

Alex M. Garcia

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Awards

- ◇ Virginia Space Grant Consortium Research Fellow
2024-2025, 2025-2026
- ◇ Graduate 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

Technical Skills

●●● = Expert
●●● = Proficient
●●● = Working Knowledge

●●● Python

●●● L^AT_EX

●●● JavaScript/HTML/CSS

●●● Bash/SLURM

●●● Git ●●● C/C++

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]

First Author: (7 total)

- ◇ Garcia, A., et al. (In Prep; 2025) “*The DREAMS Project: The Relative Impact of Astrophysics and Halo-to-Halo Variation on the Dark Matter Density Profiles of Milky Way-Mass Halos*”.
- ◇ Qi, J., Garcia, A. (equal contribution) et al. (2025) [“*Star Formation Rates, Metallicities, and Stellar Masses on kpc-scales in TNG50*”].
- ◇ Garcia, A., et al. (2025) [“*Metallicity Gradients in Modern Cosmological Simulations I: Tension Between Smooth Stellar Feedback Models and Observations*”]. ApJ. 989 147.
- ◇ Garcia, A., et al. (2025) [“*Does the Fundamental Metallicity Relation Evolve with Redshift? II: The Evolution in Normalisation of the Mass-Metallicity Relation*”]. MNRAS. 536, 119.
- ◇ Garcia, A., et al. (2024) [“*Does the Fundamental Metallicity Relation Evolve with Redshift? I: The Correlation Between Offsets from the Mass-Metallicity Relation and Star Formation Rate*”]. MNRAS. 531, 1398.
- ◇ Garcia, A., et al. (2024) [“*Interplay of Stellar and Gas-Phase Metallicities: Unveiling Insights for Stellar Feedback Modeling with Illustris, IllustrisTNG, and EAGLE*”]. MNRAS. 529, 3342.
- ◇ Garcia, A., et al. (2023) [“*Gas-phase metallicity break radii of star-forming galaxies in IllustrisTNG*”]. MNRAS. 519, 4716.

Student Papers Supervised:

- ◇ Carnevale, L., Garcia, A., et al. (2025) “*The Mass Dependence of the Fundamental Metallicity Relation in Cosmological Simulations*”
- ◇ Leisher, I., Torrey, P., Garcia, A., et al. (2025) “*Linking Warm Dark Matter to Merger Tree Histories via Deep Learning Networks*”.

Student Theses Supervised: (Available upon request)

*Co-supervised with P. Torrey

- ◇ L. Carnevale (Senior Thesis, UVA 2025)
- ◇ Z. Stevens* (Senior Thesis, UVA 2024)
- ◇ C. O'Brien* (Senior Thesis, Ohio State 2023)

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

—Student Mentoring—

- ◇ D. Robinson
2025
- ◇ M. Kulkarni
2025
- ◇ L. Carnevale
2024 - 2025
- ◇ I. Leisher
2024 - 2025
- ◇ M. Liu
2024
- ◇ Z. Stevens
2023 - 2024
- ◇ C. O'Brien
2022 - 2024

—Service—

Student/Postdoc Leadership Council
NSF-Simons CosmicAI Institute
2025 - Present

Referee
MNRAS
2023, 2024, 2025

Host
Journal Club (UVA)
2024 - Present

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

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 & Workshop Contributions:

- ◇ GOALS Workshop – Charlottesville, USA
September 2025
- ◇ Open SkAI – Chicago, USA [Poster]
September 2025
- ◇ Simulation Based Inference for Galaxy Evolution – Bristol, UK
May 2025
- ◇ DREAMS Workshop – New York, USA
May 2025
- ◇ Student Research Conference – Hampton University, USA
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 – Baltimore, USA [Video]
April 2024
- ◇ Building Galaxies from Scratch – Vienna, Austria [Poster]
February 2024
- ◇ Resolving Galaxy Ecosystems – Hong Kong
December 2023

Invited Seminars

- ◇ Astronomy Seminar – U. Kentucky
November 2025
- ◇ Cosmology Group – U. Maryland
October 2024
- ◇ Astronomy Seminar – Virginia Tech
September 2024
- ◇ Astronomy Seminar – Australian National University
June 2024

Other Formal Presentations:

- ◇ Astronomy on Tap – U. Virginia
November 2025
- ◇ ANR Dark Meeting – U. Lyon (virtual)
July 2025
- ◇ Conroy Group Meeting – CfA Harvard-Smithsonian
April 2025
- ◇ McCormick Observatory Public Night – U. Virginia
July 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

—Teaching—

Institution		Course		Semester
Virginia	ASTR	1210	◇ Intro Sky & Solar System	FA 25
		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]

Summary: **31** total papers, **9** h-index, **178** total citations (Manuscripts in preparation available upon request)

First Author

7. **Garcia, A.**, Rose, J., Torrey, P., Caputo, A., Listanti, M., Pace, A., Liu, H., Hussein, A., Liu, H., Villaescusa-Navarro F., Barry, J., Leisher, I., Lille, E., Kho, J., Ahvazi, N., Ngyuen, T., Ou, X., Necib, L., Kallivayalil, N., Vogelsberger, M. “*The DREAMS Project: The Relative Impact of Astrophysics and Halo-to-Halo Variation on the Dark Matter Density Profiles of Milky Way-Mass Halos*”. 2025. In Prep.
6. Qi, J. & **Garcia, A.** (equal contribution from Qi and Garcia), Robinson, D., 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. Accepted.
5. **Garcia, A.**, Torrey, P., Bhagwat, A., Wright, R., Chen, Q., Grasha, K., Ridolfo, S., Hemler, Z., Sarkar, A., Chakraborty, P., Nelson, E., Sanders, R., Costa, T., Vogelsberger, M., Kewley, L., Ellison, S., Hernquist, L. [*“Metallicity Gradients in Modern Cosmological Simulations I: Tension Between Smooth Stellar Feedback Models and Observations”*]. 2025. ApJ. 989 147.
4. **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, 119.
3. **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.
2. **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.
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.

