

Dr. Caleb R. Choban

COMPUTATIONAL ASTROPHYSICIST · INTERSTELLAR DUST ENTHUSIAST

Indiana University Bloomington, Department of Astronomy, 727 East 3rd Street, Bloomington, IN 47405

✉ calebchoban@gmail.com | 🌐 calebchoban.github.io | 📧 calebchoban | ORCID 0000-0001-9200-169X

Education

University of California San Diego

PH.D. IN PHYSICS

San Diego, CA

2016 - 2023

University of California San Diego

B.S. IN PHYSICS W/ SPEC. IN ASTROPHYSICS (CUM LAUDE)

San Diego, CA

2011 - 2015

Research Experience

Inaugural Sullivan Prize Fellow

IU BLOOMINGTON DEPARTMENT OF ASTRONOMY

2023-PRESENT

- Investigating the emergence of dust in the early Universe with cosmological zoom-in simulations
- Using radiative transfer codes to forward-model observables from simulations

Graduate Student Researcher

UC SAN DIEGO DEPARTMENT OF PHYSICS

Advisor: Dušan Kereš

2016 - 2023

- Developed and integrated galactic dust evolution models into the massively parallel C package GIZMO
- Investigated the evolution of galactic dust populations utilizing cosmological zoom-in simulations

Undergraduate Student Researcher

UC SAN DIEGO DEPARTMENT OF PHYSICS

Advisor: Adam Burgasser

2014-2016

- Contributed to the development of the public SPLAT Python package, used to access and analyze brown dwarf spectra
- Developed a machine-learning clustering algorithm to identify rare populations of stars and brown dwarfs

Skills

Programming Python · C/C++ · Mathematica · LaTeX · Parallel programming with MPI/OpenMP · Meshless finite mass codes

Other Big data analysis · Utilizing several national supercomputers · Forward-modeling observations

Publications

FIRST AUTHOR

- **“A Dusty Dawn: Galactic Dust Buildup at $z \gtrsim 5$ ”**
C. R. Choban, S. SALIM, D. KEREŠ, C. C. HAYWARD, AND K. M. SANDSTROM, 2025, MNRAS, 537, 1518
- **“A Dusty Locale: Evolution of Galactic Dust Populations from Milky Way to Dwarf-Mass Galaxies”**
C. R. Choban, D. KEREŠ, K. M. SANDSTROM, P. F. HOPKINS, C. C. HAYWARD, AND C. FAUCHER-GIGUÈRE, 2024, MNRAS, 529, 2356
- **“The Galactic Dust-Up: Modeling Dust Evolution in FIRE”**
C. R. Choban, D. KEREŠ, P. F. HOPKINS, K. M. SANDSTROM, C. C. HAYWARD, AND C. FAUCHER-GIGUÈRE, 2022, MNRAS, 514, 4506

IN PROGRESS

- **“Ashes of FIRE: Modeling Dust Grain Size Evolution in Galaxies”**
C. R. Choban, ET AL., IN PREP
- **“The Dependence of Galaxy Morphology and Sizes on Dust Variability”**
ALEJANDRO GUZMÁN-ORTEGA, **C. R. Choban**, C. C. HAYWARD, ET AL., IN PREP
- **“Using PHANGS Bubble Statistics to Constrain Star Formation and Feedback”**
HAO-SHENG WANG, **C. R. Choban**, ET AL., IN PREP

CONTRIBUTOR

- **“Fire-3: Updated Stellar Evolution Models, Yields, & Microphysics and Fitting Functions for Applications in Galaxy Simulations”**
P. F. HOPKINS, A. WETZEL, C. WHEELER, R. SANDERSON, M. Y. GRUDIĆ, O. SAMEIE, M. BOYLAN-KOLCHIN, M. ORR, X. MA, C. FAUCHER-GIGUÈRE, D. KEREŠ, E. QUATAERT, K. SU, J. MORENO, R. FELDMANN, J. S. BULLOCK, S. R. LOEBMAN, D. ANGLÉS-ÁLCÁZAR, J. STERN, L. NECIB, **C. R. Choban**, C. C. HAYWARD, 2023, MNRAS, 519, 3154
- **“Characterization of the Very Low Mass Secondary in the GJ 660.1AB System”**
C. AGANZE, A. J. BURGASSER, J. K. FAHERTY, **C. R. Choban**, I. ESCALA, M. A. LOPEZ, Y. JIN, T. TAMIYA, M. TALLIS, W. ROCKWARD, 2016, AJ, 151, 6A
- **“The First Brown Dwarf in the 32 Orionis Association”**
A. J. BURGASSER, M. A. LOPEZ, E. E. MAMAJEK, J. GAGNE, J. K. FAHERTY, M. TALLIS, **C. R. Choban**, I. ESCALA, C. AGANZE, 2016, APJ, 820, 32B

