Brandon L. Barker

1105 Bridge Ave., Unit 116
Knoxville, TN 37916
(731)-415-4972
bbarker5@vols.utk.edu
astrobarker.github.io

EDUCATION

Bachelor of Science in Physics **exp. May 2019**
University of Tennessee, Knoxville, TN
Concentration: Honors Academic Physics
Minor: Astronomy
Additional Major: Mathematics

RESEARCH EXPERIENCE

Summer Undergraduate Researcher **Summer 2018**
Michigan State University

- Selected to be one of 13 participants in the Advanced Computational Research Experience for Students (ACRES) REU program to work under Dr. Sean Couch (MSU).
- Explored the sensitivity of core-collapse supernovae to variations in input nuclear physics.
- Used new model for driving 1D explosions that includes the crucial effects of turbulence and convection.

Summer Undergraduate Researcher **Summer 2017**
Instituto Nazionale di Fisica Nucleare (INFN) - Sezione di Pisa; Pisa, Italy

- Received a competitive scholarship under the DOE-INFN Student Exchange Program to work at the lab under Dr. Barbara Patricelli (University of Pisa, INFN) for two months.
- Investigated possible joint detection rates for gravitational wave signals from binary neutron star mergers and short gamma ray bursts.

Undergraduate Researcher **August 2016 - Present**
Joint Institute for Computational Sciences, Oak Ridge National Laboratory (ORNL); University of Tennessee (UTK), Knoxville

- Developed new algorithms for supernova hydrodynamics utilizing discontinuous Galerkin methods under Dr. Anthony Mezzacappa (ORNL, UTK) and Dr. Eirik Endeve (ORNL, UTK).

Summer Undergraduate Researcher **Summer 2016**
Joint Institute for Advanced Materials, Oak Ridge National Laboratory (ORNL); University of Tennessee (UTK), Knoxville

- Developed a vacuum suitcase for use in the lab, and helped commission an X-ray photoelectron spectrometer (XPS) under Dr. Norman Mannella (UTK) and Dr. Paolo Vilmercati (UTK).

Undergraduate Researcher **Summer 2015 - May 2016**
Joint Institute for Computational Sciences, Oak Ridge National Laboratory (ORNL); University of Tennessee (UTK), Knoxville

- Conducted research on impact of turbulent flows on the evolution of the supernova explosion under Dr. Anthony Mezzacappa (UTK, ORNL) and Dr. Eirik Endeve (UTK, ORNL). Studied the realtive contributions of the various explosion mechanisms to the revival of the stalled shock. Developed an analysis package employing a singular value decomposition in order aid in these studies.

– Received full funding for Summer 2015 to support this work.

PUBLICATIONS

"Equation of State Dependence of the Observable Properties of Turbulence-aided Neutrino-driven Core-collapse Supernovae." M. Warren, **B. Barker**, T. Cooper, S. Couch, J. Ranta, M. Pajkos, E. O'Connor. 2018. (in prep).

"thornado-hydro: towards discontinuous galerkin methods for supernova hydrodynamics." E. Endeve, J. Buffaloe, S. Dunham, N. Roberts, K. Andrew, **B. Barker**, D. Pochik, J. Pulsinelli, A. Mezzacappa. 2018.

SELECTED PRESENTATIONS AND POSTERS

"Effects of Input Nuclear Physics on Core Collapse Supernova Simulations," Fifth Joint Meeting of the Nuclear Physics Divisions of the APS and JPS, Waikoloa, HI. (poster). 2018.

"Effects of Input Nuclear Physics on Core Collapse Supernova Simulations," Mid-Michigan Symposium for Undergraduate Research Experiences (Mid-SURE), Michigan State University. (poster). 2018.

"High Energy Follow-up Study of Gravitational Wave Transients," 231st Meeting of the American Astronomical Society, National Harbor, MD. (poster) 2018.

"Discontinuous Galerkin Methods in Nuclear Astrophysics Simulations," Sigma Pi Sigma Quadrennial Physics Conference , San Francisco, CA (poster). 2016.

"A Singular Value Decomposition of $15M_{\odot}$ CHIMERA Entropy Data," Southeast Section of the American Physical Society Annual Meeting, Mobile, Al. (talk). 2015.

