

## **EDUCATION**

University of Notre Dame, Notre Dame, IN — Ph.D. in Physics, 2016

Advisor: Dr. Grant Mathews

Thesis: Neutrinos in core-collapse supernovae

University of Notre Dame, Notre Dame, IN — M.S. in Physics, 2014

Reed College, Portland, OR — B.A. in Physics, 2011

## **RESEARCH EXPERIENCE**

**Postdoctoral Research Associate, Michigan State University — 2016-Present**

*Department of Physics & Astronomy/Joint Institute for Nuclear Astrophysics*

Advisor: Dr. Sean Couch

*Core-collapse supernovae.* Studying role of convection and turbulence in supernova explosion mechanism. Developing improved spherically symmetric model for systematic nucleosynthesis and equation of state studies.

**Graduate Research Assistant, University of Notre Dame — 2011-2016**

*Joint Institute for Nuclear Astrophysics/Center for Astrophysics at Notre Dame University*

Advisor: Dr. Grant Mathews

*Core-collapse supernovae.* Explored the role of neutrinos in core-collapse supernovae, with focus on the explosion mechanism. Utilized the University of Notre Dame/Lawrence Livermore National Laboratory supernova model.

*Sterile neutrinos.* Investigated the impact of sterile neutrinos on supernova explosion energies. Collaborated with Dr. Toshitaka Kajino and Dr. Jun Hidaka, National Astronomical Observatory of Japan.

*Nuclear equation of state.* Assisted in developing the Notre Dame-Livermore Equation of State, a generalized nuclear equation of state for use in core-collapse supernova and neutron star simulations. Includes 3-body forces and transition to quark gluon plasma.

*Neutron star accretion.* Investigated neutrino emission during hypercritical accretion onto neutron stars to determine role in Thorne-Zytkow objects, supernova fallback, and long gamma-ray bursts. Collaborated with Dr. Remo Ruffini and Dr. Jorge Rueda, University of Rome “La Sapienza” and International Center for Relativistic Astrophysics (ICRA).

*Big bang nucleosynthesis.* Evaluated thermonuclear reaction rates for primordial nucleosynthesis based on experimental data.

### **Senior Thesis, Reed College — 2010-11**

Advisor: Dr. Joel Franklin

Developed computational hydrodynamic simulations to examine the behavior of fluids under the influence of self-gravity, including applications in protostellar formation and supernova explosions.

### **Undergraduate Laboratory Internship, Argonne National Laboratory — 2008**

Advisors: Dr. Stephen Peiper and Dr. Kenneth Nollett

Tested the role of fusion processes other than the triple alpha process in reaching the CNO cycle in Population III stars.

### **GRANTS & AWARDS**

- 2016 University of Notre Dame Shaheen Graduate School Award
- 2015,-13 University of Notre Dame Downes Memorial Professional Development Grant
- 2015,-14,-13 University of Notre Dame Graduate Student Union Conference Grant
- 2013 University of Notre Dame Luksic Travel Grant
- 2013 National Science Foundation Graduate Research Fellowship Honorable Mention
- 2013 University of Notre Dame Notebaert Professional Development Travel Grant
- 2012 Department of Energy Office of Science Graduate Fellowship Finalist

### **TEACHING EXPERIENCE**

#### **Teaching Practicum, University of Notre Dame; Notre Dame, IN — 2015**

Structured teaching experience where three lectures are planned, delivered and observed, and reflected upon. Lectures given in introductory physics courses for engineering students and physics majors.

#### **Teaching Assistant, University of Notre Dame; Notre Dame, IN — 2011-15**

Responsible for grading essays, homework assignments, and exams, holding office hours and help sessions, and assisting in laboratory courses. Assisted in undergraduate general science, introductory physics, and advanced courses and graduate level courses.

#### **Guest Lectures, University of Notre Dame; Notre Dame, IN — 2013-15**

Planned and delivered lectures in several undergraduate courses.

- 2015 “Geoengineering as a counter strategy,” Climate Physics
- 2015 “Multi-physics simulations in astrophysics,” Computational Methods in Physics
- 2014 “Radiation and the radiation reaction,” Electromagnetic Waves
- 2013 “Parallel transport and the Riemann tensor,” General Relativity

#### **Teaching Assistant, Reed College; Portland, OR — 2009-11**

Graded homework assignments for introductory physics, quantum mechanics, and classical mechanics courses.

#### **Teaching Assistant, Monmouth College; Monmouth, IL — 2008**

Assisted during the laboratory component of the introductory astronomy course.

