

# Carl Edward Fields, Jr.

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## EDUCATION

**MICHIGAN STATE UNIVERSITY**  
**PH.D., ASTRONOMY & ASTROPHYSICS**  
 College of Natural Sciences  
 Expected (May 2021) | East Lansing, MI

**CERTIFICATE IN TEACHING COLLEGE  
 SCIENCE AND MATHEMATICS**  
 College of Natural Sciences  
 May 2020 | East Lansing, MI

**CERTIFICATE IN HIGH PERFORMANCE  
 COMPUTING**  
 College of Natural Sciences  
 December 2018 | East Lansing, MI

**ARIZONA STATE UNIVERSITY**  
**B.S., PHYSICS, w/ HONORS**  
 College of Liberal Arts and Sciences  
 May 2016 | Tempe, AZ

**B.S., ASTROPHYSICS, w/ HONORS**  
 School of Earth and Space Exploration  
 May 2016 | Tempe, AZ

## TECHNICAL SKILLS

### Languages/Platforms:

FORTRAN • Python • C++ •  $\text{\LaTeX}$   
 HTML • MatLab • Linux (RHEL)

### Software/Numerical Instruments:

MESA • MAESTRO • FLASH  
 Ialsuite • Adobe Illustrator

## ADVISORS

### Graduate Advisor

Sean Couch  
 Michigan State University

### Undergraduate/Thesis Advisor

Frank Timmes  
 Arizona State University

## ADVISEES

### Current

Emma Brann, B.S. Physics, 2021, MSU

## MENTORING

### Previous

Bilal Jones, Ph. D Physics, 2021 MSU  
 Tom-Erik H., Ph. D Physics, 2021 MSU  
 Tyler Cox, B.S. Astrophysics, 2019, ASU

## RESEARCH INTERESTS

Stellar Evolution, Core-Collapse Supernovae, Stellar Nucleosynthesis, Gravitational Waves, High-Performance Computing, and Radiation Hydrodynamics.

## CURRENT/RECENT APPOINTMENTS

2018 - Present	Graduate Research Asst., CCS-2, Los Alamos National Lab
2016 - Present	Graduate Research Fellow, National Science Foundation
2015 - Present	Lead Developer, <b>MESA-Web</b> - <a href="https://mesa-web.asu.edu">mesa-web.asu.edu</a>
2019 - 2020	Teaching Assistant, Dept. of CMSE, MSU
Summer 2019	Graduate Writing Coach/Facilitator, SROP, MSU
2017 - 2019	Data Science Fellow, LSST Corporation
2016 - 2019	Predocutorial Fellow, Nat'l Academies/FORD Foundation

## PUBLICATIONS SUMMARY

Summary: 16 publications: 8 refereed, 1 in press, 2 in prep.  
 Citations: 310;  $h$ -index: 6;  $i_{10}$ -index: 6 ([Google Scholar Link](#))

## RECENT FUNDING, AWARDS, DISTINCTIONS

2020	<b>Dr. Pliny A. and Margaret H. Price Prize, Ohio State University</b> research excellence and exceptional promise
2020	<b>Edward A. Bouchet Graduate Honor Society, Michigan State University</b> exemplify the five core values of the society
2019	<b>Beth Brown Memorial Prize, National Society of Black Physicists/AAS</b> best graduate oral presentation
2019	<b>Stellar Modelling for Nuclear Astrophysics Workshop, JINA-CEE/NSF</b> organizing committee
2017	<b>Data Science Fellowship, LSST Corporation</b>
2016	<b>Predocutorial Fellowship, FORD Foundation/NASEM</b> promise that you show for future achievement as a scholar ...
2016	<b>Graduate Research Fellowship, NSF</b> demonstrated potential to contribute to ...
2016	<b>Academic Achievement Graduate Assistantship, MSU</b> demonstrated promotion of understanding among persons ...
2016	<b>Chambliss Astronomy Achievement Award (Hon. Mention), AAS</b> undergraduate poster presentation.
2015	<b>ASU/NASA Space Grant Undergraduate Fellowship</b>
2015	<b>Carl A. Rouse Fellowship, National Society of Black Physicists/Caltech</b> in support of research in gravitational-wave science
2015	<b>Undergraduate Summer Enrichment Award, ASU</b> for proposal titled, <i>On The Evolution of The Elements</i>
2015	<b>LIGO Summer Undergraduate Research Fellowship, Caltech</b> project entitled, <i>Testing The Strong-Field Dynamics of General Relativity</i> ...
2015	<b>Beth Brown Memorial Prize, National Society of Black Physicists/AAS</b> best undergraduate poster presentation.

