

DR. ANNA CORINNE CHILDS

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ORCID: 0000-0002-9343-8612

Work/Research Experience

Postdoctoral Associate, 2022-present

CIERA, Northwestern University

Advisor: *Aaron Geller, PhD*

Topics: *Photometric data analysis, pipeline development & binary star formation and evolution*

Postdoctoral Associate, Summer 2022

University of Nevada, Las Vegas (UNLV)

Advisor: *Rebecca Martin, PhD*

Topics: *Circumbinary planet formation, dynamics, disk evolution & habitability around M-dwarfs*

Graduate Research Assistant, 2015-2022

UNLV

Advisor: *Jason Steffen, PhD*

Topics: *Terrestrial planet formation & numerical methods*

Research Intern, 2018

NASA Goddard, Greenbelt, MD

Advisor: *Elisa Quintana, PhD*

Topics: *Constraining the composition of terrestrial planets*

Research Intern, 2016

NASA Ames, Moffett Field, CA

Advisor: *Elisa Quintana, PhD*

Topics: *Giant planet effects on terrestrial planet formation*

Undergraduate Research Assistant, 2013-2014 **Lawrence Berkeley National Laboratory**

Advisor: *Dennis Lindle, PhD*

Topics: *Physical chemistry & experimental physics*

Education

PhD, Astronomy, May 13 2022

UNLV

Advisor: *Jason Steffen, PhD*

Dissertation: *Terrestrial planet formation in M-dwarf and binary star systems*

MS, Physics, 2017

UNLV

Advisor: *Jason Steffen, PhD*

Thesis: *Giant planet effects on terrestrial system architecture*

BS, Mathematics, 2014

UNLV

Teaching/Mentoring

High school REACH mentor, 2023-present

CIERA, Northwestern University

Undergraduate mentor, 2022-present

CIERA, Northwestern University

Physics Teaching Assistant, 2017-2020

UNLV

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- [21] Planetary Survival in Alpha Centauri AB: Tracing an Open Cluster Origin
Childs, A.C., & A. Geller (ApJ, in prep.)
- [20] Dynamical Effects on Binary Mass Ratios: Evidence from 30 Open Clusters
Childs, A.C., & A. Geller (ApJ, in review)
- [19] Observational Signatures of a Previous Instability in Multi-planet M-Dwarf Planetary Systems
Childs, A.C., A. Hua, R. Martin, C. Yang, & A. Geller, ApJ, February 2025, DOI: 10.3847/1538-4357/adbb53
- [18] Composition Tracking for Collisions Between Differentiated Bodies in REBOUND
 Ferich, N., **A.C. Childs**, & J. Steffen, New Astronomy, October 2024, DOI: 10.48550/arXiv.2406.08588
- [17] Goodbye to Chi-by-Eye: A Bayesian Analysis of Photometric Binaries in Six Open Clusters
Childs, A.C., A. Geller, T. von Hippel, E. Motherway, & C. Zwicker, ApJ, February 2024, DOI: 2024ApJ...962...41C
- [16] Inclination instability of circumbinary planets
 Lubow, S., **A.C. Childs**, & R. Martin, MNRAS, May 2024, DOI: 10.1093/mnras/stae1040
- [15] Investigating Mass Segregation of the Binary Stars in the Open Cluster NGC 6819
 Zwicker, C., A. Geller, **A.C. Childs**, & T. von Hippel, ApJ, May 2024, DOI:10.48550/arXiv.2308.15582
- [14] Relativistic Effects on Circumbinary Disk Evolution: Breaking the Polar Alignment around Eccentric Black Hole Binary Systems
Childs, A.C., R. Martin, C. Nixon, A. Geller, S. Lubow, Z. Shu, & S. Lepp, ApJ, February 2024, DOI:2024ApJ...962...77C
- [13] Tracing the Origins of Mass Segregation in M35: Evidence for Primordially Segregated Binaries
 Motherway, E., A. Geller, **A.C. Childs**, C. Zwicker, & T. von Hippel, ApJL, December 2023, DOI:10.48550/arXiv.2308.13520
- [12] Mergers of black hole binaries driven by misaligned circumbinary discs
 Martin, R., S. Lepp, B. Zhang, C. Nixon, & **A. C. Childs**, MNRAS Letters, November 2023, DOI:10.1093/mnrasl/slad174
- [11] Composition constraints of the TRAPPIST-1 planets from their formation
Childs, A.C., C.Shakespeare, D. Rice, C. Yang, & J. Steffen, MNRAS, July 2023, DOI:10.48550/arXiv.2307.04989

[10] Coplanar Circumbinary Planets Can Be Unstable to Large Tilt Oscillations in the Presence of an Inner Polar Planet

Childs, A.C., R. Martin, S. Lepp, S. Lubow, & A. Geller, ApJL, March 2023, DOI:10.3847/2041-8213/acbcc9

[9] Formation of super-Earths in icy dead zones around low-mass stars

Vallet, D., **A.C. Childs**, R. Martin, M. Livio, & S. Lepp, MNRAS Letters, February 2023, DOI:10.1093/mnrasl/slac144

[8] Life on exoplanets in the habitable zone of M Dwarfs?

