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

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

ASTRONOMY UNDERGRAD. THESIS
Properties of Supernova Progenitor Stars
Advisor: Frank Timmes

TECHNICAL SKILLS

Languages/Platforms:
`FORTRAN` • Python • `C++` • LaTeX
HTML • MatLab • Linux (RHEL)

Software/Numerical Instruments:
`MESA` • `MAESTRO` • `FLASH`
`lalsuite` • Adobe Illustrator

ADVISING

Graduate Advisor
Sean Couch
Michigan State University

Undergraduate/Thesis Advisor
Frank Timmes
Arizona State University

Previous Summer Research
Tjonne Li, & Alan Weinstein
California Institute of Technology

MENTORING

Current
Tom-Erik Haugen
Ph. D Physics, 2021 MSU

Previous
Tyler Cox, B.S. Astrophysics, 2019, ASU
Brandon Sumner, B.S. Physics, 2016, ASU

RESEARCH INTERESTS

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

CURRENT/RECENT APPOINTMENTS

2016 - Present	Graduate Research Fellow, National Science Foundation
2016 - Present	Predoctoral Fellow, Nat'l Academies/FORD Foundation
2015 - Present	Lead Developer, `MESA-Web` - `mesa-web.asu.edu`
2015 - 2016	Research Assistant, Joint Institute for Nuclear Astrophysics, ASU

SELECTED PUBLICATIONS

Summary: 7 publications: 4 refereed, 3 in preparation.
Citations: 43; h-index: 3; i_{10}-index: 2 (**Google Scholar**)

· *The* $^{12}C(\alpha,\gamma)^{16}O$ *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)

· *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

· *Properties of Carbon-Oxygen White Dwarfs From Monte Carlo Stellar Models*, **C. E. Fields**, R. Farmer, I. Petermann, C. Iliadis, & F. X. Timmes, ApJ, 2016, **823**, 46

RECENT AWARDS, HONORS, DISTINCTIONS

Summary: ∼ 269k since 2017, ∼ 251k since 2015, ∼ 274k since 2013.

2017 **Data Science Fellowship, LSST Collaboration**

2016 **Predoctoral Fellowship, FORD Foundation/NASEM**
promise that you show for future achievement as a scholar . . .

2016 **Graduate Research Fellowship, NSF**
demonstrated potential to contribute to . . .

2016 **Academic Achievement Graduate Assistantship, MSU**
demonstrated promotion of understanding among persons . . .

2016 **Chambliss Astronomy Acheivement Award (Hon. Mention), AAS**
undergraduate poster presentation.

2015 **ASU/NASA Space Grant Undergraduate Fellowship**

2015 **Carl A. Rouse Fellowship, National Society of Black Physicists/Caltech**
in support of research in gravitational-wave science

2015 **APIASF/Coca-Cola Scholarship**
selected out of nearly 9,000 applicants from over 48 countries

2015 **Undergraduate Summer Enrichment Award, ASU**
for proposal titled, *On The Evolution of The Elements*

2015 **LIGO Summer Undergraduate Research Fellowship, Caltech**
project entitled, *Testing The Strong-Field Dynamics of General Relativity* . . .

2015 **Norm Perrill Origins Project Scholarship, ASU Origins Project**

2015 **Beth Brown Memorial Prize, National Society of Black Physicists/AAS**
best undergraduate poster presentation.

PREVIOUS RESEARCH EXPERIENCE

LIGO SCIENTIFIC COLLABORATION, CALTECH | Summer Undergraduate Research Fellow
June 2015 – Aug 2015 | Pasadena, CA
Worked with **A. Weinstein** and **T. G. F. Li.** performing generic modifications to gravitational-wave signals emitted by binary black hole mergers to probe our ability to recover non-GR signals using Advanced LIGO. A manuscript for this project is in preparation.