## TEACHING

### **GRADUATE TEACHING ASSISTANT | VISUALIZING SCIENTIFIC DATASETS**

Department of CMSE, Michigan State University | Spring 2020, East Lansing, MI

Teaching assistant for course focused on various aspects of learning the language and techniques of constructing visualizations for use in science. Led class of ~40 in in guest lesson on *Volumetric Visualizations*. Helped assist in transition course to online format towards the end of the semester.

### **INSTRUCTIONAL/LABORATORY AIDE | GENERAL PHYSICS LABORATORY I/II**

Department of Physics, Arizona State University | August 2014 - May 2015, Phoenix, AZ

Provided overview of material being covered in lecture component of course to over 80 students. Led students through experiments in kinematics, optics, thermodynamics, and electricity & magnetism. Gained experience working with students from diverse student body with varying learning goals.

## OUTREACH

### **SPACETIME PROGRAM, THE PLANETARY SOCIETY | SPACETIME EXPERT**

January 2018 – Present

The SpaceTime program is a program designed to connect experts in astronomy with classrooms across all across the country. SpaceTime experts lead discussions about their research and allow a space for students to directly ask questions they otherwise would not have the opportunity to ask.

### **SUMMER RESEARCH OPPORTUNITIES PROGRAM (SROP), MSU | WRITING COACH/FACILITATOR**

Summer 2019

The goal of SROP is to increase the number of underrepresented students who pursue graduate study and research careers. This position gave me the opportunity to mentor students that came from a similar ethnic/socioeconomic background as myself. I met with the students on a weekly basis and provided feedback on preparing documents such as personal statements, CVs, and research proposals. This opportunity was immensely rewarding in helping develop many professional development skills and also in helping students like myself reach the next step in their career.

### **WOMAN AND MINORITIES IN PHYSICS SCIENCES (WAMPS), MSU | MENTOR**

August 2017 – May 2019 | East Lansing, MI

**WaMPS** is a graduate student group at Michigan State University. Our purpose is to promote diversity in the physical sciences by encouraging women and minorities to pursue the field. We also work to support women and minorities who are already members of the physical science community.

### **PHYSICS GRADUATE ORGANIZATION (PGO), MSU | DIRECTOR OF INCLUSION (ELECTED FALL 2016)**

The Inclusivity Director is the main individual working to improve the diversity of the physics department. The Director leads a small group of individuals in making both short- and long-term goals and plans to improve representation and inclusion within the department.

### **THE SUNDIAL PROJECT, ASU | MENTOR**

August 2014 – May 2016 | Tempe, AZ

**Sundial** is an organization that seeks to foster a diverse community of undergraduates, graduates, post-docs, and faculty with interest in the physical sciences.

### **WESTERN SCHOOL OF SCIENCE & TECHNOLOGY | INSTRUCTIONAL FELLOW/AVID TUTOR**

June 2014 – May 2016 | Phoenix, AZ

Western Tech. is a new charter school in Phoenix designed to help promote interest in science and technology in those whom come from low income families or are dealing with other socioeconomic factors. My volunteer service here allows me to inspire young minds to pursue higher education as a role model assisting in the teaching process with the primary instructor.

