M. Riley Owens

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Education

University of Cincinnati August 2018 – April 2022
Bachelor of Science in Astrophysics, Physics *GPA: 3.73*

Research Experience

Postbaccalaureate researcher May 2022 – December 2022
West Virginia University, advised by Prof. Loren Anderson

- Continued previous work with the addition of new low-frequency data

Undergraduate researcher May 2021 – August 2021
West Virginia University, advised by Prof. Loren Anderson

- Investigated kinematics of the massive star forming complex Cygnus X to characterize stellar feedback on small scales

Undergraduate / postbaccalaureate researcher October 2019 – Present
University of Cincinnati, advised by Prof. Matthew Bayliss

- Studying the strongly lensed, LyC-leaking Sunburst Arc with rest-UV spectroscopy to understand mechanisms of LyC escape
- Searching for new, lensed, LyC-leaking galaxies

Publications

12. **Owens, M. R.**, Malhas, C. M., Smith, P., Burns, J. G., Chisholm, J., Rigby, J. R., Bayliss, M. B. (in prep.). "Dissecting the subgalactic outflow structure of the Sunburst Arc". https://www.overleaf.com/read/rzqypfpzpcsv0c2cac

11. Hsiao, T. Y.-Y., Coe, D., Bradley, L. D., Windhorst, R. A., Jiménez-Teja, Y., Resseguier, T., Brammer, G., Abdurro'uf, Dayal, P., Kokorev, V., Ricotti, M., Xu, X., Killi, M., **Owens, M. R.**, Adamo, A., Bhatawdekar, R. (in prep.). "High Redshift Galaxies at $8 < z < 13$ of SPT0615 with JWST".

10. Emig, K. L., Salas, P., Anderson, L., Roshi, D. A., Bonne, L., Bolatto, A. D., Grenier, I., Levy, R. C., Linville, D. J., Luisi, M., **Owens, M. R.**, Poojapriyatharsheni, J., Schneider, N., Tibaldo, L., Tielens, A. G. G. M., Walch, S., White, G. J. (subm.). "Cold dark gas in Cygnus X: The first large-scale mapping of low-frequency carbon recombination lines".

9. **Owens, M. R.**, Kim, K. J., Bayliss, M. B., Rivera-Thorsen, T. E., Sharon, K., Rigby, J. R., Navarre, A., Florian, M., Gladders, M. D., Burns, J. G., Khullar, G., Chisholm, J., Mahler, G., Dahle, H., Malhas, C. M., Welch, B., Hutchison, T. A., Gassis, R., Choe, S., Adhikari, P. (2024). "Connecting Lyα and Ionizing Photon Escape in the Sunburst Arc". *The Astrophysical Journal*.

8. Cloonan, A. P., Khullar, G., Napier, K. A., Gladders, M. D., Dahle, H., Rosener, R., Sullivan Jr., J., Bayliss, M. B., Chicoine, N., Escapa, I., Garza, D., Garza, J., Glusman, R., Gozman, K., Horwath, G., Kisare, A., Levine, B. C., Liang, O., Malagon, N., Martinez, M. N., Masegian, A., Mork, S. D., Niu, K., **Owens, M. R.**, Pan, Y., Rigby, J. R., Sharon, K., Sierra, I., Stark, A. A., Sukay, E., Tamargo-Arizmendi, M., Tavangar, K., Teixeira, R., Tsiane, K., Wagner, G., Zaborowski, E. A., Zhang, Y., Zhao, Y. (2024). "COOL-LAMPS VIII: Characterization of known wide-separation lensed quasars and their host galaxies reveals evidence for a smaller $M_{\rm BH}/M_\star$ than field quasars at $z \sim 2$". arXiv:2408.03379.

7. Choe, S., Rivera-Thorsen, T. E., Dahle, H., Sharon, K., **Owens, M. R.**, Rigby, J. R., Bayliss, M. B., Hayes, M. J., Hutchison, T., Welch, B., Chisholm, J., Gladders, M. D., Khullar, G., Kim, K. (2024). "The Sunburst Arc with JWST: II. Observations of an Eta Carinae Analog at $z = 2.37$". arXiv:2405.06953.

6. Welch, B., Rivera-Thorsen, T. E., Rigby, J., Hutchison, T., Olivier, G. M., Berg, D. A., Sharon, K., Dahle, H., **Owens, M. R.**, Bayliss, M. B., Khullar, G., Chisholm, J., Hayes, M., Kim, K. J. (2024). "The Sunburst Arc with JWST: III. An abundance of Direct Chemical Abundances". arXiv:2405.06631.