SPACETREX LABORATORY, ASU | Undergraduate Student Researcher
July 2014 – November 2014 | Tempe, AZ
Worked with **Jekan Thanga** on the Attitude Control Systems of the Asteroid Origins Satellite (AOSAT-1) mission to test asteroid formation mechanisms in low g. Mission has been accepted to launch as part of NASA's CubeSat Launch Initiative.

SCHOOL OF EARTH & SPACE EXPLORATION, ASU | Research Assistant
May 2014 – Jan 2015 | Tempe, AZ
Worked with **FrankTimmes** investigating the propagation of carbon flames inside SAGB stars using the stellar evolution toolkit, "Modules for Experiments in Stellar Astrophysics (MESA)" Resulted in (1) second author publication.

OUTREACH

WOMAN AND MINORITIES IN PHYSICS SCIENCES (WAMPS), MSU | Mentor
August 2017 – Present | Tempe, AZ
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)
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 actions such as working with faculty allies, collecting data about the current departmental climate, organizing large-scale meetings of the entire physics department, and making both short- and long-term goals and plans to improve representation and inclusion within the department.

AZ SCIENCE CENTER OUTREACH EVENT, ASU/NASA SPACE GRANT CONS. | Event Coordinator
Multiple Dates, November 2015 | Phoenix, AZ
Led an outreach event performing various physics demonstrations at the AZ Science Center to help engage the public and get students of a young age interested in science.

THE SUNDIAL PROJECT, ASU | Mentor
August 2014 – Present | 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 – Present | 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

231ST MEETING OF THE AMERICAN ASTRONOMICAL SOCIETY
Student Presenter | January 2018 - Washington, DC
Multi-Dimensional Simulations of Core-Collapse Supernova Progenitors

CONFERENCE OF FORD FELLOWS
Student Presenter | September 2017 - San Juan, PR
Multi-Dimensional Simulations of Massive Stars

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

227TH 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

AMERICAN PHYSICAL SOCIETY 2015 MARCH MEETING
Student Presenter | March 2015 - San Antonio, TX
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 COLLEGIATE RESEARCH CONFERENCE, HARVARD
Student Presenter | January 2015 - Cambridge, MA
The Evolution of Carbon Flames inside Super Asymptotic Giant Branch Stars

SIGMA XI INTERNATIONAL RESEARCH CONFERENCE
Student Presenter | November 2014 - Glendale, AZ
The Evolution of Carbon Flames inside Super Asymptotic Giant Branch Stars

VU-EDGE PH.D. PRE-VU RECRUITMENT EVENT, VANDERBILT
Selected Participant/Invited Talk | October 2014 - Nashville, TN
The Evolution of Carbon Flames inside Super Asymptotic Giant Branch Stars

NATIONAL/INTERNATIONAL SERVICE

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

PRESS

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***, ΣΞ (Sigma Xi), Interview
brief discussion about my current research and long term goals.

AWARDS, HONORS, DISTINCTIONS

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

2011 UFCW 99 Scholarship, United Food & Commercial Workers 99
2011 Sam Walton Community Scholarship, Walmart-ACT

2011 H.A.C.E.R. Scholarship, Ronald McDonald House Charities Foundation

academic achievements, outstanding community service, and financial need

2011 APIASF/Wells Fargo Scholarship, Asian & Pacific Islander American Scholarship Foundation
academic achievement, outstanding community service and financial need
selected out of 5,000 applicants from over 31 countries

Awards Total: ~$322k

REFEREED PUBLICATIONS

7. *Full 4π Three-Dimensional Evolution Of Iron Core-Collapse Of a Massive Star*, **C. E. Fields**, S. M. Couch, M. Zingale, W. D. Arnett, & F. X. Timmes, The Astrophysical Journal Letters, In Prep.
6. *On The Transition Between Convective nd Radiative Carbon Burning in Massive Stars*, I. Petermann, R. Farmer, **C. E. Fields**, & F. X. Timmes, ApJ, In Prep.
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, ApJ, In Prep.
4. *The $^{12}C(\alpha,\gamma)^{16}O$ 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

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, 227th 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