Childs, A.C., R. Martin, & M. Livio, ApJL, October 2022, DOI:10.3847/2041-8213/ac9052

[7] Misaligned circumbinary disks as efficient progenitors of interstellar asteroids

Childs, A.C. & R. Martin, ApJL, August 2022, DOI:10.3847/2041-8213/ac8880

[6] A radial limit on polar circumbinary orbits from general relativity

Lepp, S., R. Martin & **A.C. Childs**, ApJL, April 2022, DOI:10.3847/2041-8213/ac61e1

[5] Misalignment of terrestrial circumbinary planets as an indicator of their formation mechanism

Childs, A.C. & R. Martin, ApJL, February 2022, DOI:10.3847/2041-8213/ac574f

[4] Collisional fragmentation and bulk composition tracking in REBOUND

Childs, A.C. & J. Steffen, MNRAS, January 2022, DOI:10.1093/mnras/stac158

[3] Formation of polar terrestrial circumbinary planets

Childs, A.C. & R. Martin, ApJL, September 2021, DOI:10.3847/2041-8213/ac2957

[2] Terrestrial planet formation in a circumbinary disc around a coplanar binary

Childs, A.C. & R. Martin, MNRAS, August 2021, DOI:10.1093/mnras/stab2419

[1] Giant planet effects on terrestrial planet formation and system architecture

Childs, A.C., E. Quintana, T. Barclay, & J. Steffen, MNRAS, February 2019, DOI:10.1093/mnras/stz385

Peer Review Contributions

Reviewer for ApJ	Since 2024
Reviewer for MNRAS	Since 2022
Reviewer for ICARUS	Since 2022
NASA ROSES Panelist	2023
NSF Panelist	2025

Proposals

Lead an HST Archive Theory proposal (PI: Dr. Aaron Geller)	Submitted March 2024
<i>Investigating Planetary Populations in Globular Clusters: A Comprehensive N-body Study</i>	

Lead an HST Archive Theory proposal (PI: Dr. Aaron Geller)

Submitted March 2023

Predicting Circumbinary Planet Occurrence Rates in Globular Clusters From Dynamical Studies of Their Stability and Formation

Software Development

Pipeline for identifying photometric binaries with Gaia DR3 data,
Childs et al., ApJ, February 2024

github.com/ageller/BASE9

Pebble accretion, type-I migration, eccentricity and inclination
dampening for REBOUNDx, see Childs et al., MNRAS July 2023

Fragmentation for REBOUND, see Childs & Steffen 2022

github.com/ANNACRNN

Bulk composition tracking for REBOUND, see Childs & Steffen 2022

github.com/ANNACRNN

Artificial Intelligence Skills

Developed ZENITH (<https://x.com/AgentzenithAi>), an AI-driven agent that analyzes and discusses new and interesting astronomy research on social media.

Utilized unsupervised clustering algorithms (e.g., DBSCAN, Gaussian Mixture Models) to identify open cluster members using Gaia DR3 data (Childs & Geller, in review).

Experience with using next-nearest neighbor and KDE tree methods for pattern recognition in high-dimensional astronomical datasets (Childs & Geller, in review).

Implemented random forests and gradient boosting (XGBoost, LightGBM) in an effort to construct a robust extinction map (Childs & Geller, in review).

Notable Talks

Shanghai Astronomical Observatory's (SHAO) ET Science Seminar (*invited speaker*)
The Formation and Habitability of Terrestrial Planets Around M-dwarfs

July 17, 2024

First North American PHANTOM Workshop (*invited keynote speaker*)
Prize Talk: Modeling Relativistic Effects with PHANTOM

July 9, 2024

REBOUND Conference 2024 (*invited speaker*)
Fragmentation in REBOUND

July 9, 2024

43rd Bay Area Exoplanet Meeting
The Formation of Circumbinary Terrestrial Planets

April 2023

Public Talk at Embry-Riddle Aeronautical University (*invited speaker*)
The Formation of Binary Stars and the Tatooine Planets Around Them

March 2023

American Astronomical Society (AAS) 241st meeting
Constraining Binary Demographics in Open Clusters to Test Binary Formation and Evolution Theory

January 2023

European Astronomical Society (EAS) Annual Meeting
Terrestrial Circumbinary Planet Formation

June 2022

Press

Science Magazine <i>Bizarre 'Tatooine' exoplanet orbits two failed stars at once</i>	16 April 2025
SETI Live <i>The Trouble with M Dwarf Stars</i>	09 February 2023
Astrobites <i>Icy Dead Zones: Birthplaces of Super-Earths?</i>	10 December 2022
Phys Org <i>Another reason red dwarfs might be bad for life: No asteroid belts</i>	31 September 2022
Science Alert <i>This Trait of Red Dwarf Star Systems Could Help Us Resolve The Red Sky Paradox</i>	19 September 2022
AAS NOVA <i>Making Misaligned Planets</i>	23 March 2022
Astrobites <i>Perpendicular planets are less peculiar than you'd think</i>	23 November 2021
AAS NOVA <i>Another Kind of Tatooine: Can Planets Form Perpendicular to a Binary System?</i>	25 October 2021

Awards

Nevada Space Grant Consortium Graduate Fellowship, 2019-2020	NASA
Graduate Assistantship, 2015-2022	UNLV
UNLV Symphony Music Scholarship, 2009-2014	UNLV
Millennium Scholarship, 2009-2014	UNLV

Outreach

Volunteer violinist, 2022-present	Auburn Symphony Orchestra, Auburn, CA
Colloquium speaker, 2019-2020	Las Vegas Astronomical Society
Organizer and speaker, 2019	Astronomy on Tap, Las Vegas
Volunteer violinist, 2018-2020	Henderson Symphony Orchestra, Henderson, NV