Co-Author

‡Undergraduate Student Led

24. Ahvazi, N. et al., including **Garcia, A.**
23. Rose, J., et al. including **Garcia, A.**. DREAMS CDM Central Galaxies. 2025. In Prep.
22. Lille, E., et al. including **Garcia, A.**, “*The Effects of Cosmic Variance and Astrophysical Uncertainty on Dark Matter Velocity Distributions*”. 2025. In Prep.
21. Green, K., et al. including **Garcia, A.**. “*The Resolved Star Formation and Stellar Mass Properties of Luminous Infrared Galaxies*”, 2025. In Prep.
20. Narayanan, D. et al., including **Garcia, A.**. “*The Growth of Dust in Galaxies in the First Billion Years with Applications to Blue Monsters*”. 2025. In Prep.
19. Rose, J., et al. including **Garcia, A.**. “*The DREAMS Project: Disentangling the Impact of Cosmic Variance and Baryonic Feedback on Satellite Galaxies*”. 2025. In Prep.
18. Bhowmick, A., Blecha, L., Torrey, P., Kelley, L., Natarajan, P., Weinberger, R., **Garcia, A.**, Hernquist, L., Di Matteo, T., Somerville, R., Vogelsberger, M. “*Heavy seeds and the first black holes: Insights from the BRAHMA simulations*”. 2025. ApJ. In Prep.
17. ‡Carnevale, L., **Garcia, A.**, et al. “*The Mass Dependence of the Fundamental Metallicity Relation in Cosmological Simulations*”. 2025. In Prep
16. ‡Leisher, I., Torrey, P., **Garcia, A.**, Rose, J., Narayanan, D., Zimmerman, D., Vogelsberger, M., et al. “*Linking Warm Dark Matter to Merger Tree Histories via Deep Learning Networks*”. 2025. In Prep
15. Heretz, P., **Garcia, A.**, Triani, P., Battisti, A., Torrey, P., Pope, A., Calzetti, D., Kewley, L. “*A New Metallicity Diagnostic Suitable for Low Spectral Resolution Surveys of Star-Forming Galaxies*”. 2025. In Prep.

14. Jain, S., Sanders, R., Khostovan, A., Jones, T., Shapley, A., Reddy, N., **Garcia, A.**, Torrey, P., Coil, A. [*“A Uniform Analysis of Gas-phase Metallicity Evolution with 1 – 3 Gyr Time Sampling over the Past 12 Billion Years”*]. 2025. Submitted.
13. Silvestrini, M., Torta, C., Busillo, V., Farahi, A., **Garcia, A.**, Kallivayalil, N., Napolitano, R., Rose, J., Torrey, P., Villaescusa-Navarro, F., Vogelsberger, M. *“CASCO: Cosmological and Astrophysical parameters from Cosmological simulations and Observations IV. Testing warm dark matter cosmologies with galaxy scaling relations: a joint simulation–observation study using DREAMS simulations”*. 2025. A&A. Submitted.
12. Costanza, B., Wang, B., Villaescusa-Navarro, F., **Garcia, A.**, Rose, J., Vogelsberger, M., Torrey, P., Farahi, A., Shen, X., Leisher, I. *“On the Sensitivity of Different Galaxy Properties to Warm Dark Matter”*. 2025. ApJ. Submitted.
11. Kho, J., Bhowmick, A., Torrey, P., **Garcia, A.**, Ahvazi, N., Blecha, L. [*“Signatures of BH seeding on the $M_{\text{BH}} - \sigma$ relation: Predictions from the BRAHMA simulations”*]. 2025. ApJ. Submitted.
10. Chen, Q., **Garcia, A.**, Grasha, K., Wisnioski, E., Li, Z., Torrey, P., Remus, R., Kimming, L., Battisti, A., Buder, S. *“How Mergers and Flybys Shape Azimuthal Age Patterns in Spiral Galaxies”* 2025. MNRAS. Submitted.
9. ‡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.
8. Kewley, L., Grasha, K., **Garcia, A.**, Torrey, P., Rich, J., Hemler, Z., Zhu, P., Chen, Q., Seibert, M., Hernquist, L., Madore, B., *“Extragalactic Archaeology via Gas-Phase Oxygen Abundance Gradients”*. 2025. Nature. Submitted.
7. 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.
6. 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 985, 24.
5. Rose, J., et al., including **Garcia, A.** [*“Introducing the DREAMS project: DaRk mattEr and Astrophysics with Machine learning and Simulations”*]. 2025. ApJ. 982, 68.
4. 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.
3. 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.
2. Shurui, L., Villascusa-Navarro, F., Rose, J., Torrey, P., Farahi, A., Kollman, 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.
1. ‡Hartley, A., Nelson, E., Suess, K., **Garcia, A.**, Park, M., Hernquist, L., Bezanson, R., Nevin, R., Pillepich, A., Schecter, A., Terrazas, B., Torrey, P., Wellons, S., Whitaker, K., Williams, C. [*“The First Quiescent Galaxies in TNG300”*]. 2023. MNRAS 522, 3138.