

Alex M. Garcia

Contacts

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Awards

- ◇ Virginia Space Grant Consortium Research Fellow
2024-25, 2025-26
- ◇ Graduate Teaching Award (UF)
2023
- ◇ Outstanding Master's Thesis (UF)
2022

Honors

- ◇ Outstanding Research Presentation (UF)
2022
- ◇ Distinguished Contributions by a Graduate Student (UF)
2022
- ◇ Distinguished Service and Citizenship (UF)
2022
- ◇ Tutor of the Year Finalist; Honorable Mention (UIUC)
2021

Technical Skills

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

●●● Python ●●● L^AT_EX

●●● Bash/SLURM ●●● Git

●●● C/C++

●●● JavaScript/HTML/CSS

Education

University of Virginia
2023 – Present
Doctorate of Philosophy in Astronomy
Master of Science in Astronomy (*Awarded 2025*)

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: (8 total)

- ◇ **Garcia, A.**, et al. (2025) [*“The DREAMS Project: Disentangling the Impact of Halo-to-Halo Variance and Baryonic Feedback on Milky Way Dark Matter Density Profiles”*]. ApJ. Submitted.
- ◇ **Garcia, A.**, et al. (2025) [*“Metallicity Gradients in Modern Cosmological Simulations II: The Role of Bursty Versus Smooth Feedback at High Redshift”*]. ApJ. Submitted.
- ◇ Qi, J., **Garcia, A.** [equal contribution] et al. (2025) [*“Star Formation Rates, Metallicities, and Stellar Masses on kpc-scales in TNG50”*]. ApJ. 993, 32.
- ◇ **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”*]. Under Collaboration Review. [Document Available]
- ◇ Leisher, I., Torrey, P., **Garcia, A.**, et al. (2025) [*“Linking Warm Dark Matter to Merger Tree Histories via Deep Learning Networks”*]. ApJ. Submitted.

Student Theses Supervised: (Available upon request)

*Co-supervised with P. Torrey

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

—Student Mentoring—

- ◇ D. Western
2025
- ◇ 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:

- ◇ NSF Summit for AI Institute Leadership – Reston, VA [**Poster**] *October 2025*
- ◇ 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
<i>Virginia</i>	ASTR	1210	◇ Intro Sky & Solar System	<i>FA 25</i>
		2110	◇ Intro to Astrophysics	<i>FA 24</i>
		†1250	◇ Alien Worlds	<i>SU 24</i>
		4470	◇ Computational Astrophysics	<i>SP 24</i>
		3830	◇ Planetary Astronomy (+Lab)	<i>SP 24</i>
		1220	◇ Stars, Galaxies, and Universe	<i>SP 24</i>
		5110	◇ Astronomical Techniques	<i>FA 23</i>
<i>Florida</i>	AST	†1022	◇ Astronomy Laboratory	<i>SP 23</i>
		†1022	◇ Astronomy Laboratory	<i>SP 22</i>
		1002	◇ Discovering the Universe	<i>FA 21</i>
<i>Illinois</i>	ASTR	330	◇ Extraterrestrial Life	<i>SP 21</i>
		330	◇ Extraterrestrial Life	<i>W 21</i>
		100	◇ Introduction to Astronomy	<i>FA 20</i>
		150	◇ Killer Skies: Astro-Disasters	<i>FA 20</i>

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

Complete Publication List

See also: [\[NASA/ADS Library\]](#)

Summary: **32** total papers, **10** *h*-index, **10** *i10*-index, **15** *g*-index

First Author

8. **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., Costanza, B., Kho, J., Lille, E., Jiaxuan, L., Bhowmick, A., Nguyen, T., O'Neil, S., Ou, X., Shen, X., Kallivayalil, N., Necib, L., Vogelsberger, M. [*"The DREAMS Project: Disentangling the Impact of Halo-to-Halo Variance and Baryonic Feedback on Milky Way Dark Matter Density Profiles"*]. 2025. ApJ. Submitted.
7. **Garcia, A.**, Torrey, P., Bhagwat, A., Shen, X., Vogelsberger, M., McClymont, W., Nagarajan-Swenson, J., Zhu, P., Zimmerman, D., Zier, O., Biddle, S., Wright, R., Grasha, K., Keating, L., Kannan, R., Smith, A., Garaldi, E., Puchwein, E., Ciardi, B., Hernquist, L., Kewley, L. [*"Metallicity Gradients in Modern Cosmological Simulations II: The Role of Bursty Versus Smooth Feedback at High Redshift."*] 2025. ApJ. Submitted.
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. 993 32.
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

25. Green, K., et al. including **Garcia, A.**. "*The Resolved Star Formation and Stellar Mass Properties of Luminous Infrared Galaxies*". Under Collaboration Review.
24. ‡Carnevale, L., **Garcia, A.**, et al. [*"The Mass Dependence of the Fundamental Metallicity Relation in Cosmological Simulations"*]. Under Collaboration Review.

