

# William M. Wolf

## Curriculum Vitae

### Address

Phillips Science Hall 230  
101 Roosevelt Avenue  
TEau Claire, WI 54701

### Contact

wolfwm@uwec.edu  
(715) 836-5749  
billwolf.space

### RESEARCH INTERESTS

- Theoretical stellar astrophysics
  - 1D modeling of stellar structure
  - Stellar explosions: novae and supernovae
  - White dwarf stars
- Undergraduate research experiences
- Contemporary models of physics and astronomy education

### EDUCATION

<i>Doctor of Philosophy, Physics</i> University of California, Santa Barbara, CA Advisors: Lars Bildsten and Andy Howell Thesis: Supersoft Emission from Thermonuclear Burning on Hydrogen-Accreting White Dwarfs	September 2017
<i>Master of Arts, Physics</i> University of California, Santa Barbara, Santa Barbara, CA Advisors: Lars Bildsten and Andy Howell	April 2013
<i>Bachelor of Science, Physics</i> Eastern Illinois University, Charleston, IL University Honors; Summa Cum Laude Summer 2009 REU at U. of Rochester <ul style="list-style-type: none"><li>• Advisor: Eric Blackman</li><li>• Topic: Astrophysical Jets</li></ul>	<i>Bachelor of Arts, Mathematics</i> Eastern Illinois University, Charleston, IL University Honors; Summa Cum Laude Departmental Honors <ul style="list-style-type: none"><li>• Advisor: Leo Comerford</li><li>• Thesis: Conjugacy in Hyperbolic Groups</li></ul>

### ACADEMIC APPOINTMENTS

<i>Assistant Professor</i> Department of Physics and Astronomy, University of Wisconsin – Eau Claire	August 2019 – Present
<i>Postdoctoral Research Associate</i> School of Earth and Space Exploration, Arizona State University	September 2017 – August 2019
<i>Adjunct Professor</i> Maricopa County Community Colleges	August 2018 – May 2019
<i>Graduate Research Assistant</i> Department of Physics, UC Santa Barbara	June 2011 – September 2017
<i>Graduate Teaching Assistant</i> Department of Physics, UC Santa Barbara	September 2010 – May 2016

**SUMMARY OF TEACHING EXPERIENCE***Instructor of Record (Chandler-Gilbert Community College)*

Course Name	Style	Term	Approx. Enrollment
AST 111: Introduction to Solar System Astronomy	Lecture	Fall 2018	24
AST 112: Introduction to Stars, Galaxies, & Cosmology	Lecture	Fall 2018	24
AST 113: Introduction to Solar System Astronomy	Lab	Fall 2018	24
AST 114: Introduction to Stars, Galaxies, and Cosmology	Lab	Fall 2018	24

*Online: AST 111x (ASU)*

- AST 111x is an online version of ASU's course, AST 111: Introduction to Solar System Astronomy
- Offered as part of ASU's Global Freshman Academy
- Enrollment: ~ 3000
- I help moderate discussions and participate in live video question and answer sessions with the instructor, Frank Timmes
- Worked on three offerings so far in 2017-2018; anticipate serving as instructor in Summer 2019

*Undergraduate Teaching Assistant (UC Santa Barbara)*

Course Name	Style	Term	Approx. Enrollment
ASTRO 1: Introductory Astronomy	Discussion	Winter 2011	60
ASTRO 2: Introductory Cosmology	Discussion	Spring 2011	40
PHYS 1: Introductory Physics for Engineers	Discussion	Winter 2012	30
PHYS 3L: Introductory Physics for Engineers	Lab	Fall 2010, 2011	24
PHYS 132: Stellar Structure & Evolution	Discussion	Fall 2010, 2011	40
PHYS 133: Galaxies & Cosmology	Discussion	Winter 2012	40
PHYS 134: Observational Astrophysics	Lab	Spring 2012	24

*Graduate Teaching Assistant (UC Santa Barbara)*

- Assisted in teaching of the graduate course PHYS 232: Stellar Structure
- Aided students in installing and using the MESA software instrument used for their projects
- Served as a guest lecturer on the topic of white dwarf stars
- Helped in Fall 2013 and Spring 2016 offerings

