

# Ryan Orvedahl / Curriculum Vitae

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## 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 hydrodynamics algorithms to problems in astrophysics. Of particular interest are problems involving general relativity and magnetic fields that can be found in magnetohydrodynamics and relativistic magnetohydrodynamics.

## Education:

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 2014 - *Univ of Colorado at Boulder:*  
Graduate research assistant. Work on Compressible Spherical Segment code to study the near surface shear layer in the Sun. *advisor: Dr. J. Toomre*

Sept 2013 - *Univ of Colorado at Boulder:*  
Graduate research (unpaid). 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*

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:**

- 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
- 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 - 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 1040, Accelerated Intro Astronomy II:* Sun, stars, birth and death of stars, neutron stars, black holes and galaxies. (Teaching Assistant at CU Boulder)

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

**Teaching Experience (cont.):**

*MAT 131-132, Calculus I & II:* Single variable calculus covering limits, derivatives, integrals and their applications. (Tutor at SUNY Stony Brook)

*PHY 131-132, Physics I & II:* Calculus based physics covering mechanics, electricity and magnetism, circuits, waves, optics and thermodynamics. (Tutor at SUNY Stony Brook)

*PHY 251, Modern Physics:* An introduction to physics of the 20th century focusing on special relativity and quantum mechanics. (Tutor at SUNY Stony Brook)

*PHY 300, Waves and Optics:* Upper division physics course on waves and optics. (Tutor at SUNY Stony Brook)

*PHY 306, Thermodynamics, Kinetic Theory and Statistical Mechanics:* Upper division physics course on thermodynamics, kinetic theory and statistical mechanics. (Tutor at SUNY Stony Brook)

**University Service:**

2014 - Astronomy Help Room Volunteer (CU Boulder)  
 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:**

Member of the American Astronomical Society

Member of the Solar Physics Division

**Other Activities:**

2014 - Member of Astronomy Club (CU Boulder)  
 2010 - 2011 Needham Community Concert Band (Tenor Sax)  
 2009 - 2010 Secretary of pre-colonized Delta Upsilon Fraternity

**References:**

Dr. Ben Brown  
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Dr. Juri Toomre  
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Dr. Mike Zingale  
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