

Sóley Hyman

University of Arizona
Department of Astronomy & Steward Observatory
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EDUCATION

University of Arizona

Tucson, AZ

Graduate student (started August 2020)

Expected graduation: May 2025

- **Andrew Carnie University Fellow (2020-21)**
- Research: Using Permutation Entropy and Statistical Complexity Analysis (PESCy) to detect orbital chaos; Post-Newtonian Astrometric and Spectroscopic Models of Orbits around Black Holes
- **Key Courses:** Intro. to Computing, Computational and Statistical Methods in Astrophysics, Physics of Astrophysics, Stars and Planets, Extragalactic Astronomy and Cosmology, Interstellar Medium and Star Formation, Astronomical Instrumentation, Structure and Dynamics of Galaxies

Harvard College

Cambridge, MA

A.B. Astrophysics and Physics, GPA 3.870

May 2019

- **Magna Cum Laude with Highest Honors**
- **Minor in Music**
- **Leo Goldberg Prize for outstanding senior astronomy thesis (May 2019)**
- **Harvard College Scholar (2016-17)**
- Senior thesis: A multiwavelength follow-up study of the enigmatic 3C 220.3 lensed system
- **Key Courses:** Intro. Mechanics & Relativity, Intro. Electricity and Magnetism & Statistical Physics, Wave Phenomena, Quantum Mechanics I, Stellar and Planetary Astronomy, Galactic and Extragalactic Astronomy, Observational Astronomy, Elementary Particle Physics

OTHER HONORS AND AWARDS

University of Arizona Theoretical Astrophysics Program Student Travel Grant (2023)

National Science Foundation Graduate Fellowship Research Program, Honorable Mention (2022)

Andrew Carnie University Fellows Program Professional Development Award (2022)

RESEARCH EXPERIENCE

University of Arizona, Steward Observatory

January 2023 to present

Graduate Research Assistant, Supervisor: Dr. Kathryn Daniel

Using the Permutation Entropy and Statistical Complexity Analysis (PESCy) method with different gravitational potentials to differentiate between chaotic orbital behavior and numerical noise in simulations

University of Arizona, Steward Observatory

October 2020 to December 2022

Graduate Research Assistant, Supervisor: Drs. Dimitrios Psaltis and Feryal Özel

Developing a novel, analytic, astrometric and spectroscopic model for the relativistic orbits of the cluster of stars near Sgr A* to explore the observability of various relativistic effects, test potential modifications of general relativity, and investigate the influence of extended mass distributions on extreme stellar orbits

- **Published paper** (“Analytic Post-Newtonian Astrometric and Spectroscopic Models of Orbits around Black Holes”)
- **Will present research results at 54th Annual Meeting of the Division on Dynamical Astronomy (upcoming)**

Center for Astrophysics / Harvard & Smithsonian

September 2019 to August 2020

Astrophysicist, Supervisor: Dr. Belinda Wilkes

Extending previous multiwavelength analysis of the 3C 220.3 galaxy system (a radio galaxy with a gravitationally lensed submillimeter galaxy) to include characterization of the magnetic fields and diffuse X-ray emission of the radio galaxy, reconstruction of the lensed galaxy, investigation of the dark matter fractions of the radio galaxy and a potential companion galaxy (“Source B”)

- **PI on MMT/Binospec proposal for spectra of potential companion galaxy (SAO-8-20a, accepted)**
- **Presented talk on 3C 220.3 analysis at the American Astronomical Society (AAS) 235 Winter Meeting (January 2020)**

RESEARCH EXPERIENCE (CONTINUED)*Harvard College, Department of Astronomy*

September 2018 to May 2019

Undergraduate Research Assistant to Dr. Belinda Wilkes

Performing X-ray and optical wavelength analysis of the 3C 220.3 galaxy system to reconstruct the lensed galaxy and investigate the mass distribution and kinematics of the radio galaxy

- **Resulted in senior thesis (“A multiwavelength follow-up study of the enigmatic 3C 220.3 lensed system”) for A.B. in Astrophysics and Physics (April 2019)**
- **Awarded Leo Goldberg Prize for outstanding senior astronomy thesis (May 2019)**

Harvard College, Department of Astronomy

Summer 2018 to present

Research Collaborator with Allyson Bieryla

Developing Arduino-based devices to convert light/color to sound for the blind and visually impaired communities around the world

- Received funding from the International Astronomical Union (IAU) to construct 20 light-conversion devices (LightSound) to distribute to BVI students in Chile and Argentina for the solar eclipses in July 2019 and December 2020
- **Generated extensive media coverage in international press (Reuters, AP, etc.) during the July 2019 eclipse**
- **Resulted in exhibition demonstration at the IAU General Assembly (August 2018), poster presentation at the AAS 233 Winter Meeting (January 2019), both oral talk and poster at the AAS 234 Summer Meeting (June 2019), and workshop at the AAS 235 Winter Meeting (January 2020)**

Harvard College, Department of Astronomy

Summer 2018 to May 2019

Student Leader for Harvard Observing Project (HOP)

Leading observing sessions (along with several other Astronomy graduate students) at the Clay Telescope (Harvard University Science Center) for Harvard students and affiliates interested in astronomy

Harvard College, Department of Physics

January 2018 to August 2019

Undergraduate Research Assistant to Dr. Roxanne Guénette

Developed an algorithm for Fermilab’s MicroBooNE detector that will select sections of the data that correspond to specific particle interactions caused by neutrinos

Washington University in St. Louis

Summer 2016 and 2017

Research Assistant to Dr. James Buckley

Worked on the research and design for the Advance Particle–astrophysics Telescope (APT), a space-based gamma ray telescope that will help with the dark matter search while also providing an all-sky field of view for recording gamma ray bursts

- Summer 2016: took spectroscopy measurements of various types of optical fibers to determine most effective type, wrote Python codes to analyze data, organized new lab space, and salvaged electronics from old laser
- Summer 2017: simulated various optical fiber orientations and geometries with a Python package, took measurements of APT prototype with Cs-137 source

TEACHING EXPERIENCE*University of Arizona, Steward Observatory*

Spring 2023

ASTR 203 Teaching Assistant, Professor: Dr. Thomas Fleming

Teaching assistant for 140-person general education class on stars, responsible for running office hours, working planetarium where class is held, presenting several lectures, and grading essays for the class.