5. Rivera-Thorsen, T. E., Chisholm, J., Welch, B., Rigby, J. R., Hutchison, T., Florian, M., Sharon, K., Choe, S., Dahle, H., Bayliss, M. B., Khullar, G., Gladders, M., Hayes, M., Adamo, A., **Owens, M. R.**, Kim, K. (2024). "The Sunburst Arc with JWST: I. Detection of Wolf-Rayet stars injecting nitrogen into a low-metallicity, $z = 2.37$ proto-globular cluster leaking ionizing photons". *Astronomy & Astrophysics*.

4. Klein, M., Sharon, K., Napier, K., Gladders, M. D., Khullar, G., Bayliss, M., Dahle, H., **Owens, M. R.**, Stark, A., Brownsberger, S., Kim, K. J., Kuchta, N., Mahler, G., Smith, G., Walker, R., Gozman, K., Martinez, M. N., Matthews Acuña, O. S., Merz, K., Sanchez, J. A., Kavin Stein, D. J., Sukay, E. O., Tavangar, K. (2024). "COOL-LAMPS. VI. Lens Model and New Constraints on the Properties of COOL J1241+2219, a Bright $z = 5$ Lyman Break Galaxy and its $z = 1$ Cluster Lens". *The Astrophysical Journal*.

3. Navarre, A., Khullar, G., Bayliss, M. B., Dahle, H., Florian, M., Gladders, M., Kim, K. J., **Owens, M. R.**, Rigby, J., Sharon, K., Shibuya, T., Walker, R. (2024). "Resolving Clumpy versus Extended Lyα in Strongly Lensed, High-redshift Lyα Emitters". *The Astrophysical Journal*.

2. Kim, K. J., Bayliss, M. B., Rigby, J. R., Gladders, M. D., Chisholm, J., Sharon, K., Dahle, H., Rivera-Thorsen, T. E., Florian, M. K., Khullar, G., Mahler, G., Mainali, R., Napier, K. A., Navarre, A., **Owens, M. R.**, Roberson, J. (2023). "Small Region, Big Impact: Highly Anisotropic Lyman-continuum Escape from a Compact Starburst Region with Extreme Physical Properties". *The Astrophysical Journal Letters*.

1. Mainali, R., Rigby, J. R., Chisholm, J., Bayliss, M., Bordoloi, R., Gladders, M. D., Rivera-Thorsen, T. E., Dahle, H., Sharon, K., Florian, M., Sharma, S., **Owens, M. R.**, Kjellgren, K., Kim, K. J., Wayne, J. (2022). "The Connection between Galactic Outflows and the Escape of Ionizing Photons". *The Astrophysical Journal*.

White Papers

1. Kim, K. J., Bayliss, M. B., Dahle, H., Hutchison, T., Sharon, K., Mahler, G., **Owens, M. R.**, Rhoads, J. E. (2023). "Strongly lensed [O III] emitters at Cosmic Noon with Roman: Characterizing extreme emission line galaxies on star cluster complex scales (100 pc)". arXiv:2307.01247.

Meeting Proceedings

22. **Owens, M. R.**, Kim, K. J., Bayliss, M. B., Rivera-Thorsen, T. E., Sharon, K., Rigby, J. R., Navarre, A., Florian, M., Gladders, M. D., Burns, J. G., Khullar, G., Chisholm, J., Mahler, G., Dahle, H., Malhas, C. M., Welch, B., Hutchison, T. A., Gassis, R., Choe, S., Adhikari, P., Smith, P. A., Tiju, J. M. (15 January 2025). *The strongly lensed Sunburst Arc galaxy reveals direct Lyman-α escape hundreds of parsecs away from ionizing photon escape* [Oral presentation]. American Astronomical Society meeting #245, National Harbor, MD, USA.

21. Adhikari, P., Bayliss, M., Gladders, M., Sharon, K., Gassis, R., Dahle, H., Ebey, A., **Owens, R.** (11 January 2024). *Probing Galaxy Cluster Dynamics: Virial Mass Constraints and Velocity Phase-Space Substructure Analysis* [Poster presentation]. American Astronomical Society meeting #243, New Orleans, LA, USA.

20. **Owens, R.**, Kim, K., Bayliss, M., Rivera-Thorsen, E., Sharon, K., Rigby, J., Navarre, A., Florian, M., Gladders, M., Burns, J., Khullar, G., Chisholm, J., Mahler, G., Dahle, H., Malhas, C., Welch, B., Hutchison, T., Gassis, R., Choe, S., Adhikari, P. (8 January 2024). *Connecting Lyman-α and ionizing photon escape at cosmic noon with a strongly lensed galaxy arc* [Oral presentation]. American Astronomical Society meeting #243, New Orleans, LA, USA.

