

Alex M. Garcia

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Awards

- ◇ Virginia Space Grant Consortium Research Fellow (UVA)
2024
- ◇ Graduate Student Teaching Award (UF)
Spring 2023
- ◇ Outstanding Master's Thesis (UF)
Fall 2022

Honors

- ◇ Outstanding Research Presentation (UF)
Fall 2022
- ◇ Distinguished Contributions by a Graduate Student (UF)
Fall 2022
- ◇ Distinguished Service and Citizenship (UF)
Fall 2022
- ◇ Tutor of the Year Finalist; Honorable Mention (UIUC)
Spring 2021
- ◇ Eagle Scout, Boy Scouts of America
April 2015

Student Mentoring

- ◇ L. Carnevale (UVA)
2024 - 2025
- ◇ I. Leisher (Grinnell College)
2024 - 2025

Education

University of Virginia
2023 – Present

Doctorate of Philosophy in Astronomy
Master of Science in Astronomy

University of Florida
2021 – 2023

Master of Science in Astronomy

University of Illinois
2017 – 2021

Bachelor's of Science in Engineering Physics (*Honors*)
Bachelor's of Science in Astronomy (*Distinction*)

Select Publications

Complete Publication List on last page; see also [NASA/ADS Library]
Summary: 16 total papers, 6 h-index, 98 total citations

First & Corresponding Author: (6 total)

- ◇ *Metallicity Gradients in Modern Cosmological Simulations I: Tension Between Smooth Stellar Feedback Models and Observations* [arXiv] **Submitted**
- ◇ † *Star Formation Rates, Metallicities, and Stellar Masses on kpc-scales in TNG50* [arXiv] **Submitted**
- ◇ *Does the Fundamental Metallicity Relation Evolve with Redshift? II: The Evolution in Normalisation of the Mass-Metallicity Relation* [arXiv] [MNRAS]
- ◇ *Does the Fundamental Metallicity Relation Evolve with Redshift? I: The Correlation Between Offsets from the Mass-Metallicity Relation and Star Formation Rate* [arXiv] [MNRAS]
- ◇ *Interplay of Stellar and Gas-Phase Metallicities: Unveiling Insights for Stellar Feedback Modeling with Illustris, IllustrisTNG, and EAGLE* [arXiv] [MNRAS]
- ◇ *Gas-phase metallicity break radii of star-forming galaxies in IllustrisTNG* [arXiv] [MNRAS]

† Corresponding Author

Student Theses Supervised:

- ◇ L. Carnevale (Senior Thesis, UVA 2025) – “Does the Fundamental Metallicity Relation Evolve with Mass?”
- ◇ † Z. Stevens (Senior Thesis, UVA 2024) – “Constraining the Splashback Radius in IllustrisTNG”
- ◇ † C. O'Brien (Senior Thesis, Ohio State 2023) – “Parameterizing Splashback Radius-Mass Relations of Galaxy Clusters with IllustrisTNG Simulations”

† Co-supervised with P. Torrey

Research Experience

Graduate Researcher
2021 – Present

University of Virginia
University of Florida
P. Torrey

Undergraduate Researcher
2020 – 2021

University of Illinois
B. Dunne & Y. Shen

- ◇ M. Liu (UVA)
2024
- ◇ Z. Stevens (UVA)
2023 - 2024
- ◇ C. O'Brien (UF REU)
2022 - 2024

Service

Graduate Student Rep.
NSF-Simons CosmicAI Student Post-
doc Leadership Council
2025 - Present

Host
Journal Club (UVA)
2024 - Present

Member
Dark Skies, Bright Kids Outreach
Group (UVA)
2023 - Present

Referee
MNRAS
2023, 2024, 2025

Gradaute Student Rep.
Committee for DEI (UF)
2021 - 2023

Other Work

Planetarium Assistant
Kika Silva Pla Planetarium
Gainesville, FL
2021 - 2023

Tutor/Lead Tutor
College of Engineering (UIUC)
Urbana, IL
2018 - 2021

Contributed Talks & Presentations

Conference Contributions:

