Alec Martin

Curriculum Vitæ

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Education

2019–2025 **Ph.D. in Physics**, *The University of Missouri - Columbia* , Columbia, MO
Extragalactic Astronomy: investigating star-formation activities in distant galaxies observed by HST and JWST.

2019–2022 **M.Sc. in Physics**, *The University of Missouri - Columbia*, Columbia, MO

2015–2019 **B.Sc. in Astrophysics**, *Ohio Wesleyan University*, Delaware, OH
Astrophysics. Senior thesis: Starspot Modeling On Rapid, Differentially Rotating Stars.
Minors: Mathematics

Professional Experience

2020– **Research Assistant**, *The University of Missouri - Columbia*, Columbia, MO

2019–2020 **Teaching Assistant**, *The University of Missouri - Columbia*, Columbia, MO
Algebra-based introductory physics laboratory.

2017–2019 **Teaching Assistant**, *Ohio Wesleyan University*, Delaware, OH
Lecture introductory astronomy teaching assistant.

Research

2019– **Ultraviolet Imaging of the Cosmic Assembly Near-infrared Deep Extragalactic Legacy Survey Fields (UVCANDELS)**
Team member of UVCANDELS *is the definitive extragalactic UV imaging of the four premier HST deep-wide survey fields best suited to JWST observations.*
- Lead study on star-formation in the above goals for galaxies and properties of their star-forming substructures.
- Contribute to the efforts of expanding UVCANDELS to a larger area.

2023– **Studying Giant Star-forming clumps with the James Webb Space Telescope**
Current work using an accepted JWST archival research proposal is designed to provide unprecedented accuracy of the clump stellar population property estimates (stellar mass, age, dust extinction, star formation rate) in nearby z galaxies, and extending this research to distant galaxies.
- Lead study on properties of standard source detected clumps through Baysian SED-fitting.
- Collaborate with both Machine learning and simulated clump research groups.

Internships

2017 **Summer Science Research Program**, *Ohio Wesleyan University, Department of Physics and Astronomy*, Delaware, OH, May 23 to July 28

- Utilized a 14" Celestron telescope to obtain and reduce photometric data from a fast rotating star (LO-Pegasi) to model and analyze its differential rotation through starspot light curves.
- Created simulated models of starspot surface features for current observations extending the known evolution image.
- Work determined estimates of the coefficient of differential rotation for three assumed inclination angles (30◦, 45◦, and 60◦).

Proposals

2024 **An Extragalactic Hunt for High Redshift Spirals)**, *JWST Cycle 4 GO Proposal*, Co-I, **Pending**

- Co-Lead investigator that will construct a catalog of high-z spiral detected by JWST out to z $\sim$ 4.

2024 **Investigating the Structure of Spiral Galaxies at high redshift (z$\sim>$ 3)**, *JWST Cycle 4 AR Proposal*, Co-I, **Pending**

- Co-Lead investigator that will construct a catalog of high-z spiral. Project will aim to detect bulge and clump structures, measure pitch angles and environment densities and apply corresponding relations to the formation theory of spiral arms.

2024 **Securing Spectroscopic Redshifts in a Galaxy-Galaxy Lensing System in CEERS**, *JWST Cycle 4 GO Proposal*, CO-I, **Pending**

- Contributed to the writing of the Scientific Justification and Technical Justification.
- Constructed SED-Fitting plots.

2023 **Analyzing Giant Clumps in JWST Images of Star-Forming Galaxies to Constrain Feedback**, *JWST Cycle 2 AR Proposal*, CO-I, **Accepted**

- Co-I that will lead the study investigating giant star-forming region's physical properties through observational data.
- Direct collaboration with machine-learning and simulation Co-I groups.