## SOCIETIES/AFFILIATIONS

**AMERICAN ASTRONOMICAL SOCIETY | JUNIOR MEMBER**

**AMERICAN PHYSICAL SOCIETY | UNDERGRADUATE MEMBER**

**SIGMA XI NATIONAL HONOR SOCIETY | ASSOCIATE MEMBER**

**NAACP - MARICOPA COUNTY BRANCH UNIT # 1011 | FULL MEMBER**

**NATIONAL SOCIETY OF BLACK PHYSICIST | FULL MEMBER**

**SACNAS | JUNIOR MEMBER**

## CONFERENCES, EVENTS, PRESENTATIONS

### CONFERENCE OF THE NATIONAL SOCIETY OF BLACK PHYSICIST

ORAL PRESENTATION | NOVEMBER 2019 - PROVIDENCE, RHODE ISLAND

*The Progenitors of Core-Collapse Supernovae*

### THE BANNEKER INSTITUTE, HARVARD UNIVERSITY

ORAL PRESENTATION | JULY 2019 - CAMBRIDGE, MASSACHUSETTS

*On Getting to grad school, star stuff, and beyond*

### KAVLI INSTITUTE FOR PHYSICS & MATHEMATICS OF THE UNIVERSE, UNIVERSITY OF TOKYO

SEMINAR | JANUARY 2019 - KASHIWA, JAPAN

*The Progenitors of Core-Collapse Supernovae*

### LOS ALAMOS NATIONAL LABORATORY, CENTER FOR THEORETICAL ASTROPHYSICS

ASTRO SEMINAR | JULY 2018 - LOS ALAMOS, NM, USA

*The Progenitors of Core-Collapse Supernovae*

### JINE-CEE FRONTIERS IN NUCLEAR ASTROPHYSICS

STUDENT PRESENTER | FEBRUARY 2017 - EAST LANSING, MI

*On Variations of Pre-Supernova Model Properties*

### NATIONAL SOCIETY OF BLACK PHYSICISTS FALL WORKSHOP

STUDENT PRESENTER | OCTOBER 2016 - FERMILAB

*On Variations of Pre-Supernova Model Properties*

### AGEP MICHIGAN ALLIANCE 2016 FALL CONFERENCE

STUDENT PRESENTER | OCTOBER 2016 - EAST LANSING, MI

*On Variations of Pre-Supernova Model Properties*

### CONFERENCE OF FORD FELLOWS

STUDENT PRESENTER | SEPTEMBER 2016 - EAST LANSING, MI

*On Variations of Pre-Supernova Model Properties*

### 227<sup>TH</sup> MEETING OF THE AMERICAN ASTRONOMICAL SOCIETY

STUDENT PRESENTER | JANUARY 2016 - KISSIMMEE, FL

*On The Origin of The Elements: The Spectacular Role of White Dwarfs*

### MESA SUMMER SCHOOL 2015, UCSB

SELECTED PARTICIPANT | AUGUST 2015 - SANTA BARBARA, CA

### CALTECH GRAVITATIONAL WAVES ASTROPHYSICS SCHOOL 2015, CALTECH

PARTICIPANT | JULY 2015 - PASADENA, CA

### SCHOOL OF EARTH & SPACE EXPLORATION, ARIZONA STATE UNIVERSITY

INVITED TALK | APRIL 2015

*On Carbon Burning in SAGB Stars*

### JINA-CEE FRONTIERS IN NUCLEAR ASTROPHYSICS MEETING

STUDENT PRESENTER | MARCH 2015 - EAST LANSING, MI

*On Carbon Burning in SAGB Stars*

### CONFERENCE OF THE NATIONAL SOCIETY OF BLACK PHYSICIST

STUDENT PRESENTER | FEBRUARY 2015 - BALTIMORE, MD

*On Carbon Burning in SAGB Stars*

## NATIONAL/INTERNATIONAL SERVICE

- 2019 - 2020 *Organizing Committee - Stellar Modelling for Nuclear Astrophysics Workshop*, JINA-CEE/LSU
- 2018 - 2019 *Local Organizing Committee - JINA Frontiers 2019 Meeting*, Joint Institute for Nuclear Astrophysics, MSU
- 2017 - *Scientific Referee*, The American Astronomical Society Journals
- 2017 *Teaching Assistant for Prof. Leslie Rogers*, 2017 MESA Summer School, UCSB
- 2016 *Teaching Assistant for Prof. Jim Fuller*, 2016 MESA Summer School, UCSB

