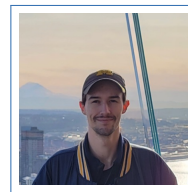


Ryan Walker

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Education

2020–2024 **BS, Astronomy and Astrophysics; BS, Interdisciplinary Physics**, *University of Michigan*, Ann Arbor, GPA: 3.1/4.0

Research Experience

- 2024–Present **SULI; Cosmology Intern**, *Argonne National Laboratory*, Lemont, IL
Using machine learning to identify Brightest Cluster Galaxies in SPT-3G data with Dr. Lindsey Bleem.
- Co-developed Image Marker (Github) to help produce a human-eye training set for machine learning.
 - Image Marker will be submitted to the Journal of Open Source Software. Image Marker will also be used in future South Pole Telescope publications.
 - Learning to train a neural network to identify Brightest Cluster Galaxies and their properties in a new dataset of galaxy clusters detected by SPT-3G.
 - Accepted to SULI for Spring 2025 term and will be returning to continue this project.
- 2024–Present **Research Assistant**, *University of Michigan*, Ann Arbor, MI
Producing lensing models for project MEGaSaURA. Working with Prof. Keren Sharon.
- Producing updated lensing models using Hubble Space Telescope data for galaxy clusters in project MEGaSaURA as we prepare for James Webb Space Telescope data.
 - Producing updated lensing models using new James Webb Space Telescope data for comparison to Hubble Space Telescope models.
- 2023–2024 **Telescope Operator, Research Assistant**, *University of Michigan*, Ann Arbor, MI
Participating in the Dynamic Eclipse Broadcast (DEB) Initiative. Working with Prof. David Gerdes.
- Traveled to Albuquerque, NM after training to setup and operate amateur solar imaging equipment to image the 2023 Annular Solar Eclipse in preparation for the 2024 Total Solar Eclipse.
 - Traveled to Bandera, TX to image the 2024 Total Solar Eclipse with the same equipment.

2023–2024 **Research Mentor**

Mentoring Ori Algave, a high school student.

- Taught Ori about the scientific methods of doing astronomy research.
- Worked with Ori to design a research project revolving around their amateur astrophotography equipment.
- Taught Ori how to collect and analyze exoplanet transit data using AstrolImageJ to create transit light curves.

2022–2024 **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 $z \sim 4.9$ Lyman-alpha emitter.
- Presented a poster in-person at the 241st AAS meeting in Seattle, WA.
- First author publication: Walker et al. 2024, RNAAS.
- Co-authored peer-reviewed publications: Navarre et al. 2024, ApJ; Navarre et al. 2024, in prep.

Summer 2023 **Observational Astronomy Researcher**, *University of Michigan*, Kitt Peak National Observatory, AZ, Ground-based Observations, as part of ASTRO461 taught by Prof. Sally Oey.

Investigating the Reliability of Photometric Redshifts.

- Designed a research project and wrote a telescope proposal.
- 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, Research Assistant, 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.
- Learned to design a telescope survey to search for Jupiter Trojans that could be visited by the Lucy Spacecraft mission.
- Presented a poster at the Spring 2023 University of Michigan Department of Astronomy Undergraduate Research Poster Symposium.
- Co-author status on the upcoming paper releasing the results of this study. Preliminary results are currently detailed in the abstract submitted to the BAAS: **Interpreting the Stellar Occultations of (15094) Polymele – a Lucy Target**, Harold Levison et al. (2023).

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 luminosity.
- Oral presentation at the University of Michigan UROP Spring 2021 Symposium, received 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

2024 **A Strong Lensing Model of RCS1 J0224-0002.5**

Ryan Walker, Keren Sharon, Alexander Navarre, Matthew Bayliss, Michael D. Gladders, 2024 (published to RNAAS).

2023 **Resolving Clumpy vs. Extended Ly- α In Strongly Lensed, High-Redshift Ly- α Emitters**

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 (published to ApJ).

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 (published to ApJ).

2024 **Navarre et al. 2024**, in prep.

2024 **Levison et al.**, 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 General 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., Mahler, 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). Argonne Leadership Computing Facility AI for Science on Supercomputers advanced certificate.
- High proficiency: Linux, Windows 10/11, Python, Bash, \LaTeX , DS9, Lenstool, PyQt6, spectroscopic and photometric data reduction, PixInsight, Adobe Photoshop.
- Intermediate proficiency: Git, C++, MS Excel/Google Spreadsheets, Xspec, HTML.
- Basic familiarity: MATLAB, IRAF, Galfit, CSS.

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.

Professional Organization Memberships

- Student Astronomical Society member.
- Society of Physics Students member.
- American Astronomical Society Undergraduate Student member.
- Not Rich At UMich Board Member, Media Manager (former).

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 4+ hours for dark skies for just one night. Some of my work can be viewed on my website linked here. |
| 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. This interest has led me to take an upper level physics instrumentation lab during my undergraduate career. |