

The Ohio State University
Department of Astronomy
140 W. 18th Ave
McPherson Laboratory 4029
Columbus, OH, 43210

Email: phillips.1622@buckeyemail.osu.edu

Website: capricephillips.github.io

RESEARCH INTERESTS

I am interested in brown dwarf and exoplanet atmospheric characterization, direct imaging techniques, high resolution spectroscopy of substellar objects, and stellar abundance measurements. My main research goals are to explore planetary formation through atmospheric characterization retrievals of brown dwarfs and directly imaged exoplanets. Along with this, I am interested in detecting biosignatures and the habitability of temperate exoplanets.

EDUCATION

- **The Ohio State University** Columbus, OH
Ph.D. Astronomy Expected 2025
M.S. Astronomy August 2022
Thesis Topic: *Searching for Biosignatures in the Atmospheres of Gas Dwarf Planets*
Graduate Certificate In College and University Teaching (In Progress)
- **The University of Texas at Austin** Austin, TX
M.A. Astronomy May 2019
Thesis Title: *2M0443+3723 B: A Young Companion at the Substellar Boundary with Potential Membership in the β Pictoris Moving Group*
- **University of Arkansas at Little Rock** Little Rock, AR
B.S. Physics; Minor: Mathematics December 2015

RESEARCH POSITIONS

- **Research Analyst, Advisor: Dr. Megan Bedell** New York, NY
Flatiron Institute, Center for Computational Astrophysics February 2024 – June 2024
 - Using *iSpec* and *pyM00GI* to determine stellar parameters and abundance measurement for FGK host stars of benchmark brown dwarf companions
 - Determining projected rotational velocities and radial velocities of stellar sample
- **Graduate Student Researcher & Visiting Scientist, Advisor: Dr. Jackie Faherty**
The Ohio State University & American Museum of Natural History January 2022 – present
 - Exploring atmospheric properties of substellar companions to probe planetary formation mechanisms
 - Using *Brewster* to robustly decouple temperature, gravity, composition, and cloud properties for planetary mass companions
- **Graduate Student Researcher, Advisor: Dr. Ji Wang** Columbus, OH
Department of Astronomy, The Ohio State University January 2022 – present
 - Combining photometry, low-to-medium resolution and high resolution spectroscopy of directly imaged exoplanets and brown dwarfs from KPIC to constrain carbon-to-oxygen ratios to explore if metal enrichment in atmospheres is universal

- Graduate Student Researcher, Advisor: Dr. Ji Wang** Columbus, OH
 Department of Astronomy, The Ohio State University September 2019 – January 2022
 - Investigated whether biosignatures on gas dwarfs are detectable with the MIRI, NIRSpec, and NIRISS instruments aboard *JWST* mission
 - Investigated whether biosignatures on temperate gas dwarfs/terrestrial-like planets are detectable with the upcoming *Twinkle* space mission
 - Determined suitable targets for observations for *Twinkle* and *JWST*
- Graduate Student Researcher, Advisor: Dr. Brendan Bowler** Austin, TX
 Department of Astronomy, The University of Texas at Austin January 2017 – May 2019
 - Characterized the physical and empirical properties of a candidate benchmark brown dwarf companion in the β Pictoris Moving Group

PUBLICATIONS

FIRST AND SECOND AUTHOR:

- Phillips, C.**, Faherty, J., Burningham, B., Vos, J., Gonzales, E., Calamari, E., Gaarn, J., Whiteford, N., *Retrieving Young Cloudy L-Dwarfs: A Nearby Planetary-Mass Companion BD+60 1417B and Its Isolated Red Twin W0047*, in prep
- Phillips, C.**, Wang, J., Edwards, B., Rodriguez Martinez, R., Pai Asnodkar, A., BS, Gaudi, *Is LTT 1445 Ab a Hycean World or a cold Haber World? Exploring the Potential of Twinkle to Unveil Its Nature*, in review
- Phillips, C.**, Wang, J., Kendrew, S., Greene, T., Hu, R., Valenti, J., Panero, W., Schulze, J., 2021, The Astrophysical Journal, 923, 144, *Detecting Biosignatures in the Atmospheres of Gas Dwarfs Planets with the James Webb Space Telescope*
- Phillips, C.**, Bowler, B., Mace, G., Liu, M., Sokal, K., 2020, The Astrophysical Journal, 896, 173, *2MASS J04435686+3723033 B: A Young Companion at the Substellar Boundary with Potential Membership in the β Pictoris Moving Group*

OTHER CO-AUTHOR:

- 2030STEM Collaboration, Adams J., Asai, MD, Cohen, R., et al., incl **Phillips, C.**, 2023, *Accelerating and scaling mentoring strategies to build infrastructure that supports underrepresented groups in STEM*
- Finnerty, L., Scholfield, T., Sappey, B. et al., incl **Phillips, C.**, 2023, Keck/KPIC Emission Spectroscopy of WASP-33b, in review
- Xin, Y, Xuan, J, Mawet, D., et al., incl **Phillips, C.**, 2023, *On-sky speckle nulling through a single-mode fiber with the Keck Planet Imager and Characterizer*, in review
- Edwards, B., Changeat, Q., Tsirias, A., incl **Phillips, C.**, 2023, *Characterising a World Within the Hot Neptune Desert: Transit Observations of LTT 9779 b with HST WFC3*, in prep
- Stotesbury, I., Edwards, B., ABB, et al., incl **Phillips, C.**, 2022, *Twinkle - a small satellite spectroscopy mission for the next phase of exoplanet science*

