

Carnegie Institution of Washington
The Observatories
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James W. Johnson
Curriculum Vitae
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ACADEMIC POSITIONS

Carnegie Institution of Washington – The Observatories Pasadena, California
2023 – Present **Postdoctoral Fellow**, Carnegie Theoretical Astrophysics Center (CTAC)
Supervisor: Dr. Ana Bonaca

EDUCATION

The Ohio State University Columbus, Ohio
July 2023 **Ph.D. in Astrophysics**, Dissertation Advisor: David H. Weinberg
From Dwarfs to Spirals: Chemical Evolution of Galaxies across Stellar Mass and the Implications for Nucleosynthesis
November 2019 **M.S. in Astrophysics**
Vanderbilt University Nashville, Tennessee
May 2017 **B.A.**, Physics (major), Astronomy (minor), *cum laude*
Highest Honors in Astronomy, Thesis Advisor: Andreas A. Berlind

RESEARCH

33	13	20	770+	18
Journal Publications	1st & 2nd Author	Contributing Author	Citations	H-Index

Interests

Galactic chemical evolution – The Milky Way – Dwarf galaxies – The astrophysical origin of the elements – Big bang nucleosynthesis – Near field cosmology – Astronomical software

NASA ADS Libraries (A full list of my journal publications is included.)

All My Papers <https://ui.adsabs.harvard.edu/public-libraries/rIqfpNKmSdaOMIAhkk2VzQ>
1st & 2nd Author <https://ui.adsabs.harvard.edu/public-libraries/go1WSseGTMeft2SxdESAgw>
Co-Author https://ui.adsabs.harvard.edu/public-libraries/sZkjSf_XRSKSRykqBe6B-w

Seminars & Conference Presentations

Contributed Talk	Sloan Digital Sky Survey Collaboration Meeting	2025
Invited Seminar	University of California, Davis (Davis, CA)	2025
Invited Seminar	Stockholms Universitet , Dept. of Astronomy (Stockholm, Sweden)	2025
Invited Seminar	Uppsala Universitet , Dept. of Physics & Astronomy (Uppsala, Sweden)	2025
Poster	Small Galaxies, Cosmic Questions - II	2024
	University of Durham (Durham, United Kingdom)	

Contributed Talk	DHWFEST: Dark, Hot, Warm, and Fuzzy matter in Space and Time	2024
	University of Utah (Salt Lake City, UT)	
Contributed Talk	Sloan Digital Sky Survey Collaboration Meeting	2024
Invited Seminar	Lund University , Dept. of Physics (Lund, Sweden)	2024
Contributed Talk	ADONIS: Abundance Gradients in the Local Universe	2024
	Munich Institute for Astro-, Particle, and BioPhysics (MIAPbP) (Munich, Germany)	
Contributed Talk	Surveying the Milky Way: The Universe in Our Own Backyard	2023
	California Institute of Technology (Pasadena, CA)	
Dissertation Talk	241st American Astronomical Society Meeting	2023
Contributed Talk	Sloan Digital Sky Survey Collaboration Meeting	2021
Contributed Talk	Galactic Archaeology with Hermes Science Meeting	2021
Contributed Talk	Sloan Digital Sky Survey Collaboration Meeting	2020
Poster	236th American Astronomical Society Meeting	2020
Invited Seminar	University of California, Santa Cruz (Santa Cruz, CA)	2019

Astrophysical Software Development



Versatile Integrator for Chemical Evolution (VICE)

Lead developer and license owner (Spring 2018 – Present)

Documentation: <https://vice-astro.readthedocs.io>

Source Code: <https://github.com/giganano/VICE.git>

Install: <https://pypi.org/project/vice>

Observing Programs

PI: *The First Extragalactic Measure of the Helium Isotopic Ratio – A New Test of Fundamental Physics*

2024B WINERED spectrograph, 18 hours (Clay 6.5-m Telescope, Las Campanas Observatory)

2025A MIKE spectrograph, 6 hours (Clay 6.5-m Telescope, Las Campanas Observatory)

HONORS & AWARDS

2023	CTAC Postdoctoral Fellowship , Carnegie Science
2022	Ann S. Tuttle Paper Prize , Ohio State, Dept. of Astronomy
	Annual award to the top graduate student-led publication of the previous year
	Paper: Johnson J.W., et al., 2021, MNRAS, 508, 4484 (arxiv:2103.09838)
2022 – 2023	Presidential Fellowship , Ohio State, College of Arts & Sciences
	Financial support for final-year graduate students
2017 – 2018	University Fellowship , Ohio State, College of Arts & Sciences
	Financial support for first-year graduate students
2017	Larry Ross Cathey Award , Vanderbilt, Dept. of Physics & Astronomy
	Outstanding graduating senior studying astronomy
Inducted 2015	Sigma Pi Sigma Physics National Honor Society , Vanderbilt Chapter
7 of 8 semesters	Dean's List , Vanderbilt, College of Arts & Sciences