Honors and Awards

2022 **240th American Astronomical Society Chambliss Award**, *Honorable Mention*, Pasadena, CA

2019 **Sigma Pi Sigma Honor Society**, *Inductee*, Delaware, OH

Conferences, Meetings & Talks

University of Missouri - Astronomy Seminar (*2020 - 2024*): Bi-annual semester talks given on star-formation, galaxy-galaxy lensing, SED fitting, Galaxy simulation and other extragalactic research topics at home institute.

2025 **245th American Astronomical Society Conference** Poster presentation: *Unveiling Galactic Building Blocks: The Role of UV-Bright Star-Forming Clumps in Galaxy Formation*, National Harbour, MD, January 13.

2024 **Mid-American Regional Astrophysics Conference (MARAC)** Talk: *Detecting and Analyzing UV and IR Bright Star-forming Clumps at 0.5 < z < 5* , University of Kansas, Lawrence, KS, December 8.

STScI Spring Symposium: Recipes to Regulate Star Formation at All Scales Talk: *Clump Physical Properties: Constraining power of JWST-IR filters for Low & High z Galaxies*, Baltimore, MD, April 16.

243st American Astronomical Society Conference Poster presentation: *Properties of Giant Star-forming Clumps and Their Host Galaxies Observed by HST and JWST in UVCANDELS*, New Orleans, LA, January 10.

2023 **241st American Astronomical Society Conference** Invited special session talk: *Demographics of Giant UV Star-forming Clumps in Galaxies at $0.5 \leq z \leq 1$ in UVCANDELS* , Seattle, WA, January 10.

Mid-American Regional Astrophysics Conference (MARAC) Talk: *Properties of Giant Star-forming Clumps and Their Host Galaxies Observed by HST and JWST in UVCANDELS*, Benedictine College, Atchison, KS, November 3.

2022 **DAWN Winter School in Astrophysics** Virtual training with programs involving data reduction and spectral energy distribution (SED) fitting. Copenhagen, DEN, February 7-11.

240th American Astronomical Society Conference Special session talk: *Demographics of Giant UV Star-forming Clumps in Galaxies at $0.5 \leq z \leq 1$ in UVCANDELS* , Pasadena, CA, June 14.

Mid-American Regional Astrophysics Conference (MARAC) Talk: *Demographics of Giant UV Star-forming Clumps in Galaxies at $0.5 \leq z \leq 1$ in UVCANDELS*, University of Arkansas, Fayetteville, AR, October 8.

2018 **231st American Astronomical Society Conference**. Poster presentation: *Starspot Modeling On Rapid, Differentially Rotating Stars*, Washington, DC, January 11.

2017 **Summer Science Research Program Symposium** Poster presentation: *Starspot Modeling On Rapid, Differentially Rotating Stars*, Ohio Wesleyan University, Delaware, OH, September 18.

Outreach

2019

Laws Observatory Staff Observer, *University of Missouri - Columbia*, Columbia, MO

- Co-Lead graduate student for public viewing events utilizing a 16" Cassegrain Celestron telescope. Responsibilities include operating telescope and establishing other special events outside of weekly outreach including private tours for girl/boy scouts, college classes and K-12 student groups.

2024

Solar Eclipse Viewing Demonstration, Alton, MO

- Provided public viewing of our solar telescope viewing of the April 8th solar eclipse.

2023

Columbia Young Scientists (CYS) Expo, *University of Missouri - Columbia*, Columbia, MO

- Science Exposition for local K-8 science students.

2022
2020

Rock Bridge High School Physics Demonstration, *Rock Bridge High School*, Columbia, MO

- Annual physics demonstration for K-8 children in the local community.

2018
2017

Rutherford B. Hayes High School Physics Demonstration, *Rutherford B. Hayes High School*, Delaware, OH

- Annual physics demonstration for K-8 children in the local community.

2017

Partial Solar Eclipse Viewing Demonstration, *Ohio Wesleyan University*, Deleware, OH

- University tabling event showcasing pinhole box viewings of the partial solar eclipse.

