Ryan Walker

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Education

2020–2024 **BS, Astronomy and Astrophysics; BS, Interdisciplinary Physics**, *University of Michigan*, Ann Arbor, *GPA: 3.3/4.0, Major GPA: 3.2/4.0*

Research Experience

2023–Present **Telescope Operator**, *University of Michigan*, Ann Arbor, MI
Participating in the Dynamic Eclipse Broadcast Initiative. Working with Prof. David Gerdes.

- Traveled to Albuquerque, NM after training to setup and operate an amateur solar imaging setup to image the 2023 Annular Solar Eclipse in preparation for the 2024 Total Solar Eclipse.

2023–Present **Research Assistant**, *University of Michigan*, Ann Arbor, MI
Dark Matter and Galaxy Cluster Evolution. Working with Prof. Keren Sharon.

- Produced lensing models for many different galaxy clusters to study how galaxy clusters form and how they grow in dark matter.

2022–Present **Research Assistant**, *University of Michigan*, Ann Arbor, MI
A Strong Lensing Model of RCS 0224-0002.5. Working with Prof. Keren Sharon.

- Produced a well-rounded gravitational lensing model to further study a lensed z∼4.9 Lyman-alpha emitter.
- Presented a poster in person at the 241st AAS meeting in Seattle, WA.
- Co-authored peer-reviewed publications: Navarre et al. 2023, submitted to ApJ; Navarre et al. 2023, in prep.

Summer 2023 **Observational Astronomy Research**, *University of Michigan*, Kitt Peak National Observatory, AZ, Ground-based Observations, as part of ASTRO461
Investigating the Reliability of Photometric Redshifts.

- Wrote telescope proposal paper and collected photometric and spectroscopic data using the McGraw-Hill and Hiltner telescopes at MDM Observatory.
- Learned to operate large-scale telescopes and reduce raw data.
- Presented a poster to the staff at Kitt Peak National Observatory.

Winter 2023 **Volunteer Telescope Operator, Researcher**, *University of Michigan, Southwest Research Institute, NASA*, Ann Arbor, MI, Longmont, CO
Worked with Prof. David Gerdes, Dr. Marc Buie, and Dr. Harold Levison.

- Volunteered to travel to Longmont, CO to train to setup and operate a Celestron C11 telescope, tracking mount, and imaging software to photograph the 2023 stellar occultation of the Jupiter Trojan, Polymele, and its now confirmed moon, Shaun, as confirmed by the results of this collaborative project.
- Exploring the science of stellar occultations and the orbital properties and stability of Jupiter Trojans using n-body simulations.
- Learning the logistics involved in designing a survey to search for Jupiter Trojans to add to the Lucy Spacecraft mission.
- Presented a poster at the Spring 2023 University of Michigan Department of Astronomy Undergraduate Research Poster Symposium.

2020–2021 **Research Assistant**, *University of Michigan*, Ann Arbor, MI
Characterizing Black Hole Binary Outbursts. Worked with Dr. Mark Reynolds.

- Analyzed the X-ray outburst light curve of AT2019wey to determine the origin of the outburst from its mass.
- Oral presentation at the University of Michigan UROP Spring 2021 Symposium, receiving a Blue Ribbon award for the presentation.
- Presented a poster at the Spring 2021 University of Michigan Department of Astronomy Undergraduate Research Poster Symposium.

Telescope Time

2023 **MDM Observatory, McGraw-Hill 1.3m**, *4.75 hrs (PI)*
Walker, R., Wanink, M. *Investigating the Reliability of Photometric Redshifts*
Operated and maintained the McGraw-Hill telescope.

2023 **MDM Observatory, Hiltner 2.4m**, *3.25 hrs (PI)*
Walker, R., Wanink, M. *Investigating the Reliability of Photometric Redshifts*
Operated the Hiltner telescope.

2023 **Gemini Observatory, Gemini South 8.1m**, *1.88 hrs (Co-I)*
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. *Identifying galaxy-lensed Lyman-alpha emitters*

Publications

2023 **Characterizing Strongly-Lensed, High-Redshift Ly-α Emitters I: Image Plane Analysis**
Navarre, A., Khullar, G., Bayliss, M., Dahle, H., Florian, M., Gladders, M., Kim, K., Owens, R., Rigby, J., Sharon, K., Shibuya, T., **Walker, R.**, 2023, (in prep).

