

Ryan Orvedahl / Curriculum Vitae

phone: (508) 361-7229 e-mail: ryan.orvedahl@colorado.edu

web: <https://orvedahl.bitbucket.io/>

Present Position (Aug 2013 - Present):

Ph.D. Student *University of Colorado at Boulder, Boulder, CO*
Dept. of Astrophysical & Planetary Sciences

Research Interests:

I am interested in developing and applying computational fluid dynamics algorithms to problems in astrophysics. Of particular interest are problems involving magnetic fields that can be found in stellar interiors, accretion disks, planetary cores, and magnetospheres.

Education:

May 2016 *University of Colorado at Boulder:*
M.S. in Astrophysical & Planetary Sciences
thesis: "Simulations of the Tayler Instability" advisor: Dr. J. Toomre

May 2013 *SUNY Stony Brook:*
B.S. in Physics (Honors), Astronomy (Honors), Summa Cum Laude
thesis: "What is a Flame?" advisor: Dr. M. Zingale
Minor in Mathematics

Research Experience:

May 2016 - *Univ of Colorado at Boulder:*
Graduate research assistant. Use Rayleigh code to study rotating convection in stars and planets using the MHD equations. *advisor: Dr. M. Calkins*

May 2016 - *Univ of Colorado at Boulder:*
Aug 2018 Graduate research. Use Dedalus code to study MHD waves in systems with many coronal arcades. *advisor: Dr. B. Hindman*

May 2014 - *Univ of Colorado at Boulder:*
Aug 2016 Graduate research assistant. Work on Compressible Spherical Segment code to study the near surface shear layer in the Sun. Use Dedalus code to run simulations of the Tayler instability. *advisor: Dr. J. Toomre*

Sept 2013 - *Univ of Colorado at Boulder:*
Jan 2016 Graduate research. Write programs to generate synthetic spectra of warped accretion discs around compact objects.
advisors: Dr. C. Nixon & G. Salvesen

Summer 2013 *SUNY Stony Brook:*
Project Aide. Work on MAESTRO-MESA integration and Spectral Deferred Corrections algorithm. *advisor: Dr. M. Zingale*

Feb 2011 - *SUNY Stony Brook:*
May 2013 Undergraduate research for credit. Work on MAESTRO algorithm issues, particle analysis, integration of MESA modules and thermonuclear flames.
advisor: Dr. M. Zingale

Research Experience (cont.):

- Summer 2012 *SUNY Stony Brook:*
Internship, worked on integration of MESA stellar evolution modules into the MAESTRO hydrodynamics code. *advisor:* Dr. M. Zingale
- Summer 2011 *Harvard-Smithsonian Center for Astrophysics:*
REU internship, worked on the coronal heating problem by searching for Alfvén waves in the Solar Dynamics Observatory data.
advisor: Dr. A. A. van Ballegoijen
- Summer 2010 *Siemens Healthcare Diagnostics R & D Sensors and Reagents:*
Internship, worked on mathematically predicting the steady state signal response of a sensor using early rate data. *advisor:* Dr. J. Benco

Publications and Presentations:

- Dec 2019 “Energetics of the Dipolar Magnetic Field” R. J. Orvedahl, M. Calkins, N. Featherstone. Poster presentation at American Geophysical Union
- Dec 2018 “Spontaneous Transitions of the Magnetic Field Morphology within Long-Time Evolution Simulations” R. J. Orvedahl, M. Calkins, N. Featherstone. Poster presentation at American Geophysical Union
- Jul 2018 “Spontaneous Transitions of the Magnetic Field Morphology within Long-Time Evolution Simulations” R. J. Orvedahl, M. Calkins, N. Featherstone. Poster presentation at Study of Earth’s Deep Interior Conference
- Mar 2018 “Prandtl-number Effects in High-Rayleigh-number Spherical Convection” R. J. Orvedahl, M. A. Calkins, N. A. Featherstone, B. W. Hindman *ApJ* 856, 13 (2018) arXiv:astro-ph/1803.07035
- Dec 2017 “Multiscale Analysis of Rapidly Rotating Dynamo Simulations” R. J. Orvedahl, M. Calkins, N. Featherstone. Poster presentation at American Geophysical Union
- Nov 2017 “Multiscale Analysis of Rapidly Rotating Dynamo Simulations” R. J. Orvedahl, M. Calkins, N. Featherstone. Oral presentation at American Physical Society, Division of Fluid Dynamics
- Aug 2017 “Visualizing a Boiling Star” Invited talk at the RMACC High Performance Computing Symposium
- May 2016 “Simulations of the Tayler Instability” Oral presentation at CU Boulder
- Jun 2014 “Low Mach Number Simulations of Nuclear Flames Using Spectral Deferred Corrections” R. J. Orvedahl, M. Zingale, A. S. Almgren, J. B. Bell, A. Nonaka. Poster presentation at the 224th meeting of the American Astronomical Society
- Jan 2013 “Low Mach Number Modeling of Convection in Helium Shells on Sub-Chandrasekhar White Dwarfs. I. Methodology” M. Zingale, A. Nonaka, A. S. Almgren, J. B. Bell, C. M. Malone, R. J. Orvedahl, *ApJ* 764, 97 (2013) arXiv:astro-ph/1212.4380
- Jan 2013 “Exploring the Effects of Large Networks on Evolution in Low Mach Number Flows” R. J. Orvedahl, M. Zingale, A. S. Almgren, J. B. Bell, A. Nonaka. Poster presentation at the 221st meeting of the American Astronomical Society