Submitted to Journal

23. Lille, E., Rose, J., Lisanti, M., **Garcia, A.**, Kollmann, K., Li, J., Mostow, O., Shen, X., Brooks, A., Farahi, A., Kallivayalil, N., Necib, L., Pace, A., Torrey, P., Vogelsberger, M. "*The DREAMS Project: Disentangling the Impact of Halo-to-Halo Variance and Baryonic Feedback on Milky Way Dark Matter Velocity Distributions*". 2025. ApJ. Submitted.
22. Rose, J., Lisanti, M., Torrey, P., Villaescusa-Navarro F., **Garcia, A.**, Farahi, A., Fillion, C., Brooks, A., Kallivayalil, N., Kollmann, K., Lilie, E., Li, J., Mostow, O., Cruz, A., Ngyuen, T., Pace, A., Ahvazi, N., O'Neil, S., Shen, X., Cyr-Racine, F., Caputo, A., Price-Whelan, A., Geha, M., Greene, J., Necib, L., Vogelsberger, M., Muñoz, J., Dalcanton, J. [*"The DREAMS Project: Disentangling the Impact of Halo-to-Halo Variance and Baryonic Feedback on Milky Way Satellite Galaxies"*]. 2025. ApJ. Submitted
21. Rose, J., Lisanti, M., Torrey, P., Villaescusa-Navarro F., **Garcia, A.**, Farahi, A., Fillion, C., Brooks, A., Kallivayalil, N., Kollman, K., Lilie, E., Roy, S., Pace, A., Ahvazi, N., O'Neil, S., Shen, X., Greene, J., Vogelsberger, M. [*"The DREAMS Project: A New Suite of 1,024 Simulations to Contextualize the Milky Way and Assess Physics Uncertainties"*]. 2025. ApJ. Submitted.
20. Ahvazi, N., Pace, A., Garling, C., Ou, X., Kallivayalil, N., Torrey, P., Benson, A., Bhowmick, A., Torres-Albà, N., **Garcia, A.**, Kho, J., Warfield, J., Atzberger, K. [*"The Abundance and Properties of the lowest Luminosity Dwarf Galaxies around the Milky Way: Insights from Semi-Analytic Models"*]. 2025. ApJ. Submitted.
19. Heretz, P., Triani, P., Battisti, A., **Garcia, A.**, Torrey, P., Pope, A., Calzetti, D., Kewley, L. "*A New Metallicity Diagnostic Suitable for Low Spectral Resolution Surveys of Star-Forming Galaxies*". 2025. ApJ. Submitted.

18. ‡Leisher, I., Torrey, P., **Garcia, A.**, Rose, J., Villaescusa-Navarro F., Lubberts, Z., Farahi, A., O’Neil, S., Shen, X., Mostow, O., Kallivayalil, N., Zimmerman, D., Narayana, D., Vogelsberger, M. [*“Linking Warm Dark Matter to Merger Tree Histories via Deep Learning Networks”*]. 2025. ApJ. Submitted.
17. Garling, C., **Garcia, A.**, Ahvazi, N., Kallivayalil, N., McQuinn, K., Feldmann, R., Cohen, R. [*“A Unified Framework Connecting Chemical Enrichment with Resolved Star Formation Histories”*]. 2025. ApJ. Submitted.
16. 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. Submitted.
15. Narayanan, D., Torrey, P., Stark, D., Chirsholm, J., Finkelstein, S., **Garcia, A.**, Marinacci, F., Kelley-Derzon, J., Sales, L., Savitch, E., Vogelsberger, M., Zimmerman, D. [*“The Growth of Dust in Galaxies in the First Billion Years with Applications to Blue Monsters”*]. 2025. Submitted.
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 (Second Review).
12. Chen, Q., **Garcia, A.**, Li, Z., Wisnioski, E., Grasha, K., Torrey, P., Remus, R., Kimming, L., Battisti, A., Buder, S. *“How Mergers and Flybys Shape Azimuthal Age Patterns in Spiral Galaxies”* 2025. MNRAS. Submitted (Second Review).
11. Nyguen, T., Villaescusa-Navarro, F., Misha-Sharma, S., Cuesta-Lazaro, C., Torrey, P., Farahi, A., **Garcia, A.**, Rose, J., O’Neil, S., Vogelsberger, M., Shen, X., Roche, C., Anglés-Alcazar, D., Kallivayalil, N., Muñoz, J., Cyr-Racine, F., Roy, S., Necib, L., Kollmann, K. [*“How DREAMS are made: Emulating subhalo populations under alternative dark matter scenarios with Diffusion Models”*]. 2024. MNRAS. Submitted.

Accepted to Journal

10. 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 Astronomy. Accepted. In Press.
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. Accepted. 995, 25.
8. 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 994, 62.
7. 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 994, 172.
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., Torrey, P., Villaescusa-Navarro, F., Lisanti, M., Nyguen, T., Roy, S., Kollmann, K., Vogelsberger, M., Cyr-Racine, F., Medvedev, M., Genel, S., Anglés-Alcazar, D., Kallivayalil, N., Wang, B., Costanza, B., O’Neil, S., Ciani, R., Karmakar, S., **Garcia, A.**, Low, R., Lin, S., Mostow, O., Cruz, A., Caputo, A., Farahi, A., Muñoz, J., Necib, L., Teyssier, R., Dalcanton, J., Spergel, D. [*“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., Schechter, A., Terrazas, B., Torrey, P., Wellons, S., Whitaker, K., Williams, C. [*“The First Quiescent Galaxies in TNG300”*]. 2023. MNRAS 522, 3138.