
- Referee, Monthly Notices of the Royal Astronomical Society
- Referee, The Astrophysical Journal

Public Outreach

- 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.
- Jazz Under the Stars 2016-present
  Conducted public tours of the campus observatory.
- PLU Physics Demo Nights 2014-present
  Conducted demonstrations of physical principles for the public.
- Tacoma Astronomical Society Presentations 2014-2015
  Delivered two public presentations on relativity and black holes.
- 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.

Public Outreach (cont.)

- 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.

Research Interests

Astronomy & astrophysics; Numerical magnetohydrodynamics (MHD); Visualization of 3D data; Fluid instabilities; Astrophysical jets; Black hole accretion disks; Solar/planetary observations.

Research Experience

JILA/University of Colorado, Boulder, CO USA

Research Associate—Mitchell C. Begelman **2010 - 2013**
Conducted an ensemble of numerical simulations to explore current-driven and Kelvin-Helmholtz instabilities in astrophysical jets.

University of Maryland, College Park, MD USA

Research Associate—C. S. Reynolds/M. C. Miller **2007 - 2010**
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.

University of Minnesota, Minneapolis, MN USA

Research Assistant—Thomas W. Jones **2001 - 2007**
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.

University of Chicago, Chicago, IL USA

Research Assistant—Angela V. Olinto **1999 - 2001**
Developed code to simulate ultra high energy cosmic ray propagation through a realistic model of the Galaxy.

Mentoring Experience

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

Co-mentored undergraduate physics students Justin DeMattos and Megan Longstaff on planetary science observational research project.

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

Co-mentored undergraduate physics student Kimberly Belmes on research project involving observations and analysis of sunspots.

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

Co-advised Department of Astronomy graduate student Greg Salvesen on research project involving simulation of magnetized Kelvin-Helmholtz instability.

Grants Awarded

- PLU Natural Sciences Summer Undergraduate Research Program (NSSURP) summer stipend & funding for two students 2018
- PLU Natural Sciences Summer Undergraduate Research Program (NSSURP) summer stipend & 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

- University of Minnesota Doctoral Dissertation Fellowship 2006-2007
- University of Minnesota Graduate School Fellowship 2001-2002

Seminars and Colloquia

- Physics Seminar, University of Puget Sound 10/2012
- CASA/JILA Astrophysics Lunch Seminar, CU-Boulder 03/2012
- CASA/JILA Astrophysics Lunch Seminar, CU-Boulder 02/2011
- Astrophysics Seminar, Rutgers University 11/2009
- Astronomy Special Seminar, Columbia University 11/2009
- CGWP Seminar, Pennsylvania State University 10/2009
- Astro Lunch seminar, Carnegie Mellon University/Pitt University 02/2009
- ASD Colloquium, Goddard Space Flight Center 12/2007

Conference Presentations

- 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*)
- 2nd ICM Theory and Computation Workshop 08/2012
  –Ann Arbor, MI (*invited talk*)

Conference Presentations (cont.)

- 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*)
- The Monster's Fiery Breath: Feedback in Galaxies, Groups, and Clusters 06/2009
  –University of Wisconsin, Madison, WI (*contributed poster*)
- The 213th Meeting of the American Astronomical Society 01/2009
  –Long Beach, CA (*contributed poster*)
- Putting Gravity to Work: From Black Holes to Galaxy Clusters 07/2008
  –University of Cambridge, UK (*contributed poster*)
- The 209th Meeting of the American Astronomical Society 01/2007
  –Seattle, WA (*contributed poster*)
- The 23rd Texas Symposium on Relativistic Astrophysics 12/2006
  –Melbourne, Australia (*contributed talk*)
- The 206th Meeting of the American Astronomical Society 05/2005
  –Minneapolis, MN (*contributed talk*)
- The 3rd Korean Astrophysics Workshop on Cosmic Rays and Magnetic Fields in Large Scale Structure 08/2004
  –Busan, Republic of Korea (*contributed poster*)
- The 203rd Meeting of the American Astronomical Society 01/2004
  –Atlanta, GA (*contributed poster*)
- The 27th International Cosmic Ray Conference 08/2001
  –Hamburg, Germany (*contributed talk*)

Refereed Journal Publications

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.

Refereed Journal Publications (cont.)

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.