MENTORSHIP

Cal-Bridge Summer Research Program

2025 – Present	Christopher Giudice (undergraduate), San Francisco State University
	Project: The Chemical Equilibration Timescale of the Milky Way Disk
2024 – 2025	Damien Tessmer (undergraduate), San Diego State University
	Project: Identifying trends in stellar nucleosynthesis with SDSS-V data

The Ohio State University

- 2021 – Present **Liam O. Dubay** (graduate), Dept. of Astronomy
 Projects: Galactic chemical evolution in the Milky Way
 (arxiv:2404.08509, 2508.00988)
- 2022 – Present **Daniel A. Boyea** (undergraduate), Dept. of Astronomy
 Project: Investigating the astrophysical origin of carbon
 Now: M.Sc. student at University of Victoria (Victoria, BC, Canada)
- 2021 – 2023 **Miquela K. Weller** (graduate), Dept. of Astronomy
 Projects: Investigating the astrophysical origin of helium (arxiv:2404.08765)
- 2022 – 2023 **Lindsey Stultz** (undergraduate), Dept. of Physics
 Polaris Near-Peer Mentorship Program

COMMUNITY INVOLVEMENT

Carnegie Science Observatories

- 2024 – Present **Research Mentor**, Cal-Bridge Summer Research Program (2 students)
- 2024 **Advancing Inclusive Mentoring**
 12+ hours of instruction and discussion on equitable mentorship practices

Polaris Near-Peer Mentorship Program

Graduate student-leg organization at Ohio State dedicated to fostering a more inclusive environment and improving retention of underrepresented minority groups in the Dept. of Physics and the Dept. of Astronomy. Website: <https://u.osu.edu/polaris>.

- 2022 – 2023 **Leadership Committee** (budget: ~\$60,000/year)
- 2022 **Academic Facilitator**, Undergraduate Residential Summer Access Program
 Early-arrival program for first-year undergraduate students
- 2022 – 2023 **Near-Peer Mentor** (1 student)

TEACHING

Python Coding Workshops

- Program Creator**, six sessions, ~25 hours of instruction and exercises
 Website: <https://jamesjohnson.space/bootcamp>
 Source material: <https://github.com/giganano/PythonBootcamp>
- 2020 – 2023 **Full program (annually)**: Summer undergraduate research students
 The Ohio State University, Dept. of Astronomy
- 2022 **Full program**: 1st- & 2nd-year graduate students
 The Ohio State University, Dept. of Astronomy
- 2024 **Select sessions**: CASSI & Cal-Bridge undergraduate research students
 Carnegie Science Observatories

The Ohio State University, Department of Astronomy: Graduate Teaching Assistant

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|-------------|---|------------|
| 2018 – 2020 | Astronomy 1101: From Planets to Cosmos | 5 sections |
| 2019 | Astronomy 1142: Black Holes | 1 section |
| 2019 | Astronomy 1221: Astronomy Data Analysis | 1 section |
| 2018 | Astronomy 1140: Planets and the Solar System | 1 section |

MISCELLANEOUS

- 2022 – Present **Manuscript Referee:** ApJ, MNRAS, PASJ, A&A
- 2024 – Present **Working Group Co-Chair**, Galactic Genesis, Sloan Digital Sky Survey-V
- 2024 – Present **“Morning Tea” co-organizer** (daily arXiv discussion), Carnegie Science
- 2024 – 2025 **External Panelist**, Hubble Space Telescope Proposal Review, Cycles 32 & 33
- 2021 – 2023 **“Galaxy Hour” meeting organizer**, Ohio State, Dept. of Astronomy
- 2017 – 2023 **Diversity Journal Club**, Ohio State, Dept. of Astronomy
- June 2020 **Real Scientists Germany Online Outreach**
 Blog: <https://tinyurl.com/jamesjohnsonrealscientistsDE>
 Twitter: https://twitter.com/realsci_DE
- 2015 – 2017 **Undergraduate Tutor, Proctor, Grader**
 Vanderbilt University, Dept. of Physics & Astronomy
- 2015 **Cosmic Ray Observatory Project**, Instrumentation lab
 University of Nebraska-Lincoln, Dept. of Physics