- ◇ Simulation Based Inference for Galaxy Evolution – Bristol, UK
May 2025
- ◇ Student Research Conference – Hampton University
April 2025
- ◇ The Multi-phase ISM in Galaxies – Bologna, Italy [Poster]
September 2024
- ◇ Connecting Simulations and Observations – Barossa, Australia
June 2024
- ◇ Regulating Star Formation Across Time – STScI, USA [Video]
April 2024
- ◇ Building Galaxies from Scratch – Vienna, Austria [Poster]
February 2024
- ◇ Resolving Galaxy Ecosystems – Hong Kong, China
December 2023

Invited Seminars

- ◇ Cosmology Group – U. Maryland
October 2024
- ◇ Astronomy Seminar – Virginia Tech
September 2024
- ◇ Astronomy Seminar – Australian National University
June 2024

Other Formal Presentations:

- ◇ Astrophysics Theory Group – U. Virginia
February 2025
- ◇ Astrophysics Theory Group – U. Virginia
September 2024
- ◇ Ellison Group Meeting – U. Victoria (virtual)
February 2024
- ◇ Vogelsberger Group Meeting – MIT
November 2023
- ◇ Kewley Group Meeting – CfA Harvard-Smithsonian
November 2023
- ◇ Ellison Group Meeting – U. Victoria (virtual)
May 2023

Guest Lectures:

- ◇ McCormick Observatory Public Night – U. Virginia
July 2024
- ◇ ASTR 3830 (×3) – U. Virginia
Spring 2024
- ◇ ASTR 5110 – U. Virginia
September 2023

Teaching

Institution		Course		Semester
Virginia	ASTR	2110	◇ Intro to Astrophysics	FA 24
		†1250	◇ Alien Worlds	SU 24
		4470	◇ Computational Astrophysics	SP 24
		3830	◇ Planetary Astronomy (+Lab)	SP 24
		1220	◇ Stars, Galaxies, and Universe	SP 24
		5110	◇ Astronomical Techniques	FA 23
Florida	AST	†1022	◇ Astronomy Laboratory	SP 23
		†1022	◇ Astronomy Laboratory	SP 22
		1002	◇ Discovering the Universe	FA 21
Illinois	ASTR	330	◇ Extraterrestrial Life	SP 21
		330	◇ Extraterrestrial Life	W 21
		100	◇ Introduction to Astronomy	FA 20
		150	◇ Killer Skies: Astro-Disasters	FA 20

† Primary instructor (UVA; Summer 2024 – UF; Spring 2023, 2022)

Complete Publication List

[NASA/ADS Library]