*Teaching Assistant, MESA Summer School*

- Help organize and execute laboratory exercises for the annual MESA summer school
- Assisted the following lecturers and topics:
 

– Matteo Cantiello: Planetary Engulfment	August 2018
– Pablo Marchant: Stellar Rotation in Binary Systems	August 2017
– Jim Fuller: Wave Transport in Stars	August 2016
– Craig Wheeler: Massive Star Explosions	August 2015
– Lars Bildsten: Stellar Response to Mass Loss	August 2014
– Lars Bildsten: Helium Core Burning	August 2013
– Lars Bildsten: Accreting White Dwarfs	August 2012

*Mentor to Undergraduate Research Student (UC Santa Barbara)*

- Closely mentored a visiting undergraduate student, Timothy Cunningham
- After UCSB, project became his Masters' thesis
- Taught concepts of radiative transfer and stellar structure
- Taught research skills like figure design and academic writing
- Timothy is now a doctoral student at the University of Warwick

**PUBLICATIONS**

11. Paxton, Bill; Smolec, R.; Schwab, Josiah; Gautschi, A.; Bildsten, Lars; Cantiello, Matteo; Dotter, Aaron; Farmer, R.; Goldberg, Jared A.; Jermyn, Adam S.; Kanbur, S. M.; Marchant, Pablo; Thoul, Anne; Townsend, Richard H. D.; **Wolf, William M.**; Zhang, Michael; Timmes, F. X. Modules for Experiments in Stellar Astrophysics (MESA): Pulsating Variable Stars, Rotation, Convective Boundaries, and Energy Conservation. 2019, The Astrophysical Journal Supplement Series. Volume 243, Issue 1, 44p.
10. Timmes, F.X; Townsend, Richard H.D.; Bauer, Evan B.; Thoule, Anne; Fields, C. E.; **Wolf, William M.** The Impact of White Dwarf Luminosity Profiles on Oscillation Frequencies. 2018, The Astrophysical Journal Letters. Volume 867, Number 2, 6 pp.
9. **Wolf, William M.**; Townsend, Richard H. D.; Bildsten, Lars. Nonradial Pulsations in Post-outburst Novae. 2018, The Astrophysical Journal. Volume 855, Issue 2, article id. 127, 10 pp.
8. Fields, C. E.; Timmes, F. X.; Farmer, R.; Petermann, I.; **Wolf, William M.**; Couch, S. M. The Impact of Nuclear Reaction Rate Uncertainties on the Evolution of Core-collapse Supernova Progenitors. 2018, The Astrophysical Journal Supplement Series. Volume 234, Issue 2, article id. 19, 25 pp.
7. Prajs, S.; Sullivan, M.; Smith, M.; Levan, A.; Karpenka, N. V.; Edwards, T. D. P.; Walker, C. R.; **Wolf, William M.**; Balland, C.; Carlberg, R.; Howell, A.; Lidman, C.; Pain, R.; Pritchett, C.; Ruhlmann-Kleider, V. The Volumetric Rate of Superluminous Supernovae at  $z \sim 1$ . 2016, Monthly Notices of the Royal Astronomical Society. Volume 463. Issue 2. 16pp.
6. Arcavi, I.; **Wolf, William M.**; Howell, D. A.; Bildsten, L.; Leloudas, G.; Hardin, D.; Prajs, S.; Perley, D. A.; Svirski, G.; Gal-Yam, A.; Katz, B.; McCully, C.; Cenko, S. B.; Lidman, C.; Sullivan, M.; Valenti, S.; Astier, P.; Balland, C.; Carlberg, R. G.; Conley, A.; Fouchez, D.; Guy, J.; Pain, R.; Palanque-Delabrouille, N.; Perrett, K.; Pritchett, C. J.; Regnault, N.; Rich, J.; and Ruhlmann-Kleider, V. Rapidly Rising Transients in the Supernova-Superluminous Supernova Gap. 2016, The Astrophysical Journal, Volume 819, Issue 1, article id. 35, 22pp.
5. Soraisam, M. D.; Gilfanov, M.; **Wolf, William M.**; and Bildsten, L. Population of post-nova supersoft X-ray Sources. 2016, The Monthly Notices of the Royal Astronomical Society, Volume 455, Issue 1, p.668-679. January 2016.
4. Cunningham T.; **Wolf, William M.**; and Bildsten, L. Photoionization Heating of Nova Ejecta by the Post-outburst Supersoft Source. 2015, The Astrophysical Journal, Volume 803, Issue 3, article id. 76, 7pp.
3. Tang, S.; Kaplan, David L.; Phinney, E. S.; Prince, Thomas A.; Breton, Rene P.; Bellm, E.; Bildsten, L.; Cao, Y.; Kong, A. K. H.; Perley, D. A.; Sesar, B.; **Wolf, William M.**; and Yen, T.-C. Identification of the Optical Counterpart *Fermi* Black Widow Millisecond Pulsar PSR J1544+4937. 2014, The Astrophysical Journal Letters, Volume 791, article id. L5, 5pp.
2. Tang, S.; Bildsten, L.; **Wolf, William M.**; Li, K. L.; Hong, A. K. H.; Cao, Y.; Cenko, B. S.; De Cia, A.; Kasliwal, M. M.; Kulkarni, S. R.; Laher, R. R.; Masci, F.; Nugent, P. E.; Perley, D. A.; Prince, T. A.; and Surace, J. An Accreting White Dwarf Near the Chandrasekhar Limit in the Andromeda Galaxy. 2014, The Astrophysical Journal, Volume 786, Issue 1, article id. 61, 8pp.
1. **Wolf, William M.**; Bildsten, L.; Brooks, J.; and Paxton, B. 2013. Hydrogen Burning on Accreting White Dwarfs: Stability, Recurrent Novae, and the Post-nova Supersoft Phase. 2013, The Astrophysical Journal, Volume 777, Issue 2, article id. 136, 15 pp.