JOURNAL PUBLICATIONS

First & Second Author (reverse chronological order)

1. *The galactic chemical evolution of carbon: Implications for stellar nucleosynthesis*
 Boyea D.A., **Johnson J.W.**, Weinberg D.H.
 2025, submitted to MNRAS, under peer review arxiv:2511.20752
2. *Metals versus Non-Metals: Chemical Evolution of Hydrogen and Helium Isotopes in the Milky Way*
Johnson J.W., Weller M.K., Cooke R.J.
 2025, submitted to AAS Journals, under peer review arxiv:2510.08689
3. *That’s so Retro: The Gaia-Sausage-Enceladus Merger Trajectory as the Origin of the Chemical Abundance Bimodality in the Milky Way Disk*
Johnson J.W., Feuillet D.K., Bonaca A., de Brito Silva D.
 2025, submitted to AAS Journals, under peer review arxiv:2510.08688
4. *Constraints on Radial Gas Flows in the Milky Way Disk Revealed by Large Stellar Age Catalogs*
Johnson J.W.
 2025, submitted to AAS Journals, under peer review arxiv:2510.05223
5. *A Galactic Perspective on the (Unremarkable) Relative Refractory Depletion Observed in the Sun*
 Rampalli R., **Johnson J.W.**, Ness M.K., Edwards G.H., Newton E.R., Griffith E.J., Bedell M., Wang K.
 2025, submitted to AAS Journals, under peer review arxiv:2509.03577
6. *Rising from the Ashes II: The Bar-driven Abundance Bimodality in the Milky Way*
 Beane A., **Johnson J.W.**, Semenov V., Hernquist L., Chandra V., Conroy C.
 2024, ApJ, 985, 221 – 233 arxiv:2410.21580
7. *The Milky Way Radial Metallicity Gradient as an Equilibrium Phenomenon: Why Old Stars are Metal-Rich*

- Johnson J.W.**, et al.
2024, ApJ, 988, 8 – 35 arxiv:2410.13256
8. *Dwarf galaxy archaeology from chemical abundances and star formation histories*
Johnson J.W., et al.
2023, MNRAS, 526, 5084 – 5109 arxiv:2210.01816
9. *Binaries drive high Type Ia supernova rates in dwarf galaxies*
Johnson J.W., Kochanek C.S., Stanek K.Z.
2023, MNRAS, 526, 5911 – 5918 arxiv:2210.01818
10. *Empirical constraints on the nucleosynthesis of nitrogen*
Johnson J.W., Weinberg D.H., Vincenzo F., Bird J.C., Griffith E.J.
2023, MNRAS, 520, 782 – 803 arxiv:2202.04666
11. *Stellar migration and chemical enrichment in the Milky Way disc: a hybrid model*
Johnson J.W., et al.
2021, MNRAS, 508, 4484 – 4511 arxiv:2103.09838
12. *The impact of starbursts on element abundance ratios*
Johnson J.W., Weinberg D.H.
2020, MNRAS, 498, 1364 – 1381 arxiv:1911.02598
13. *The secondary spin bias of dark matter haloes*
Johnson J.W., Maller A.H., Berlind A.A., Sinha M., Holley-Bockelmann J.K.
2019, MNRAS, 486, 1156 – 1166 arxiv:1812.02206

Contributing Author (reverse chronological order)

1. *[C/N] Ages for Red Giants and their Implications for Galactic Archaeology*
Roberts J.D., Pinsonneault M.H., Johnson J.A. Dubay L.O., **Johnson J.W.**
2025, submitted to AAS Journals, under peer review arxiv:2509.25321
2. *Challenges to the Two-Infall Scenario by Large Stellar Age Catalogs*
Dubay L.O., Johnson J.A., **Johnson J.W.**, Roberts J.D.
2025, submitted to AAS Journals, under peer review arxiv:2508.00988
3. *The Open Cluster Chemical Abundances and Mapping Survey: VIII. Galactic Chemical Gradient and Azimuthal Analysis from SDSS/MWM DR19*
Otto J.M., et al., incl. **Johnson J.W.**
2025, submitted to AAS Journals, under peer review arxiv:2507.07264
4. *The Nineteenth Data Release of the Sloan Digital Sky Survey*
SDSS Collaboration, et al., incl. **Johnson J.W.**
2025, submitted to AAS Journals, under peer review arxiv:2507.07093
5. *Sloan Digital Sky Survey-V: Pioneering Panoptic Spectroscopy*
Kollmeier J.A., et al., incl. **Johnson J.W.**
2025, submitted to AJ, under peer review arxiv:2507.06989
6. *Many Elements Matter: Detailed Abundance Patterns Reveal Star-formation and Enrichment Differences among Milky Way Structural Components*

