Raphael E. **Hviding**

Astronomer | PhD Candidate | He/His

rehviding@arizona.edu • as.arizona.edu/~rehviding • +1 (520) 626-1798

TheSkyentist • 0000-0002-4684-9005 • rehviding

Research Interests: Obscured Quasars, Active Galactic Nuclei, Galaxy Evolution

Education

University of Arizona **Tucson, AZ**

Ph.D., M.Sc. in Astronomy & Astrophysics Aug. 2023, Jan. 2021

– *Seeing Red: The Present and Future of mid-IR AGN Selection with Optical Spectroscopy*

– *Advisors: Professor Kevin N. Hainline & Professor Marcia J. Rieke*

Dartmouth College **Hanover, NH**

B.A. in Physics (High Honors), Mathematics, and Astronomy (Minor) Jun. 2018

– *Senior Honors Thesis: "Understanding the Galactic Scale Effects of AGN with Fabry-Pérot Spectroscopy from SALT"*

– *Advisor: Professor Ryan C. Hickox*

Honors & Awards

Awarded

2022	Departmental Graduate Student Award for Service	UArizona
2018 - 2023	National Science Foundation Graduate Research Fellowship	NSF
2018	College of Science Fellowship	UArizona
2018	International Travel Grant	AAS
2017 - 2018	E. E. Just Scholar	Dartmouth College
2016	James O. Freedman Presidential Scholar	Dartmouth College

Publications

Nine refereed journal articles: [**full list**]

(four as first/corresponding author, two as second/third author)

[1] **Raphael E. Hviding** et al., Accepted to AJ, *The Kiloparsec Scale Influence of the AGN in NGC 1068 with SALT RSS Fabry-Pérot Spectroscopy*

[2] Emma Curtis-Lake, ..., **Raphael E. Hviding** et al., Nature Astronomy 7 622C, *Spectroscopic confirmation of four metal-poor galaxies at* $z = 10.3 - 13.2$

[3] B. E. Robertson, ..., **Raphael E. Hviding** et al., Nature Astronomy 7 611R, *Identification and properties of intense star-forming galaxies at redshifts* $z > 10$

[4] **Raphael E. Hviding** et al., 2022, AJ, 163, 224, *A New Infrared Criterion for Selecting Active Galactic Nuclei to Lower Luminosities*

[5] Kevin N. Hainline, **Raphael E. Hviding** et al., 2020, ApJ, 892, 125, *Simulating JWST/ NIRCam Color Selection of High-Redshift Galaxies*

[6] W. Yan, R. C. Hickox, K. N. Hainline, D. Stern, G. Lansbury, D. M. Alexander, **Raphael E. Hviding** et al., 2019, ApJ, 870, 33, *NuSTAR and Keck Observations of Heavily Obscured Quasars Selected by WISE*

[7] L. Claire Gasque, Callum A. Hening, **Raphael E. Hviding** et al., 2019, AJ, 158, 156, *Two Long-period Cataclysmic Variable Stars: ASASSN-14ho and V1062 Cyg*

[8] **Raphael E. Hviding** et al., 2018, ApJ, 868, 16, *Spatially Extended Low Ionization Emission Regions (LIERs) at* $z \sim 0.9$

[9] **Raphael E. Hviding** et al., 2018, MNRAS, 474, 1955, *Characterizing the WISE-selected Heavily Obscured Quasar Population with Optical Spectroscopy from the Southern African Large Telescope*

Other

[10] Kevin N. Hainline, ..., **Raphael E. Hviding** et al., Submitted to AJ, *The Cosmos in its Infancy: JADES Galaxy Candidates at* $z > 8$ *in GOODS-S and GOODS-N*

[11] Bunker J. Andrew, ..., **Raphael E. Hviding** et al., Submitted to A&A, *JADES NIRSpec Initial Data Release for the Hubble Ultra Deep Field: Redshifts and Line Fluxes of Distant Galaxies from the Deepest JWST Cycle 1 NIRSpec Multi-Object Spectroscopy*