SOFTWARE EXPERIENCE

Data Analysis Software: CIAO, DS9, IRAF, ROOT

Other Software: LaTeX, Adobe Premiere Pro

Programming languages: Python, Arduino

LANGUAGES

English (native proficiency)

French (limited working proficiency)

CONFERENCE PRESENTATIONS, WORKSHOPS, PAPERS, AND PROPOSALS*Conference Presentations*

- Hyman, S. Ó.**, Psaltis, D., Özel, F. 2023, in 54th Division on Dynamical Astronomy Meeting (East Lansing: Michigan State University), <https://dda.aas.org/meetings/2023/program>
- Bieryla, A. and **Hyman, S.O.** 2021, in SciAccess 2021, "LightSound: Accessibility for the 2023 and 2024 Solar Eclipses" 2021
- Hyman, S.O.**, Wilkes, B. J., Kuraszkiwicz, J., & Azadi M. 2020, in American Astronomical Society Meeting Abstracts, Vol. 235, American Astronomical Society Meeting Abstracts #235, 151.01
- Patel, N.A., Moran, J., Ding, A., Christensen, I., **Hyman, S.**, Rahman, T., & Kimberk, R. 2020, in American Astronomical Society Meeting Abstracts, Vol. 235, American Astronomical Society Meeting Abstracts #235, 117.04
- Bieryla, A., **Hyman, S.**, Davis, D. 2020, in American Astronomical Society Meeting Abstracts, Vol. 235, American Astronomical Society Meeting Abstracts #235, 203.04
- Hyman, S.**, Bieryla, A., Davis, D., & Diaz-Merced, W. 2019, in American Astronomical Society Meeting Abstracts, Vol. 234, American Astronomical Society Meeting Abstracts #234, 104.03
- Hyman, S.** 2019, in 29th New England Regional Quasars and AGN Meeting (Cambridge: Massachusetts Inst. of Technology), https://rboissay.scripts.mit.edu/Nerquam2019dyn/Nerquam2019_abstracts.php
- Hyman, S.O.** 2019, American Astronomical Society Meeting #234, Solar Eclipse Planning Workshop, "LightSound: Experiencing a Solar Eclipse through Sonification," https://aas.org/files/resources/aas234_sep_w_program_190531.pdf
- Hyman, S.O.**, Bieryla, A., Davis, D., & Diaz-Merced, W. 2019, in American Astronomical Society Meeting Abstracts, Vol. 233, American Astronomical Society Meeting Abstracts #233, 255.11

Conference Workshops

- LightSound: A Sonification Tool for Solar Eclipses and Inclusive Classrooms, American Astronomical Society Solar Eclipse Planning Workshop, **co-organizer**, October 2022.
- LightSound: Learn to Build a Sonification Tool to Make Your Classes and Outreach Events More Inclusive, American Astronomical Society Meeting #235, **co-organizer**, two-day workshop, <https://aas.org/meetings/aas235/workshops-events>

Papers

- Hyman, S. Ó.**, Psaltis, D., Özel, F. "Analytic Post-Newtonian Astrometric and Spectroscopic Models of Orbits around Black Holes." 2022. <https://doi.org/10.48550/arXiv.2208.01655>
- Hyman, S.O.**, Wilkes, B. J., Willner, S.P., et al. *in prep.*
- Bieryla, A., **Hyman, S.**, Garcia, B, Diaz-Merced, W., et al. 2020, CAPJ.
- Hyman, S.O.** 2019, Bachelor's Thesis, Harvard University, "A multiwavelength follow-up of the enigmatic 3C 220.3 lensed system", [doi:10.5281/zenodo.3464196](https://doi.org/10.5281/zenodo.3464196)

Telescope Proposals

- Wilkes, B. J., **Hyman, S.O.**, Willner, S., et al. 2020, MMT Cycle 2021a Program SAO-7-21a, "Is the radio galaxy 3C220.3 a dual active galaxy?"
- Hyman, S.O.**, Wilkes, B. J., Kuraszkiwicz, J., et al. 2019, MMT Cycle 2020a Program SAO-8-20a, "3C 220.3: a strong dual AGN candidate lensing a high-z sub-mm galaxy"

PUBLIC ENGAGEMENT AND VOLUNTEER WORK*Organizations and Programs*

- Collaborator** on LightSound Project Summer 2018 to present
- Developing devices to make solar eclipses accessible for blind and low-vision individuals)
- Organizer** of Steward Observatory's Colloquium Lunch August 2022 to present
- Organize weekly lunches with graduate students and the department colloquium speaker and moderate/facilitate discussion
 - Invite local faculty guests on weeks without colloquia
- Co-organizer** of Tucson's Astronomy on Tap (SpaceDrafts)
- Organize public astronomy talk series at local brewery

Talks

- "Ears to the Skies! The Past, Present, and Future of Sound in Astronomy," Tucson, AZ Astronomy on Tap, October 2022.

Magazines/Local News

- The Harvard Gazette*: "Astronomy Lab sees the light — and wants everyone else to, too" (August 2019) <https://news.harvard.edu/gazette/story/2019/08/astronomy-lab-at-harvard-makes-accessibility-a-priority>