*First Author †Corresponding Author ‡Student Led

16. ***Garcia, Alex M.**, et al. “*Metallicity Gradients in Modern Cosmological Simulations I: Tension Between Smooth Stellar Feedback Models and Observations*”. 2025. ApJ. Submitted.
15. Chen, Q., **Garcia, A.**, et al. “*How Mergers and Flybys Shape Azimuthal Age Patterns in Spiral Galaxies*” 2025. MNRAS. Submitted.
14. †Qi, J., **Garcia, A.**, Torrey, P., Moreno J., Green, K., Evans, A., Hemler Z., Hernquist L., Ellison, S. “*Star Formation Rates, Metallicities, and Stellar Masses on kpc-scales in TNG50*”. 2025. ApJ. Submitted.
13. ‡Mostow, O., Torrey, P., Rose, J., **Garcia, A.**, Ahvazi, N., Lisanti, M., Kallivayalil, N. “*How Many Bursts Does it Take to Form a Core at the Center of a Galaxy?*”. 2025. ApJ. Submitted.
12. Chakraborty, P., Sarkar, A., Smith, R., Ferland, G., McDonald, M., Forman, W., Vogelsberger M., Torrey, P., **Garcia, A.**, Bautz, M., Foster, A., Miller, E., Grant, C. “*Unveiling the Cosmic Chemistry II: “direct” T_e based metallicity of galaxies at $3 < z < 10$ with JWST/NIRSpec*”. 2025. ApJ. Submitted.
11. Kewley, L., Grasha, K., Hemler, Z., **Garcia, A.**, Torrey, P., Hernquist, L., Chen, Q., Madore, B., Rich, J., Seibert, M. “*Extragalactic Archaeology: the chemical and accretion history of NGC 1365*”. 2024. Nature. Submitted.
10. Nyguen, T., et al., including **Garcia, A.** “*How DREAMS are made: Emulating subhalo populations under alternative dark matter scenarios with Diffusion Models*”. 2024. MNRAS. Submitted.
9. Rose, J., et al., including **Garcia, A.** “*Introducing the DREAMS project: DaRk mattEr and Astrophysics with Machine learning and Simulations*”. 2024. ApJ. Submitted
8. ***Garcia, A.**, Torrey P., Ellison S., Grasha K., Chen Q., Hemler Z., Zimmerman D., Wright R., Zovaro H., Nelson E., Sanders R., Kewley L., Hernquist L. “*Does the Fundamental Metallicity Relation Evolve with Redshift? II: The Evolution in Normalisation of the Mass-Metallicity Relation*”. 2025. MNRAS 536, 119G.
7. Sarkar, A., Chakraborty, P., Vogelsberger, M., McDonald, M., Torrey, P., **Garcia, A.**, Khullar, G., Ferland, G., Forman, W., Wolk, S., Schneider, B., Bautz, M., Miller, E., Grant, C., ZuHone, J. “*Unveiling the Cosmic Chemistry: Revisiting the Mass-Metallicity Relation with JWST/NIRSpec at $4 < z < 10$* ”. 2025. ApJ 978 136.
6. Chen, Q., Grasha, K., Battisti A., Wisnioski, E., Li, Z., Park, H., Groves, B., Torrey, P., Mendel, T., Madore, B., Seibert, M., Sextl, E., **Garcia, A.**, Rich, J., Beaton, R., Kewley, L. “*Quantifying azimuthal variations within the interstellar medium of spiral galaxies with the TYPHOON survey*”. 2024. MNRAS 534, 883.
5. Shurui, L., Villascusa-Navarro, F., Rose, J., Torrey, P., Farahi, A., Kollamn, K., **Garcia, A.**, Roy, S., Vogelsberger M., Kallivayalil, N., Cai, F., Luo, W. “*Can we constrain warm dark matter masses with individual galaxies?*”. 2024. ApJ 970, 170.
4. ***Garcia, A.**, Torrey, P., Ellison, S., Grasha, K., Hernquist, L., Zovaro, H., Chen, Q., Hemler, Z., Kewley, L., Nelson, E., Wright, R. “*Does the Fundamental Metallicity Relation Evolve with Redshift? I: The Correlation Between Offsets from the Mass-Metallicity Relation and Star Formation Rate*”. 2024. MNRAS 531, 1398.
3. ***Garcia, A.**, Torrey, P., Grasha, K., Hernquist, L., Ellison, S., Zovaro, H., Hemler, Z., Nelson, E., Kewley, L. “*Interplay of Stellar and Gas-Phase Metallicities: Unveiling Insights for Stellar Feedback Modeling with Illustris, IllustrisTNG, and EAGLE*”. 2024. MNRAS 529, 3342.
2. ‡Hartley, A., Nelson, E., Suess, K., **Garcia, A.**, Park, M., Hernquist, L., Bezanson, R., Nevin, R., Pillepich, A., Schechter, A., Terrazas, B., Torrey, P., Wellons, S., Whitaker, K., Williams, C. “*The First Quiescent Galaxies in TNG300*”. 2023. MNRAS 522, 3138.
1. ***Garcia, A.**, Torrey P., Hemler Z., Hernquist, L., Kewley L., Nelson E, Grasha K., Zovaro H., Chen Q., “*Gas-phase metallicity break radii of star-forming galaxies in IllustrisTNG*”. 2023. MNRAS 519, 4716.