## FUNDING, AWARDS, DISTINCTIONS

- 2020 **Dr. Pliny A. and Margaret H. Price Prize, Ohio State University**  
research excellence and exceptional promise
- 2020 **Edward A. Bouchet Graduate Honor Society, Michigan State University**  
exemplify the five core values of the society
- 2019 **Beth Brown Memorial Prize, National Society of Black Physicists/AAS**  
best graduate oral presentation
- 2019 **Stellar Modelling for Nuclear Astrophysics Workshop, JINA-CEE/NSF**  
organizing committee
- 2017 **Data Science Fellowship, LSST Collaboration**
- 2016 **Graduate Research Fellowship, National Science Foundation**  
demonstrated potential to contribute to . . .
- 2016 **Predoctoral Fellowship, FORD Foundation/Nat'l Academies of Science, Engineering, and Medicine**  
promise that you show for future achievement as a scholar . . .
- 2016 **Academic Achievement Graduate Assistantship, Michigan State University**  
demonstrated promotion of understanding among persons . . .
- 2016 **Chambliss Astronomy Achievement Award (Hon. Ment.), American Astronomical Society**  
undergraduate poster presentation
- 2015 **Space Grant Undergraduate Fellowship, National Aeronautical and Space Administration**  
academic achievement, research experience
- 2015 **Carl A. Rouse Fellowship, National Society of Black Physicists/Caltech**  
in support of research in gravitational-wave science
- 2015 **LIGO Summer Undergraduate Research Fellowship, California Institute of Technology**  
research experience, academic achievements
- 2015 **APIASF/Coca-Cola Scholarship, Asian & Pacific Islander American Scholarship Foundation**  
academic achievement, outstanding community service and financial need  
selected out of nearly 9,000 applicants from over 48 countries
- 2015 **Undergraduate Summer Enrichment Award, Arizona State University, College of Liberal Arts & Sciences**  
for proposal titled, *On The Evolution of The Elements*
- 2015 **Norm Perrill Origins Project Undergraduate Scholar, Arizona State University Origins Project**  
academic achievement, origins based research
- 2015 **AAS Beth Brown Memorial Prize, National Society of Black Physicists/American Astronomical Society**  
best undergraduate poster presentation
- 2014 **Superior Poster Presentation, Sigma Xi International Research Conference**  
superior poster presentation, Physics & Astronomy Division.
- 2014 **APIASF/Wells Fargo Scholarship, Asian & Pacific Islander American Scholarship Foundation**  
academic achievement, outstanding community service and financial need  
selected out of 7,000 applicants from over 41 countries
- 2014 **Undergraduate Summer Enrichment Award, Arizona State University, College of Liberal Arts & Sciences**  
for proposal titled, *On The Evolution of Carbon Burning Flames Inside Super-Asymptotic Giant Branch Stars*
- 2011 **Barack Obama Scholarship, Arizona State University**  
academic achievement, outstanding community service and financial need
- 2011 **New American University Dean's Award, Arizona State University**  
academic achievements

## PRESS

- 2020 **2020 Price Prize Winners Announced**, Center for Cosmology and AstroParticle Physics, OSU, News award announcement.
- 2017 **Study of the Evolution of Stars and Stellar Explosions**, Institute for Cyber Enabled Research, MSU, Interview highlight of my ongoing research at MSU using iCER computing resources.
- 2016 **Determination is the key**, ASU Now, Interview highlight of my graduate research fellowships + general Q/A about my time at ASU.
- 2015 **A Cutting-Edge Research Tool**, The UC Santa Barbara Current., Interview brief discussion about the MESA stellar evolution code and how it is used in my research.
- 2015 **Up and Down The Ladder**, ASU EdX: Introduction to Solar Systems & Astronomy, Video Presentation guest dialogue with Prof. Timmes on atomic structure of matter, phase transitions, and energy as part of the lecture series for ASU's 111x course, the largest college-credit astronomy course in the world.
- 2015 **Google Hangout for JINA CEE**, National Science Foundation, Video Presentation brief discussion about my current research and my role as an undergraduate JINA-CEE.
- 2014 **The Evolution of Carbon Burning Flames Inside Super-Asymptotic Giant Branch Stars**,  $\Sigma\Xi$  (Sigma Xi), Interview brief discussion about my current research and long term goals.