Presentations & Posters

Physics and Astronomy Colloquium

INVITED TALK

University of Toledo

2026

New Data that Challenges Underlying Assumptions in Early Galaxy Evolution

CONTRIBUTED TALK

Schoodic Institute

2025

Kavli Summer Program in Astrophysics

INVITED TALK

UVA

2025

Star Formation & ISM Seminar

INVITED TALK

CCA Flatiron

2025

Astrophysics Seminar

INVITED TALK

Purdue University

2025

Evolution of Dust and Gas throughout Cosmic Time

CONTRIBUTED POSTER PRIZE WINNER

Hiroshima, Japan

2024

Building Physical Simulations of PAH Emission in Galaxies II Workshop

INVITED TALK

University of Virginia

2024

Santa Cruz Galaxy Workshop

CONTRIBUTED TALK

UC Santa Cruz

2024

Journal Club

INVITED TALK

UI Urbana-Champaign

2024

The Impact of Astrophysical Dust: From Star Formation through Cosmology

CONTRIBUTED TALK

Aspen Center for Physics

2024

Astronomy Seminar

INVITED TALK

University of Notre Dame

2024

Illuminating the Dusty Universe: A Tribute to the Work of Bruce Draine

CONTRIBUTED TALK

Galileo Galilei Institute, Italy

2023

Olympian Symposium: Star Formation in the Era of JWST

CONTRIBUTED TALK

Paralia, Greece

2023

Friday Lunch Time Astrophysics Seminar

INVITED TALK

UC Santa Cruz

2023

Star Formation/ISM Rendezvous (SFIR) Seminar

INVITED TALK

Princeton

2022

CCA Galaxy Formation Meeting

CONTRIBUTED TALK

Flatiron

2022

Galaxy Formation and Evolution in Southern California

CONTRIBUTED TALK

California Inst. of Tech.

2016, 2018, 2019, 2022

FIRE Collaboration Seminar

INVITED TALK

Virtual

2021

Osterbrock Sierra Conference

POSTER/TALK

Sequoia National Park

2021

Dusting the Universe Conference

POSTER

Univ. of Arizona

2019

UCSD Undergraduate Research Conference

CONTRIBUTED TALK

UC San Diego

2015

Summer Undergraduate Research Conference

CONTRIBUTED TALK

UC San Diego

2014

Community Engagement

MENTORSHIP/LEADERSHIP

Kavli Summer Program in Astrophysics

MENTOR

2025

PYIU: Python Crash Course and Workshop for Scientists

ORGANIZER AND PRESENTER

2024-2025

Alice Palma Undergraduate Program

ORGANIZER AND MENTOR

2022-2025

Graduate/Undergraduate Peer-to-Peer Mentoring Program

FOUNDER AND ORGANIZER

2019-2023

Physics Graduate Council

REPRESENTATIVE

2018-2023

Society of Physics Students

VICE PRESIDENT

2014-2016

PUBLIC SPEAKING

Hutton Honors Council Association

JWST: OUR DUSTY UNIVERSE

2024

Science on Screen: Buskirk-Chumley Theater

GALAXY MOVIE THEATER: SIMULATING GALAXIES

2024

Eclipsed by Chocolate: WonderLab Museum of Science

THE HISTORY AND SCIENCE OF SOLAR ECLIPSES

2024

SCIENCE OUTREACH

Solar Eclipse IU

VOLUNTEER

2024

San Diego Air & Space Museum Space Day	2022-2023
SCIENCE DEMONSTRATOR	
Transfer Student STEM Research Seminar	2021
PRESENTER	
UCSD Young Physicists Program	2018-2020
SCIENCE DEMONSTRATOR	
San Diego Festival for Science and Engineering	2015-2020
SCIENCE DEMONSTRATOR	
Southern California Physics Graduate Admissions Bootcamp	2016-2017
PRESENTER AND TUTOR	
Institute of the Americas Science & Innovation Camp	2015-2017
SCIENCE DEMONSTRATOR	
Intertribal Youth: Indigenize Education	2015-2017
SCIENCE DEMONSTRATOR	

Honors, Awards, & Grants

Distinguished Senior Graduate Teaching Award	2023
AAS International Travel Grant	2023
UCSD Graduate Student Association Travel Grant	2019
NSF Graduate Research Fellowship, Honorable Mention	2018
UCSD Physical Sciences Dean's Undergraduate Award for Excellence	2015-2016
Provost Honours, UCSD	2013-2015

Teaching Experience

LAB ASSISTANT

PHYS 105A/B: Mathematical and Computational Physics I/II
PHYS 164: Observational Astrophysics Research Lab
PHYS 124: Laboratory Projects w/ Arduinos
PHYS 120: Circuits and Electronics Lab
PHYS 2CL: Physics Lab E&M, Waves, & Optics

LECTURE ASSISTANT

PHYS 163: Galaxies and Quasars
PHYS 162: Cosmology
PHYS 1B: Electricity and Magnetism
PHYS 13: Life in the Universe
PHYS 7: Galaxies and Cosmology

WORKSHOP INSTRUCTOR

Intermediate Introduction to Python
Time Management
Coding Design