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**LECTURES****Public Lectures**

2. **Wolf, William M.** Classical Novae: Inside Out Stars Evolving in Reverse. Astronomy on Tap Santa Barbara, M8RX, Santa Barbara, CA, USA, November 16, 2016.
1. **Wolf, William M.** Stellar Explosions. Retirement Symposium for Professor Jim Conwell, Eastern Illinois University, Charleston, Illinois, USA, November 6, 2015.

**Invited Talks**

5. **Wolf, William M.** Nucleosynthesis in Novae. To 2020 and Beyond: Radionuclides Astronomy. Los Alamos National Laboratory, Los Alamos, NM, USA, August 20, 2018.
4. **Wolf, William M.** Nova Outbursts and the MESA Models. Nova Eruptions, Cataclysmic Variables and Related Systems: Observational vs. Theoretical Challenges in the 2020 Era. 42nd COSPAR Scientific Assembly, Pasadena, CA, USA, July 18, 2018.
3. **Wolf, William M.** Introduction to MESA. ZTF Summer Undergraduate Astronomy Institute. Caltech and Pomona College, Pasadena, CA, USA, June 21, 2017.
2. **Wolf, William M.** Theory of Nova Thermonuclear Runaways. Conference on Shocks and Particle Acceleration in Novae and Supernovae. Simons Foundation and Columbia University, New York, New York, USA, June 23-25, 2016.
1. **Wolf, William M.** Nova Populations: Models vs. Observations. Stellar Remnants at the Junction: Comparing Accreting White Dwarfs, Neutron Stars, and Black Holes. Junction, Texas, USA, May 2-6, 2016.