19. Gassis, R., Bayliss, M. B., Sharon, K., Mahler, G., Gladders, M. D., Dahle, H., Florian, M. K., Rigby, J. R., McDonald, M., Elicker, L., **Owens, M. R.** (27 June 2023). *Understanding shape and centroid deviations in 39 strong lensing galaxy clusters in various dynamical states* [Oral presentation]. Observing the Universe at millimetre wavelengths, Grenoble, France.

18. **Owens, M. R.**, Kim, K. J., Bayliss, M.B., Rivera-Thorsen, T. E., Sharon, K., Rigby, J. R., Navarre, A., Florian, M., Gladders, M. D., Burns, J. G., Dahle, H., Chisholm, J., Mahler, G. (19 April 2023). *Connecting Lyα and LyC escape with a gravitationally lensed, super star cluster at cosmic noon* [Oral presentation]. Escape of Lyman radiation from galactic labyrinths, Kolymbari, Greece.

17. Kim, K. J., Bayliss, M. B., Rigby, J. R., Gladders, M. D., Chisholm, J., Sharon, K., Dahle, H., Rivera-Thorsen, T. E., Florian, M. K., Khullar, G., Mahler, G., Mainali, R., Napier, K. A., Navarre, A., **Owens, M. R.**, Roberson, J. (19 April 2023). *How ionizing radiation escapes from compact star-forming regions in the Sunburst galaxy* [Oral presentation]. Escape of Lyman radiation from galactic labyrinths, Kolymbari, Greece.

16. **Owens, M. R.**, Kim, K. J., Bayliss, M.B., Rivera-Thorsen, T. E., Sharon, K., Rigby, J. R., Navarre, A., Florian, M., Gladders, M. D., Burns, J. G., Dahle, H., Chisholm, J., Mahler, G. (14 April 2023). *Connecting Lyα and LyC escape with a gravitationally lensed, super star cluster at cosmic noon* [Oral presentation]. Kentucky Area Astronomical Society Meeting 2023, Lexington, KY, USA.

15. **Owens, R.**, Bayliss, M., Chisholm, J., Kim, K., Rigby, J., Khullar, G., Dahle, H., Sharon, K., Navarre, A., Hutchison, T. (8-12 January 2023). *Outflows and Lyman continuum escape in a highly magnified arc* [Poster presentation]. American Astronomical Society meeting #241, Seattle, WA, USA.

14. **Owens, R.**, Kim, K., Bayliss, M., Rivera-Thorsen, T. E., Dahle, H., Navarre, A., Gladders, M. D., Mahler, G., Bordoloi, R., Sharma, S., Florian, M., Sharon, K., Khullar, G. (2-11 August 2022). *Spatially variable Lyα line profiles and environments in a strong LyC leaking galaxy* [Poster presentation]. IAU General Assembly 2022, Busan, Republic of Korea.

12. **Owens, R.**, Kim, K., Bayliss, M., Rivera-Thorsen, T. E., Dahle, H., Navarre, A., Gladders, M. D., Mahler, G., Bordoloi, R., Sharma, S., Florian, M., Sharon, K., Khullar, G. (11-15 July 2022). *Spatially variable Lyα line profiles and environments in a strong LyC leaking galaxy* [Poster presentation]. National Astronomy Meeting 2022, Coventry, UK.

11. Kim, K., Bayliss, M., Chisholm, J., Dahle, H., Florian, M., Gladders, M., Khullar, G., Mahler, G., Mainali, R., Navarre, A., **Owens, R.**, Rigby, J., Rivera-Thorsen, E., Sharon, K. (15 June 2022). *How LyC photons escape from compact star-forming regions in the Sunburst galaxy* [Oral presentation]. American Astronomical Society meeting #240, Pasadena, CA, USA.

10. **Owens, R.**, Anderson, L. (12-16 June 2022). *Distribution and dynamics of ionized gas in the Cygnus X massive star-forming complex* [Poster presentation]. American Astronomical Society meeting #240, Pasadena, CA, USA.

9. **Owens, R.**, Kim, K. J., Bayliss, M., Rivera-Thorsen, T. E., Dahle, H., Navarre, A., Gladders, M. D., Mahler, G., Bordoloi, R., Sharma, S., Florian, M., Sharon, K., Khullar, G. (22 April 2022). *Spatially Variable Light and Environments in a Distant Galaxy* [Poster presentation]. Undergraduate Scholarly Showcase, Cincinnati, OH, USA.