[12] Daniel J. Eisenstein, ..., **Raphael E. Hviding** et al., Submitted to AJS, *Overview of the JWST Advanced Deep Extragalactic Survey (JADES)*

[13] M. Rieke, ..., **Raphael E. Hviding** et al., 2019, Astro2020, BAAS, 51, 45, *JWST GTO/ERS Deep Surveys*

Telescope Time

Principal Investigator

SAO 2023A *Revealing Obscured SMBH Growth: Probing Type II AGN Candidates with MMT Binospec* with MMT Binospec (2 Nights)

SAO 2022B *Uncovering the True Nature of the Kiloparsec-Scale Ionization in NGC 1068: Past AGN Activity or Shocks?* with MMT MMIRS and Bok BCSpec (1+3 Nights)

SAO 2021A *MMIRS longslit follow-up of mid-IR AGN candidates with high Balmer Decrements: Obscured optical line emission?* with MMT MMIRS (1.5 Nights)

SAO 2020B *Uncovering an Undiscovered Population of AGNs: Hectospec Follow-up of HSC-WISE-SDSS Matched Targets* with MMT Hectospec (2 Nights)

Conferences

Contributed Presentations

Jan. 2023	AAS 241	Seattle, WA
Oct. 2022	SACNAS NDiSTEM 2022	San Juan, PR
Nov. 2018	Advances with SALT	Pretoria, SA

Poster Presentations

Sep. 2022	What drives the growth of black holes?	Reykjavík, IS
Jun. 2019	IAU Galaxies 2019	Viana do Castelo, PT
Nov. 2017	Ivy League Undergraduate Research Symposium	Philadelphia, PA
Aug. 2016	Hidden Monsters	Hanover, NH
Jun. 2016	Active Galactic Nuclei: What's in a name?	Garching, DE

Computing

GELATO **Developer**

Galaxy/AGN Emission Line Analysis TOol (GELATO) Python

- *Optical Spectroscopic Fitting package with a focus on testing for AGN contributions.*
- *In use by the DESI Collaboration, a LEGA-C Collaboration project, Dr. Mar Mezcua's group at Institute of Space Sciences in Spain, and Dr. Kohei Ichikawa's group at Tohoku University.*

Programming: Python, Linux, IRAF, IDL, SQL, HTML, CSS, Git, LaTeX, SLURM, PBS

Teaching

ASTR 400B: Theoretical Astrophysics: Galaxies and Cosmology **UArizona**

Teaching Assistant with Professor Dan Stark Spring 2021

- Led office hours, graded assignments, and taught a lecture for an advanced undergraduate course.

ASTR 170B: Exploring our Universe **UArizona**

Teaching Assistant with Professor Ed Prather Spring 2023

- Participated in lesson activities and led office hours for a general-education course.

Diversity, Equity, & Inclusion

Astrocharlas Talk Series **Tucson, AZ**

Organizer Oct. 2018 - Present

- Lead Organzer since 2021, organizer since 2018.
- Astrocharlas is the first Spanish-Language public talk series at the UArizona College of Science and presents semesterly lectures from an invited expert. In addition, the program serves as a network for Spanish-speaking and Hispanic astronomers across all career levels.
- I developed our undergraduate student community, providing opportunities for career advice and networking with invited speakers.
- In the wake of COVID-19 I shifted Astrocharlas to a virtual, now hybrid, talk series.
- Along with Dr. Gurtina Besla, I secured College of Science funding to send our undergraduate students to SACNAS.
- I assisted the Neuroscience and Speech, Language & Hearing Sciences departments to begin their own Spanish-Language talk series.
- Astrocharlas bolsters the UArizona HSI initiative of scientific inclusion and retention and promotes the success of our Spanish-speaking and Hispanic undergraduate students in their future careers.