**Contributed Talks**

7. **Wolf, William M.**, Townsend, R. H. D., & Bildsten, L. Nonradial Pulsations in Post-Outburst Novae. Twenty-first European White Dwarf Workshop. University of Texas, Austin, TX, USA, July 25, 2018.
6. **Wolf, William M.** & Bildsten, L. Helium Flashes on Steadily Burning White Dwarfs. Twentieth European White Dwarf Workshop. University of Warwick, Coventry, CV4 7AL, United Kingdom, July 25 - 19, 2016.
5. **Wolf, William M.**, Cunningham, T., & Bildsten, L. Photoionization Heating of Nova Ejecta. Physics of Cataclysmic and Compact Binaries. Columbia University, New York, USA, October 30 - November 2, 2014.
4. **Wolf, William M.**, Tang, S., Bildsten, L., et al. Post-nova Supersoft Sources, Recurrent Novae, and the Fastest Recurrent Novae Yet Discovered. Type Ia Supernovae: Progenitors, Explosions, and Cosmology. University of Chicago, Chicago, USA, September 15-19, 2014.
3. **Wolf, William M.**, Bildsten, L. Helium Flashes on Steadily Burning White Dwarfs. Thirteenth Annual Theoretical Astrophysics in Southern California Meeting, UCLA, Los Angeles, California, USA, December, 2013.
2. **Wolf, William M.**, Bildsten, L., Brooks, J., and Paxton, B. Steady State Burning on White Dwarfs and Recurrent Novae. Observational Signatures of Type Ia Supernova Progenitors II, Lorentz Center, Leiden, The Netherlands, September 2013.
1. **Wolf, William M.**, Bildsten, L., Brooks, J., and Paxton, B. MESA Models for Accreting White Dwarfs with Stable Burning. Twelfth Annual Theoretical Astrophysics in Southern California Meeting, Carnegie Observatories, Pasadena, California, USA, November, 2012.

**SERVICE**

- MESA Users List* 2012 – Present
- Ask and answer questions relating to the installation and use of the MESA software instrument.
  - See archive of contributions here: <https://bit.ly/2EC3CR8>

- Journal Referee* 2014 – Present
- Refereed articles for the following journals:
- Astrophysical Journal
  - Astronomy and Astrophysics
  - Monthly Notices of the Royal Astronomical Society
  - Nature Astronomy

- Webmaster, UCSB Astronomy and Astrophysics* 2014 – 2017
- Completely redesigned website and kept it up to date, accounting for changes in faculty, postdocs, and students. Implemented selected research, faculty search, automatic “recent papers on the arxiv” features.
  - <http://www.physics.ucsb.edu/~astrogroup>

**COMPUTER SKILLS**

- Programming Languages: Ruby, Python, Mathematica, IDL, and Fortran 95
- Markup Languages: L<sup>A</sup>T<sub>E</sub>X, Markdown
- Internet Tools: HTML5, CSS3, Javascript (jQuery, CoffeeScript), Bootstrap, Ruby on Rails (RSpec, Cucumber)
- Scientific Packages: Numpy, Scipy, Matplotlib, Tioga
- Scientific Software Instruments: MESA, Cloudy
- Operating Systems: Mac, Unix/Linux.
- Version Control Systems: Git

**CODING PROJECTS**

Here are several tools I’ve written to aid in the use of MESA and analyzing the data it produces. All are open source and available through Github. Most of these are detailed on the “Projects” section of my web page: <http://wmwolf.github.io/projects/>.

- MesaTestHub*
- Web app ([testhub.mesastar.org](http://testhub.mesastar.org)) for tracking MESA test suite status
  - Ruby on Rails app deployed through Heroku
  - Used with `mesa_test`
    - Ruby gem
    - Installs and tests MESA revisions; submits results to web app

- MesaScript*
- Powerful domain-specific language for creating complex inlists
  - Written in Ruby
  - <http://wmwolf.github.io/MesaScript/>

- MesaReader*
- Eases access to MESA output for plotting or analysis
  - Python: [http://wmwolf.github.io/py\\_mesa\\_reader/](http://wmwolf.github.io/py_mesa_reader/)
  - Ruby/Tioga: [http://wmwolf.github.io/MESA\\_Reader/](http://wmwolf.github.io/MESA_Reader/)

- Mesa CLI*
- Command line interface for automating many common tasks in MESA
  - Written in Ruby
  - [http://wmwolf.github.io/mesa\\_cli/](http://wmwolf.github.io/mesa_cli/)