SELECTED HONORS AND AWARDS

Barry Goldwater Scholarship Honorable Mention	2018
Society of Physics Students National Organization Leadership Award	2018
Chancellors Citation Award for Extraordinary Academic Achievement	2018
Chancellors Citation Award for Extraordinary Professional Promise	2018
James W. McConnell Award for Academic Excellence from the Department of Physics and Astronomy	2018
Office of Research and Engagement Silver Award for the Exhibition of Undergraduate Research and Creative Achievement	2018
Arts and Sciences Award for the Exhibition of Undergraduate Research and Creative Achievement	2018
Inducted into Sigma Pi Sigma Physics Honor Society	2018
Dr. Glenn R. and Elise I. Young Scholarship from the Department of Mathematics for academic merit	2017
Cooper D. Schmitt Memorial Scholarship from the Department of Mathematics for academic merit	2017
Outstanding Undergraduate Researcher from the Department of Physics and Astronomy	2017
Robert W. Lide Citation from the Department of Physics and Astronomy for having made exceptional contributions to the undergraduate instructional laboratories	2016
University of Tennessee Chancellor's Honors Program 2014 Cohort	2014

LEADERSHIP

Dean's Student Advisory Council **Fall 2018 - Present**
University of Tennessee, Knoxville, TN

- Representative for the Department of Physics and Astronomy.

Undergraduate Research Students' Association **Spring 2018 - Present**
University of Tennessee, Knoxville, TN

- Executive Board Member
- Organize an annual undergraduate research symposium.
- Promote undergraduate research across campus.

Physics Journal Club **Spring 2017 - Present**
University of Tennessee, Knoxville, TN

- Founding member and Co-Director
- We meet weekly with faculty advisor to discuss an article in physics or astronomy.

Pursuit - The Journal of Undergraduate Research **Fall 2016 - Present**
University of Tennessee, Knoxville, TN

- Research Editor for the Sciences and Engineering: AY 2017-2019 - Reviewed all incoming submissions to check if sources are properly cited and not plagiarized and if sources exist and are correctly interpreted.
- Science and Engineering Review Team Leader: Spring 2017 - Led a review team.

Society of Physics Students **Fall 2014 - Present**
University of Tennessee, Knoxville

- Webmaster: 2015-2016, Vice President: 2016-2017, Treasurer: 2017-2018.
- Host numerous public outreach activities at local schools and other areas.
- Organize panels, trips to conferences, and host an undergraduate conference roughly once every other academic year.

COMMUNITY INVOLVEMENT

Annoor Academy Science Club **Fall 2018 - Present**
Annoor Academy, Knoxville, TN

- Created lesson plans and assisted with demonstrations for an after school science club at Annoor Academy, a private Islamic school in Knoxville.

LEGO Robotics League **Fall 2018 - Present**
Inskip Elementary School, Knoxville, TN

- Assist with an after school LEGO robotics club at Inskip Elementary, a local community school.

Saturday Science Club **Fall 2014 - Present**
Pond Gap Elementary School, Knoxville, TN

- Pond Gap Elementary School, a Title I community school in Knoxville, is visited monthly on Saturdays, and volunteers conduct science experiments and demonstrations with grade-school students with lesson plans written by volunteers.

WORK EXPERIENCE

In-Class Teaching Assistant **Spring 2018 - Present**
Department of Physics and Astronomy, University of Tennessee, Knoxville, TN

- Tutored students in an introductory astronomy class, helped with in-class activities, and graded for the instructor.

Teaching Assistant **Spring 2018**
Department of Mathematics, University of Tennessee, Knoxville, TN

- Graded written and computer assignments for a numerical algorithms class.

Department Tutor **Fall 2016 - Present**
Department of Physics and Astronomy, University of Tennessee, Knoxville, TN

- Tutored students in introductory physics and astronomy.

Lab Assistant **October 2014 - Present**
Department of Physics and Astronomy, University of Tennessee, Knoxville, TN

- Worked under the Director of Undergraduate Laboratories. Oversaw the setup of all 100-200 level introductory Physics lab sections. Worked with graduate TAs to coordinate setup, lesson plans, and makeup labs.

COMPUTER SKILLS

Languages and Software: LaTeX, Python, FORTRAN, C/C++, MatLab. Working knowledge of *nix based operating systems. Experience with git and svn. Some experience with MPI and other parallel platforms. Experience with visualization software yt and VisIt.

LANGUAGES

Intermediate proficiency in Japanese

TEST SCORES

General GRE	Verbal Reasoning: 158/170 Quantitative Reasoning: 151/170 Analytical Writing 5.0/6.0
Physics GRE	790/900