Publications and Presentations (cont.):

- Apr 2012 "Understanding the Dynamics of Convection in a Nova Using Particles" Poster presentation at SUNY Stony Brook Undergraduate Research and Creative Activities Celebration
- Aug 2011 "Magnetic Waves in Solar Coronal Loops" Oral presentation at Harvard-Smithsonian Center for Astrophysics
- Apr 2011 "Understanding the Dynamics of Convection in a Nova" Poster presentation at SUNY Stony Brook Undergraduate Research and Creative Activities Celebration
- Aug 2010 "Predicting the Steady State Signal using Early Rate Data" Oral presentation at Siemens Healthcare Diagnostics

Honors / Awards:

- 2014 - 2016 George Ellery Hale Graduate Fellow
- 2014 Excellence in Teaching Award (CU Boulder)
- 2014 SPD Studentship Award for AAS/SPD meeting (CU Boulder)
- 2013 Summa Cum Laude (SUNY Stony Brook)
- 2012 Inducted into Sigma Pi Sigma physics honor society (SUNY Stony Brook)
- 2010 Inducted into Golden Key International Honor Society (SUNY Stony Brook)
- 2010 Inducted into National Society of Collegiate Scholars (SUNY Stony Brook)
- 2009 - 2013 University Scholar (SUNY Stony Brook)
- 2009 - 2013 Dean's List (SUNY Stony Brook)

Teaching Experience:

ASTR 2040, Search for Life in the Universe: Origin and evolution of life on Earth, and the search for evidence of life in our solar system. Discuss the conditions necessary for life. (Teaching Assistant at CU Boulder: Spring 2020)

ASTR 1040, Accelerated Intro Astronomy II: Properties of the Sun, birth and death of stars, neutron stars, black holes, and galaxies. (Teaching Assistant at CU Boulder: Spring 2014, Spring 2019)

ASTR 2030, Black Holes: Properties of black holes, evidence of their existence and formation. Modern ideas of space, time, and gravity. (Teaching Assistant at CU Boulder: Fall 2013, Fall 2016, Spring 2018)

Service:

- 2018 Co-Organizer of Rayleigh workshop/tutorial for CIG (CU Boulder)
- 2018 - 2019 Faculty Representative Committee (CU Boulder)
- 2016 - 2018 Graduate Admissions Committee (CU Boulder)
- 2015 Faculty Search Committee for NSO position (CU Boulder)
- 2014 - Astronomy Help Room Volunteer (CU Boulder)

Service (cont.):

- 2014 - 2015 Academic Support Assistance Program Tutor (CU Boulder)
- 2014 - Fiske Planetarium Presenter (CU Boulder)
- 2013 - Public Observing Nights at Sommers Bausch Observatory (CU Boulder)
- 2013 - 2014 Graduate Student Concerns Committee (CU Boulder)
- 2012 - 2013 Secretary of the Undergraduate Astronomy Club (SUNY Stony Brook)
- 2010 - 2013 Astronomy Open Night Lecture Series Volunteer (SUNY Stony Brook)

Professional Societies:

- American Astronomical Society
- American Physical Society
- American Geophysical Union

References:

references available upon request