Alex M. Garcia

Contacts

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Awards

- Virginia Space Grant Consortium Research Fellow (UVA)
  2024
- Outstanding Master's Thesis (UF)
  Fall 2022

Honors

- Graduate Student Teaching Award (UF)
  Spring 2023
- 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

- Ani Venkatapuram (UVA)
  2024-25
- Laura Carnevale (UVA)
  2024-25

Education

University of Virginia
2023 – Present
Doctorate of Philosophy in Astronomy
Master's of Science in Astronomy

University of Florida
2021 – 2023
Master's 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: **17** total papers, **5** h-index, **77** total citations

First Author: (5 total)

- *The Evolution of Metallicity Gradients in Modern Cosmological Box Simulations to $z = 8$*
- *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]

Student Led:

- *Does the Fundamental Metallicity Relation Evolve with Mass?* **In Prep**

Other Significant Contribution Co-Author Papers:

- *Stellar azimuthal variations in spiral galaxies in Auriga simulations* **In Prep**
- *Extragalactic Archaeology: the chemical and accretion history of NGC 1365* **Submitted**
- *Star Formation Rates, Metallicities, and Stellar Masses on kpc-scales in TNG50* [arXiv] **Submitted**
- *The First Quiescent Galaxies in TNG300* [arXiv] [MNRAS]

Research Experience

Graduate Researcher
2021 – Present
University of Virginia
University of Florida
Paul Torrey

Undergraduate Researcher
2020 – 2021
University of Illinois
Bryan Dunne & Yue Shen

Contributed Talks & Presentations

Conference Contributions:

- The Multi-phase ISM in Galaxies – Bologna, Italy [Poster] *September 2024*

- Ilem Leisher (Grinnell College)
  2024-25
- Martin Liu (UVA)
  2024
- Zach Stevens (UVA)
  2023-24
- Caitlin O'Brien (UF REU)
  2022-24

Service

Host
Journal Club (UVA)
2024-Present

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

Referee
MNRAS
2023-2025

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

- 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 *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: (5 total)

5. *The Evolution of Metallicity Gradients in Modern Cosmological Box Simulations* **Garcia, Alex M.**, et al. 2025b. In Preparation
4. *Does the Fundamental Metallicity Relation Evolve with Redshift? II: The Evolution in Normalisation of the Mass-Metallicity Relation.* **Garcia, Alex M.**, et al. 2025a. arXiv:2407.06254. MNRAS 536, 119G.
3. *Does the Fundamental Metallicity Relation Evolve with Redshift? I: The Correlation Between Offsets from the Mass-Metallicity Relation and Star Formation Rate.* **Garcia, Alex M.**, et al. 2024b. arXiv: 2403.08856. MNRAS 531, 1398
2. *Interplay of Stellar and Gas-Phase Metallicities: Unveiling Insights for Stellar Feedback Modeling with Illustris, IllustrisTNG, and EAGLE.* **Garcia, Alex M.**, et al. 2024a. arXiv: 2401.12310. MNRAS 529, 3342
1. *Gas-phase metallicity break radii of star-forming galaxies in IllustrisTNG.* **Garcia, Alex M.**, et al. 2023. arXiv: 2212.03326. MNRAS 519, 4716

Second Author: (3 total)

‡Student Led

3. ‡*Does the Fundamental Metallicity Relation Evolve with Mass?.* Carnevale, Laura, **Garcia, Alex M.**. et al. 2025. In Preparation
2. *Stellar azimuthal variations in spiral galaxies in Auriga simulations.* Chen, Qian-hui, **Garcia, Alex M.**, et al. 2025. In Preparation
1. *Star Formation Rates, Metallicities, and Stellar Masses on kpc-scales in TNG50.* Qi, Jia, **Garcia, Alex M.**, et al. 2025. arXiv: 2501.18687. Submitted to ApJ.

Other Co-Author Papers: (9 total)

‡Student Led

9. ‡*How Many Bursts Does it Take to Form a Core at the Center of a Galaxy?.* Mostow, Olivia, ... , **Garcia, Alex M.**, et al., 2025. arXiv:2412.09566. Submitted to ApJ.
8. *Unveiling the Cosmic Chemistry II: "direct" T_e based metallicity of galaxies at* $3 < z < 10$ *with JWST/NIRSpec.* Chakraborty, Priyanka, ... , **Garcia, Alex M.**, et al., 2025. Submitted to ApJ.
7. *Quantifying azimuthal variations within the interstellar medium of spiral galaxies with the TYPHOON survey.* Chen, Qian-hui, ... , **Garcia, Alex M.**, et al. 2024b. arXiv:2409.05341. MNRAS 534, 883.
6. *Unveiling the Cosmic Chemistry: Revisiting the Mass-Metallicity Relation with JWST/NIRSpec at* $4 < z < 10$. Sarkar, Arnab, ... , **Garcia, Alex M.**, et al. 2024. arXiv: 2408.07974. ApJ 978 136.
5. *How DREAMS are made: Emulating subhalo populations under alternative dark matter scenarios with Diffusion Models.* Nyguen, Tri, ... , **Garcia, Alex M.**, et al. 2024. arXiv: 2409.02980. Submitted to MNRAS.
4. *Extragalactic Archaeology: the chemical and accretion history of NGC 1365.* Kewley, Lisa, ... , **Garcia, Alex M.**, et al. 2024. Submitted to Nature
3. *The DREAMS project: DaRk mattEr and Astrophysics with Machine learning and Simulations.* Rose, Jonah C., ... , **Garcia, Alex M.**, et al. 2024. arXiv:2405.00766. Submitted to ApJ
2. *Can we constrain warm dark matter masses with individual galaxies?.* Shurui, Lin, ... , **Garcia, Alex M.**, et al. 2024. arXiv:2401.17940. ApJ 970, 170
1. ‡*The First Quiescent Galaxies in TNG300.* Hartley, Abigail, ... , **Garcia, Alex M.**, et al. 2023. arXiv:2401.17940. MNRAS 522, 3138.