8. **Owens, R.**, Kim, K. J., Bayliss, M., Rivera-Thorsen, T. E., Dahle, H., Navarre, A., Gladders, M. D., Mahler, G., Bordoloi, R., Sharma, S., Florian, M., Sharon, K., Khullar, G. (2 April 2022). *Ultraviolet spectra of the Sunburst Arc* [Oral presentation]. Kentucky Area Astronomical Society Meeting 2022, Clarksville, TN, USA. https://sites.google.com/view/kam2022/program

7. **Owens, R.**, Anderson, L. (11 August 2021). *Ionized gas in Cygnus X* [Oral presentation]. Exploring Innovation in Appalachia Symposium, Morgantown, WV, USA.

6. **Owens, R.**, Anderson, L. (11 August 2021). *Ionized gas in Cygnus X* [Poster presentation]. Exploring Innovation in Appalachia Symposium, Morgantown, WV, USA.

5. **Owens, M. R.**, Anderson, L. (30 July 2021). *Ionized gas in Cygnus X* [Oral presentation]. 2021 Pulsar Search Collaboratory Capstone Seminar, Morgantown, WV, USA.

4. **Owens, M. R.**, Anderson, L. (30 July 2021). *Ionized gas in Cygnus X* [Poster presentation]. 2021 Pulsar Search Collaboratory Capstone Seminar, Morgantown, WV, USA.

3. **Owens, M. R.**, Anderson, L. (30 July 2021). *Lyα emission and gaseous outflows in a $z \sim 2$ lensed galaxy* [Poster presentation]. 2021 Pulsar Search Collaboratory Capstone Seminar, Morgantown, WV, USA.

2. **Owens, R.**, Anderson, L. (29 July 2021). *Ionized gas in Cygnus X* [Poster presentation]. 2021 Summer Undergraduate Research Symposium, Morgantown, WV, USA. https://undergraduateresearch.wvu.edu/symposia/summer-2021/past-symposia/-poster-presentations/physical-sciences-poster-presentations-99-117

1. **Owens, R.**, Bayliss, M. (May 2021). *Lyα emission and gaseous outflows in a $z \sim 2$ lensed galaxy* [Poster presentation]. Undergraduate Scholarly Showcase, Cincinnati, OH, USA. https://journals.uc.edu/index.php/Undergradshowcase/article/view/4465

Observing Programs

10. **Owens, R.**, Bayliss, M., Solhaug, E., Khullar, G., Welch, B., Kim, K., Gladders, M., Rivera-Thorsen, E., Dahle, H. (Gemini 2024B FT; GMOS-N; 6.7 hr). *Resolving the Lyman-alpha kinematics of a lensed galaxy with a rare Lyman-alpha profile*.

9. Bayliss, M., Navarre, A., Sharon, K., Dahle, H., **Owens, R.**, Gladders, M., Kim, K. (Gemini 2024A FT; GMOS-N; 3.2 hr). *Resolving Multi-Peaked Lyman-alpha In A Strongly Lensed Galaxy at z=4: Revealing A Candidate Highly Magnified LyC Leaking Galaxy*.

8. Bayliss, M., Dahle, H., Florian, M., Gladders, M. D., Hutchison, T. A., Khullar, G., Kim, K. J., **Owens, M. R.**, Rigby, J. R., Rivera-Thorsen, T. E., Sharon, K. (HST Cycle 32 GO; ACS, WFC3; 44 orbits). *Spatially Resolving Highly Ionized Channels of Lyman Continuum and Lyman Alpha Escape on 10's of Parsecs Scales In A Strongly Lensed Galaxy*.

7. Dahle, H., Bayliss, M., Cloonan, A. P., Florian, M., Gladders, M. D., Hutchison, T. A., Khullar, G., Kim, K. J., Mahler, G., Napier, K., **Owens, M. R.**, Rigby, J. R., Rivera-Thorsen, T. E., Sharon, K., Welch, B. (HST Cycle 32 GO; ACS, WFC3, NIRCam; 14 orbits (HST), 11.5 hr (JWST)). *Time delay cosmography with strong cluster lenses*.

6. Bayliss, M., Roberson, J., Dahle, H., Gladders, M., Khullar, G., Kim, K., **Owens, R.**, Sharon, K. (NOIRLab 2024B; FIRE; 21 hr). *Spatially Resolved Physical Conditions In a Strongly Lensed X-ray Emitting Dwarf Starburst at Cosmic Noon*.