Steward Observatory Diversity, Equity, & Inclusion Initiative **Tucson, AZ**

Department Climate Task Force Jun. 2020 - Present

- Member and liason to overall SODEI initiative.
- The task-force serves to better our own academic environment to promote the inclusion and success of our astronomers.
- I helped develop a department-wide survey to assess graduate student and postdoc well-being to create action items to promote a healthy workplace.
- I developed a strategy for allowing department members to optionally provide their pronouns and name pronunciation guides for the website.
- The task force has created actionable steps for identifying the needs of the community to promote an inclusive department.

Mentoring

NOAO Astronomy Teen Café **Tucson, AZ**

Graduate Student Guest and Discussion Leader Oct. 2018 - May. 2022

- Led group discussions about potential college career paths and graduate student life.
- Answered questions regarding academics after high school and the study of astronomy.
- Worked with high school students on relevant astronomical coding exercises.

Project ASTRO **Tucson, AZ**

Astronomer Collaborator of a School Teacher Sep. 2018 - May. 2018

- Worked with a primary school teacher to plan astronomical lessons for the classroom.
- Participated in workshops teaching school teachers about astronomical lessons plans and how to implement them.
- Organized classroom activities with guest speakers in astronomy for the classroom.

Carthage Institute of Astronomy **White Mountains, NH**

Public Astronomer under Professor Douglas Arion Summer 2015 & Summer 2018

- Worked with younger public astronomers on developing their public speaking skills.
- Organized regular public lectures and publicized them to the greater community.
- Managed large camp groups to facilitate education and generate interest in astronomy.
- Created astronomy lectures to be given to the public by other employees, even those without an astronomical background.

Public School Teaching through Project ASTRO **Baltimore, MD**

Sparks Elementary School May. 2017

- Worked with a middle school teacher to plan astronomical lessons for her classroom.
- Taught fourth grade classes about telescopes and scales in the solar system.
- Used Galileoscopes and other tools to provide hands-on demos for students.

Mokone Primary School **Langa, Cape Town, ZA**

Public School Teaching through the South African Astronomical Observatory Jan. 2017
– Taught medium sized groups of middle school learners by engaging in outdoor astronomy activities about the solar system.
– Taught inside the classroom about astronomical research being done in South Africa and around the world.

Outreach

Carthage Institute of Astronomy **White Mountains, NH**

Public Astronomer with Professor Douglas Arion Summer 2015 & Summer 2018
– I worked with the Appalachian Mountain Club to bring daytime solar observing, nighttime stellar observing, astronomy lectures, and mountain hut programs to a popular wilderness and hiking region in New Hampshire. In particular, I created and led educational activities for large camp groups of school-aged children. In addition, I wrote astronomy presentations to be given to the public that have been used in the years since. Over the course of the two summers, we reached thousands of adults and children with our educational message about astronomy and the environment.

Teaching

Public Teaching Experience with Learners of All Ages .....
– NOIRLab Teen Astronomy Cafe *Tucson, AZ, Oct. 2018 - May. 2022*
– Project Astro Sparks Elementary School *Baltimore, MD, May. 2017*
– Mokone Primary School Teaching with the SAAO *Langa, Cape Town, ZA, Jan. 2017*

Public Speaking

Presentations on Astronomy for a Public Audience .....
– Splendido Intellectual Pursuits Program *Tucson, AZ. Feb. 2019 and Feb. 2022*
– WIS STEAMFest Keynote Speaker *Washington, DC, May. 2022*
– Space Drafts *Tucson AZ, Aug. 2019 and Nov. 2021*
– SkyCenter SkyNights *Tucson, AZ, Nov. 2021*
– Astronomy on Tap *Lansing, MI, May. 2021*

Observing

Public Astronomy Telescope Observing .....
– Dartmouth College Public Observing *Hanover, NH, Sep. 2015 - Jun. 2018*
– Sidewalk Astronomy *Baltimore, MD, Apr. 2017 - Jun. 2017*