Leadership & Mentoring

2020

Astronomy Department Journal Club Co-Creator, *University of Missouri - Columbia*, Columbia, MO

- Run weekly journal club meetings for graduate students to discuss newly published academic papers in astronomy.

2020 – 2021 **Mizzou Physics and Astronomy Graduate Student Association (PAGSA)**, *Vice President*, University of Missouri - Columbia, Columbia, MO
- Internal affairs and monthly meetings helping graduate students practice presentation skills.

2020 – 2024 **Student Mentor**, *University of Missouri - Columbia*, Columbia, MO
- Served as a PHYS-ASSIST mentor for younger graduate students in physics program.
- Served as mentor for undergraduate students in program.

2017 – 2019 **Student Mentor**, *Ohio Wesleyan University*, Delaware, OH
- Served as a mentor for younger undergraduate students in physics program.

Publications

First Author

[3] **Martin, A.**, Guo, Y., Dekel, A., et al. 2024, Physical Properties of UV and IR – Bright Clumps at $0.5 < z < 5$. **Manuscript in preparation**.

[2] **Martin, A.**, Guo, Y., Dekel, A., et al. 2024, Exploring the Detection Capabilities of High Redshift UV and IR Bright Clumps with HST and JWST. **Manuscript in preparation**.

[1] **Martin, A.**, Guo, Y., Wang, X., et al. 2023, UV-bright Star-forming Clumps and Their Host Galaxies in UVCANDELS at $0.5 \leq z \leq 1$, ApJ, 955, 106, doi: 10.3847/1538-4357/aced3e

Co-authorship

[7] Soto, Emmaris, de Mello, Duilia F., **Martin, Alec**, et al. 2024, Investigating the connection of AGNs and star-formation through Clumpy spirals at $0.5 < z < 1$. **Manuscript in preparation**

[6] Mehta, V., Rafelski, M., Sunnquist, B., et al. (including **Martin, A.**) 2024, UVCANDELS: Catalogs of photometric redshifts and galaxy physical properties, Submitted to ApJS, doi: arXiv:2410.16404

[5] Kuhn, V., Guo, Y., **Martin, A.**, et al. 2024, JWST Reveals a Surprisingly High Fraction of Galaxies Being Spiral-like at $0.5 \leq z \leq 4$, ApJL, 968, L15, doi: 10.3847/2041-8213/ad43eb

[4] Sun, L., Wang, X., Teplitz, H., et al. (including **Martin, A.**) 2023, The UV luminosity function at $0.6 < z < 1$ from UVCANDELS, ApJ, 972, 8, doi: 10.3847/1538-4357/ad5540

[3] Wang, X., Teplitz H., Smith, B., et al. (including **Martin, A.**) 2023, The Lyman Continuum Escape Fraction of Star-forming Galaxies at $2.4 \leq z \leq 3.7$ from UVCANDELS, Submitted to ApJ, doi: arXiv.2308.09064

[2] Sattari, Z., Mobasher, B., Chartab, N., et al. (including **Martin, A.**) 2023, Fraction of Clumpy Star-Forming Galaxies at $0.5 \leq z \leq 3$ in UVCANDELS: Dependence on Stellar Mass and Environment, ApJ, 951, 147, doi: 10.3847/1538-4357/acd5d61285

[1] Pharo, J., Guo, Y., Barro, G., et al. (including **Martin, A.**) 2022, The Dwarf Galaxy Population at $z \sim 0.7$: A Catalog of Emission Lines and Redshifts from Deep Keck Observations, ApJS 261 12, doi: 10.3847/1538-4365/ac6cdf

Proficient Skills

Programming & Scripting languages

Python (SciPy, Pandas, Numpy, Photutils, Astropy), UNIX Shell scripting, Mathematica, LaTeX

Astronomical Data Analysis

BAGPIPES, CIGALE, EAZY, TOPCAT, Ds9, AstroImageJ, Stellarium