5. Bayliss, M., Navarre, A., Sharon, K., Dahle, H., **Owens, R.**, Gladders, M., Kim, K. (Gemini 2024A FT; GMOS-N; 3 hr). *Resolving Multi-Peaked Lyman-alpha In A Strongly Lensed Galaxy at z=4: Revealing A Candidate Highly Magnified LyC Leaking Galaxy*.

4. Bayliss, M., Gassis, R., Adhikari, P., Sharon, K., Gladders, M., Dahle, H., Napier, K., Khullar, G., Mahler, G., **Owens, R.** (Gemini 2024A; GMOS-N, GMOS-S; 27.5 hr). *A Dynamical Study of an HST+Chandra Sample of Strong Lensing Clusters*.

3. Salas, P., Emig, K., **Owens, M.**, Roshi, D. A., Anderson, L. (GBT 23B Regular; 49 hr). *The Partially Ionized Medium around HII Regions – the low frequency complement*.

2. Florian, M., Bezanson, R., Chisholm, J., Dahle, H., Gladders, M., Hutchison, T., Khullar, G., Kim, K., Mahler, G., Navarre, A., **Owens, R.**, Rigby, J., Rivera-Thorsen, T., Roberson, J., Sharon, K., Shivaei, I., Welch, B., Whitaker, K. (JWST Cycle 2 GO; NIRCam, NIRSpec; 67.6 hr). *Galaxies Under Construction: Resolved Scaling Relations and Stellar Mass Assembly as Revealed by Lensed Star-Forming Clumps at Cosmic Noon*.

1. **Owens, R.**, Kim, K., Bayliss, M., Dahle, H., Burns, J., Sharon, K., Smith, G., Klein, M., Kuchta, N., Walker, R., Rivera-Thorsen, E., Mahler, G., Khullar G. (Gemini 2023A FT; GMOS-S; 1.88 hr). *Identifying galaxy-lensed Lyman-alpha emitters*.

Teaching Experience

Tutor March 2024 – present
Varsity Tutors

- One-on-one tutor for physics students at various levels, from high school to college

Private Tutor September 2021 – April 2022
Freelance

- One-on-one tutor for high school physics students

Course Instructor January 2020 – April 2022
University of Cincinnati

- Shifted the learning community to management by the physics department as a graded class; revised course with more focus on physics research opportunities and careers, created / graded all assignments, and counseled students

Teaching Assistant August 2019 – December 2020, August 2021 – April 2022
University of Cincinnati

- Acted as a teaching assistant for the freshman physics course; graded in-class problems, led extracurricular study sessions

Peer Leader August 2019 – December 2019
University of Cincinnati

- Independently led a learning community for first year physics students to discuss navigating college life and a career in physics

Scientific Communication

6. Owens, Riley. "How a blue nugget leaks ionizing photons in a unique way" *astrobites*, in prep.
5. Owens, Riley. "Finding leaky galaxies in our cosmic neighborhood" *astrobites*, subm.
4. Owens, Riley. "Is the farthest known star actually a binary system?" *astrobites*, 6 Dec. 2023, https://astrobites.org/2023/12/06/is-the-farthest-known-star-actually-a-binary-system/.
3. Owens, Riley. "How do you find high energy photons when you can't see them?" *astrobites*, 22 Aug. 2023, https://astrobites.org/2023/08/22/how-do-you-find-high-energy-photons-when-you-cant-see-them/.
2. Owens, Riley. "Are there thousands of Godzillas hiding in plain sight?" *astrobites*, 9 Sep. 2022, https://astrobites.org/2022/09/09/are-there-thousands-of-godzillas-hiding-in-plain-sight/.
1. Owens, Riley. "How was the universe reionized? Cosmic sunbursts provide hints" *astrobites*, 9 Oct. 2021, https://astrobites.org/2021/10/09/cosmic-sunbursts-provide-hints/.

Awards, Scholarships, Fellowships

Fulbright Semifinalist, *Fulbright Program* April 2023
Chambliss Astronomy Achievement Award, *American Astronomical Society* March 2023
Undergraduate Research Fellow, *University of Cincinnati* February 2022
Dean's List, *University of Cincinnati* Fall '18, Summer '19, Spring '20 – Spring '22
Cincinnatus Scholarship, *University of Cincinnati* August 2018 – April 2022
University Honors Scholar, *University of Cincinnati* August 2018 – April 2022

Technical Skills

Languages
Python 3.x (Astropy, GaussPy+, NumPy, Pandas, SciPy)

Software
Atom, Git, LaTeX, Mathematica, SAOImageDS9, Vim

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