- Griffith E.J., Hogg D.W., Hasselquist S., **Johnson J.W.**, Price-Whelan A., Sit T., Stone-Martinez A., Weinberg D.H.
2024, ApJ, 169, 280 – 297 arxiv:2410.22121
7. *Modeling the Galactic Chemical Evolution of Helium*
Weller M.K., Weinberg D.H., **Johnson J.W.**
2024, MNRAS, 583, 1517 – 1534 arxiv:2404.08765
 8. *Galactic Chemical Evolution Models Favor an Extended Type Ia Supernova Delay-Time Distribution*
Dubay L.O., Johnson J.A., **Johnson J.W.**
2024, ApJ, 973, 55 – 80 arxiv:2404.08059
 9. *The APO-K2 Catalog. II. Accurate Stellar Ages for Red Giant Branch Stars Across the Milky Way*
Warfield J.T., et al., incl. **Johnson J.W.**
2024, AJ, 167, 208 – 231 arxiv:2403.03249
 10. *Nature vs. Nurture: Distinguishing effects from stellar processing and chemical evolution on carbon and nitrogen in red giant stars*
Roberts J.D., et al., incl. **Johnson J.W.**
2024, MNRAS, 530, 149 – 166 arxiv:2403.03249
 11. *The Scale of Stellar Yields: Implications of the Measured Mean Iron Yield of Core Collapse Supernovae*
Weinberg D.H., Griffith E.J., **Johnson J.W.**, Thompson T.A.
2023, ApJ, 973, 122 – 136 arxiv:2309.05719
 12. *Untangling the Sources of Abundance Dispersion in Low-Metallicity Stars*
Griffith E.J., Johnson J.A., Weinberg D.H., Ilyin I., **Johnson J.W.**, Rodriguez-Martinez R., Strassmeier K.G.
2022, ApJ, 944, 47 – 67 arxiv:2210.01821
 13. *Birth of the Galactic Disk Revealed by the H3 Survey*
Conroy C., et al., incl. **Johnson J.W.**
2022, submitted to AAS Journals, under peer review arxiv:2204.02989
 14. *Primordial Helium-3 Redux: The Helium Isotope Ratio of the Orion Nebula*
Cooke R.J., Noterdaeme P., **Johnson J.W.**, Pettini M., Welsh L., Peroux C., Murphy M.T., Weinberg D.H.
2022, ApJ, 932, 60 – 76 arxiv:2203.11256
 15. *Residual Abundances in GALAH DR3: Implications for Nucleosynthesis and Identification of Unique Stellar Populations*
Griffith E.J., Weinberg D.H., Buder S., Johnson J.A., **Johnson J.W.**, Vincenzo F.
2021, ApJ, 931, 23 – 50 arxiv: 2110.06240
 16. *Chemical Cartography with APOGEE: Mapping Disk Populations with a Two-Process Model and Residual Abundances*
Weinberg D.H., et al., incl. **Johnson J.W.**
2021, ApJS, 260, 32 – 77 arxiv:2108.08860

17. *CNO dredge-up in a sample of APOGEE/Kepler red giants: Tests of stellar models and galactic evolutionary trends of N/O and C/N*
 Vincenzo F., et al., incl. **Johnson J.W.**
 2021, submitted to MNRAS, under peer review arxiv:2106.03912
18. *The Impact of Black Hole Formation on Population-averaged Supernova Yields*
 Griffith E.J., Sukhbold T., Weinberg D.H., Johnson J.A., **Johnson J.W.**, Vincenzo F.
 2021, ApJ, 921, 73 – 94 arxiv:2103.09837
19. *Nucleosynthesis signatures of neutrino-driven winds from proto-neutron stars: a perspective from chemical evolution models*
 Vincenzo F., Thompson T.A., Weinberg D.H., Griffith E.J., **Johnson J.W.**, Johnson J.A.
 2021, MNRAS, 508, 3499 – 3507 arxiv:2102.04920
20. *The Similarity of Abundance Ratio Trends and Nucleosynthetic Patterns in the Milky Way Disk and Bulge*
 Griffith E.J., et al., incl. **Johnson J.W.**
 2021, ApJ, 909, 77 – 101 arxiv:2009.05063