2023 **Navarre et al. 2023b, in prep.**

2023 **COOLJ1241+2219: Strong Lensing Analysis of a Bright z=5 Lyman Break Galaxy and its z=1 Cluster Lens, from HST Imaging**
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., Lin, J. J., Martinez, M. N., Matthews Acuña, O. S., Medina, E., Merz, K., Sanchez, J. A., Sisco, E. E., Kavin Stein, D. J., Sukay, E. O., Tavangar, K., 2023, (in prep).

Presentations and Conference Proceedings

- Research Presentations
  - Spring 2021 University of Michigan UROP Research Symposium.
  - Spring 2021 University of Michigan Department of Astronomy Undergraduate Research Poster Symposium.
  - Winter 2023 241st American Astronomical Society Research Poster Symposium.
  - Spring 2023 University of Michigan Department of Astronomy Undergraduate Research Poster Symposium.
  - Summer 2023 University of Michigan Astro 461 Poster Symposium.

- Astrophotography Presentations
  - Fall 2023 Washtenaw Community College Astronomy Monthly
  - Fall 2023 Student Astronomical Society (type of meeting?)

- Conference Proceedings

2023 **A Strong Lensing Analysis of RCS 0224-0002.5**
Walker, R., Sharon, K., Navarre, A., Napier, K., Bayliss, M., Gladders, M., Dahle, H., Klein, M., Smith, G., & Kuchta, N., 2023, AAS, 55, 174.02

2023 **Strong Lensing Model of a Potential Major Merger, SPT-CL J0356-5337 at z=1.03**
Smith, G., Mahler, G., Napier, K., Sharon, K., Bayliss, M., Gladders, M., **Walker, R.**, Kuchta, N., & Klein, M., 2023, AAS, 55, 174.03

2023 **A Strong Lensing Analysis of COOLJ1241+2219 using HST Data to Reveal the Source Plane Properties of an Extremely Bright z>5 Lensed Galaxy**
Klein, M., Sharon, K., Napier, K., **Walker, R.**, Smith, G., Kuchta, N., Gladders, M., Khullar, G., Mahller, G., & Stark, A., 2023, AAS, 55, 174.04

2023 **A Gravitational Lensing Model of COOLJ2129+0126: a highly-magnified galaxy at z 5, lensed by a high-redshift galaxy cluster**
Kuchta, N., Sharon, K., Napier, K., Khullar, G., Mahler, G., Gladders, M., Dahle, H., Klein, M., Smith, G., & **Walker, R.**, 2023, AAS, 55, 174.07

Computational skills

- Extensive experience installing and managing software on personal computer, e.g., numerous operating systems in Linux/windows environments, off-the-shelf as well as specialty astronomy software (IRAF, Lenstool, Galfit, Xspec)
- High proficiency: Linux, Windows 10, Python, LaTeX, DS9, Lenstool, spectroscopic and photometric data reduction, PixInsight, Adobe Photoshop.
- Intermediate proficiency: Bash, C++, MS Excel/Google Spreadsheets, Xspec.
- Basic familiarity: MATLAB, IRAF, Galfit, HTML.

Scholarships and awards

- HAIL Scholarship from the University of Michigan, full-tuition scholarship.
- UROP 2020-2021 Blue Ribbon Award for exemplary research presentation at the 2021 UROP Spring Research Symposium.

Volunteering and Outreach

- Geometry and algebra tutor in high school.
- 2018 Thunder Over Michigan volunteer.
- Currently mentoring a high school student for their AP Research project on exoplanet detection with amateur astronomy equipment.

Professional Organization Memberships

- Not Rich At UMich Board Member, Social Media Manager.
- Student Astronomical Society member.
- Society of Physics Students member.
- American Astronomical Society Undergraduate Student member.
- Entomology Club member.

Interests

Astro-photography	I was first introduced to astrophotography in high school and fell in love since. I've been an astrophotographer since then, sometimes driving 3+ hours just for dark skies.
Music	I play an assortment of instruments and dabble in music production. I've played guitar since 2013, drums since 2015, bass guitar since 2016, and keyboard/piano since 2021.

Electronics Since I first built my own desktop PC in 2020, I've enjoyed building and repairing desktop PCs. I also have a project guitar that I am in the process of rebuilding myself.