## REFEREED PUBLICATIONS

10. *Core-Collapse Supernova Explosions of Multidimensional Progenitors: Implications for Multi-Messenger Astronomy*, **C. E. Fields**, Zac Johnston, Michael A. Pajkos, S. M. Couch, & Evan P. O'Connor 2020, In Prep.
9. *On The Development of Multidimensional Progenitor Models For Core-collapse Supernovae*, **C. E. Fields** & S. M. Couch, 2020, ApJ, In Press.
8. *Evolutionary roads leading to low effective spins, high black hole masses, and O1/O2 rates for LIGO/Virgo binary black holes*, K. Belczynski, J. Klencki, & **C. E. Fields** et al., A&A, 636, A104 (2020).
7. *Understanding the Engines and Progenitors of Gamma-Ray Bursts*, C. L. Fryer and 7 other co-authors including **C. E. Fields**, Eur. Phys. J. A (2019) 55: 132.
6. *The Impact of White Dwarf Luminosity Profiles on Oscillation Frequencies*, F. X. Timmes, Richard H. D. Townsend, Evan B. Bauer, Anne Thoul, **C. E. Fields** & William M. Wolf, 2018 ApJL, **234**, 19.
5. *The Impact of Nuclear Reaction Rate Uncertainties On The Evolution of Core-Collapse Supernova Progenitors*, **C. E. Fields**, R. Farmer, I. Petermann, C. Iliadis, S. M. Couch, & F. X. Timmes, 2018 ApJS, **867**, 30
4. *The  $^{12}\text{C}(\alpha, \gamma)^{16}\text{O}$  Reaction and Its Implications for Stellar Helium Burning*, R. J. deBoer and 12 other co-authors including **C. E. Fields**, Rev. Mod. Phys. **89**, 035007 (2017)
3. *On Variations Of Pre-Supernova Model Properties*, R. Farmer, **C. E. Fields**, I. Petermann, L. Dessart, M. Cantiello, B. Paxton, & F. X. Timmes, ApJS, 2016, **227**, 22.
2. *Properties of Carbon-Oxygen White Dwarfs From Monte Carlo Stellar Models*, **C. E. Fields**, R. Farmer, I. Petermann, C. Iliadis, & F. X. Timmes, The Astrophysical Journal, 823, **46**, 2016
1. *On Carbon Burning in Super Asymptotic Giant Branch Stars*, R. Farmer, **C. E. Fields**, & F. X. Timmes, The Astrophysical Journal, 807, **184**, 2015

## NON-REFEREED PUBLICATIONS/ABSTRACTS

6. **MESA-Web**, an online interface the stellar evolution code **MESA** for use in Introductory Astronomy Curricula, **C. E. Fields**, F. X. Timmes, S. M. Couch & M. Zingale, In Prep, [mesa-web.asu.edu](https://mesa-web.asu.edu)
5. *Catching Element Formation In The Act ; The Case for a New MeV Gamma-Ray Mission: Radionuclide Astronomy in the 2020s*, C. L. Fryer, F. X. Timmes, A. L. Hungerford, A. Couture, and many other authors including **C. E. Fields**, Bulletin of the American Astronomical Society, Vol. 51, Issue 3, id. 2 (2019)
4. *starkiller-astro/Microphysics: 19.04, common astrophysical microphysics routines with interfaces for the different AMReX codes*, the StarKiller Microphysics Development Team; including **C. E. Fields**, 10.5281/zenodo.2620545
3. *Testing The Strong-Field Dynamics of General Relativity Using Compact Binary Mergers*, **C. E. Fields**, A. Weinstein, T. G. F. Li, & M. Isi, [LIGO-DCC P1500114](#)
2. *On The Origin of The Elements: The Spectacular Role of White Dwarfs*, **C. E. Fields**, R. Farmer, I. Petermann, & F. X. Timmes, 227<sup>th</sup> Meeting of the AAS, Abstract #144.01
1. *The Evolution of Carbon Burning Flames Inside Super-Asymptotic Giant Branch Stars*, **C. E. Fields**, R. Farmer, & F. X. Timmes, APS March Meeting 2015, Abstract #V1.288