## REFEREED PUBLICATIONS

- [1] **M.L. Warren**, G.J. Mathews, R. Ruffini, and J. Rueda. “Relativistic hydrodynamic simulations of black hole formation in rapidly accreting neutron stars.” 2016. (In preparation)
- [2] J.P. Olson, **M.L. Warren**, M. Meixner, G.J. Mathews, N.Q. Lan, and H.E. Dalhed. “A density functional equation of state for supernova simulations with 3-body forces and quark gluon plasma.” *Phys.Rev.C*, 2016. (Submitted)
- [3] G.J. Mathews, **M.L. Warren**, J. Hidaka, and T. Kajino. “Sterile neutrino dark matter and core-collapse supernovae.” *Fourteenth Marcel Grossmann Meeting*, 2016. (Submitted) arXiv:1604.012431
- [4] **M.L. Warren**, M. Meixner, G.J. Mathews, J. Hidaka, and T. Kajino. “A review of the impact of sterile neutrino dark matter in core-collapse supernovae.” *MPA*, 2016. (In press) arXiv:1603.05503
- [5] **M.L. Warren**, M. Meixner, G.J. Mathews, J. Hidaka, and T. Kajino. “Sterile neutrino oscillations in core-collapse supernovae.” *Phys.Rev.D*, **90**: 103007, 2014. arXiv:1405.6101

## SEMINARS & INVITED TALKS

- [1] *Symposium on Neutron Stars in the Multimessenger Era*, Ohio University, 2016.
- [2] *Triangle Nuclear Theory Seminar*, North Carolina State University, 2015.
- [3] *Astrophysics Seminar*, University of Notre Dame, 2015.
- [4] *Physics Department Seminar*, Reed College, 2014.
- [5] *ICRANet Meeting: Black Holes: the largest energy sources in the universe*, National Academy of Sciences, Armenia, 2014.
- [6] *Supernovae, Gamma-ray bursts, and Induced Gravitational Collapse*, Ecole de Physique, France, 2014.

## CONFERENCE PRESENTATIONS

- [1] *r-Process Nucleosynthesis: Connecting FRIB with the Cosmos*, Oral presentation, Michigan State University, 2016.
- [1] *IceCube Particle Astrophysics Symposium*, Oral presentation, University of Wisconsin-Madison, 2015.
- [2] *American Physical Society April Meeting*, Oral presentation, Maryland, 2015.
- [3] *Joint Institute for Nuclear Astrophysics Frontiers Meeting*, Oral presentation, Michigan State University, 2015.
- [4] *4th Joint Meeting of the APS Division of Nuclear Physics and the Physical Society of Japan*, Oral presentation, Hawaii, 2014.
- [5] *III INCAI Workshop: Exploring the Nature of the Evolving Universe*, Oral presentation, Pontificia Universidad Catolica de Chile, Chile, 2013.
- [6] *222nd American Astronomical Society Meeting*, Oral presentation, Indiana, 2013.
- [7] *American Physical Society April Meeting*, Oral presentation, Colorado, 2013.
- [8] *Joint Institute for Nuclear Astrophysics Frontiers Meeting*, Poster presentation, Michigan State University, 2012.

## **SCHOOLS & WORKSHOPS**

- 2016 “MESA Summer School,” UC Santa Barbara
- 2015 “TALENT School on Nuclear Physics of Neutron Stars & Supernovae,” Institute for Nuclear Theory, University of Washington
- 2014 “ICRANet School in Armenia: Black Holes,” International Center for Relativistic Astrophysics, Armenia
- 2014 “TALENT School on Nuclear Theory for Astrophysics,” Joint Institute for Nuclear Physics, Michigan State University
- 2013 “National Nuclear Physics Summer School,” Stony Brook University

## **SERVICE & OUTREACH**

- 2016- Present Chairperson, 2017 JINA Frontiers Conference Organizing Committee
- 2014- Present Team member, #popscope Astronomy Outreach Program
- 2014-15 Quality of Life Chairperson, Graduate Student Union, University of Notre Dame
- 2014-15 Member, Committee for Sexual Assault Prevention, University of Notre Dame
- 2014-15 Cofounder & Member, Graduate LGBTQ and Ally Student Society, University of Notre Dame
- 2013-15 Member, University Committee for Women Faculty & Students, University of Notre Dame
- 2014,-12 Representative, Department of Physics Graduate Recruitment Committee, University of Notre Dame
- 2012- Present Cofounder & Member, Association for Women in Science, University of Notre Dame

## **SKILLS**

*Programming & Visualization:* FORTRAN, C, Python, Mathematica, LaTeX, Gnuplot, xmgrace  
*Graduate Courses:* Classical Mechanics, Quantum Mechanics, Electromagnetism, Mathematical Methods in Physics, Experimental Methods in Physics, Special & General Relativity, Statistical Thermodynamics, Nuclear Structure, Nuclear Reactions, Nuclear Astrophysics, Stellar Astrophysics, Galaxies

## **PROFESSIONAL MEMBERSHIPS**

- Member of the American Astronomical Society (AAS)
- Member of the Association for Women in Science (AWIS)
- Member of the American Physical Society (APS)