

Carl Edward Fields, Jr.

Email: feldscg@msu.edu | Github: [@carlnotsagan](https://github.com/carlnotsagan) | Web: carlnotsagan.github.io | Twitter: [@carlnotsagan](https://twitter.com/carlnotsagan)

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 Supernovae, 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: 8 publications, 4 refereed, 3 in preparation, 1 in press.

Citations: 40; h -index: 3; i_{10} -index: 2 ([Google Scholar](#))

- *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., In Press.
- *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: $\sim 269\text{k}$ since 2017, $\sim 251\text{k}$ since 2015, $\sim 274\text{k}$ 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 Achievement 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, <i>On The Evolution of The Elements</i> |
| 2015 | LIGO Summer Undergraduate Research Fellowship, Caltech
project entitled, <i>Testing The Strong-Field Dynamics of General Relativity</i> ... |
| 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 **Frank Timmes** 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**, $\Sigma\Xi$ (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 and 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 $^{12}\text{C}(\alpha, \gamma)^{16}\text{O}$ Reaction and Its Implications for Stellar Helium Burning*, R. J. deBoer and 12 other co-authors including **C. E. Fields**, *Rev. Mod. Phys.*, In Press.
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