GRANTS & DISTINCTIONS

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| • IGEN Travel Grant (\$1000) | 2023 |
| • University of California Santa Cruz Other Worlds Laboratory Mini Grant (\$3150) | 2023 |
| • AAS International Travel Grant (\$1900) | 2022 |
| • Underrepresented Minority Communities in Planetary Science Travel Grant (\$2200) | 2022 |
| • Forming and Exploring Worlds Bursary Award (£500) | 2022 |
| • Sigma Xi Grant-In-Aid of Research (\$3426) | 2022 |
| • AAS FAMOUS Travel Grant (\$1000) | 2022 |
| • Two Sigma Diversity PhD Research Grant (\$2000) | 2021 |
| • Inclusive Graduate Education Network Travel Award | 2019 |

PROFESSIONAL SERVICE GRANTS

→ **Heising-Simons Foundation Grant (\$100,000, PI)** #BlackSpaceWeek: A week dedicated to celebrating and amplifying Black scientists and engineers within the space community. Funding to support 2023 and 2024 #BlackSpaceWeek programming.

→ **The Ohio State University, College of Arts & Sciences Graduate Student Success Grant (\$2500, PI)**
Funding to support inaugural Black In Astro undergraduate research competition and travel grants to the American Astronomical Society conference

AWARDS & HONORS

• CCA Pre-Doctoral Fellowship Program, Flatiron Institute Center for Computational Astrophysics	2024
• P.E.O. Scholar Award (\$20,000)	2023 - 2024
• College of Arts and Sciences Graduate Student Award for Diversity Enhancement	2023
• Kavli Fellow	2023
• Royal Astronomical Society Annie Maunder Medal for Outreach to #BlackInAstro team	2023
• Beth Brown Memorial Award for Best Oral Presentation (NSBP/AAS)	2022
• Ann S. Tuttle Citizenship, Engagement, and Outreach Prize (OSU)	2022
• Ford Foundation Predoctoral Fellowship – Honorable Mention	2022
• 2 nd place BlackInX Interdisciplinary Twitter Research Poster Competition	2021
• Hayes Graduate Research Forum Mathematical and Physical Sciences -Third Place (OSU)	2021
• Two Sigma Diversity PhD Fellowship Finalist	2021
• ExoExplorers Program (ExoPAG Executive Committee/NASA Exoplanet Exploration Program)	2021
• 3 rd place BlackInPhysics 3MT competition	2020
• LSSTC Data Science Fellowship (Large Synoptic Survey Telescope Corporation)	2018
• Dean's Strategic Fellowship (UT Austin)	2016
• Astronomy Graduate Excellence Fellowship (UT Austin)	2016
• Outstanding Senior Award (McNair Scholars Program)	2016
• Ronald E. McNair Scholars Program (UALR)	2014-2016

WORKSHOPS & SUMMER SCHOOLS

Other Worlds Laboratory Exoplanet Summer Program (<i>UC Santa Cruz, Santa Cruz, CA</i>)	Summer 2023
Cloud Academy III (<i>Les Houches, France</i>)	March 2023
Other Worlds Laboratory Exoplanet Summer Program (<i>UC Santa Cruz, Santa Cruz, CA</i>)	Summer 2022
NYC Gaia DR3 Fête (<i>Flatiron Institute, NYC</i>)	June 2022
International High Performance Computing Summer School (<i>Athens, Greece</i>)	June 2022

OBSERVING EXPERIENCE

Keck II, KPIC, Mauna Kea Observatory (remote observing)	1 night
LBT, MODS/LBC, Mount Graham International Observatory, (queue observing)	8 nights
Keck II, NIRC2, LGS, Mauna Kea Observatory, (P.I. B. Bowler)	1 night

TELESCOPE PROPOSALS

→ JWST Cycle 2 - \$TBD, 19.0 Hours, (Co-I, PI Ben Burningham), ID. #3670 Sinking silicates: tracing rainout across the LT transition

→ Large Binocular Telescope (PEPSI), *Constraining the Abundances of Solar-Type (FGK) Host Stars of Brown Dwarfs in the Solar Neighborhood*, 10 hours awarded (PI), 2023B

→ Large Binocular Telescope (PEPSI), *Constraining the Abundances of Solar-Type (FGK) Host Stars of Brown Dwarfs in the Solar Neighborhood - Pilot Study*, 5 hours awarded (PI), 2023A

SEMINARS & COLLOQUIA

UC Berkeley Theoretical Astrophysics Center (TAC) Seminar Series (<i>webinar</i>)	April 2023
UC Santa Cruz PLUNCH Seminar (<i>webinar</i>)	March 2023
Case Western Reserve University Particle/Astro CERCA Seminar Series (<i>webinar</i>)	November 2022
NASA GSFC Exoplanet Seminar Series (<i>webinar</i>)	June 2022
University of Delaware Astro Seminar (<i>webinar</i>)	May 2022
CCA Astronomical Data Meeting (New York City, New York)	March 2022
University of Kansas Astronomy and Space Physics Seminar (<i>webinar</i>)	January 2022
STScI Exoplanet, Star, and Planet Formation Seminar Series (<i>webinar</i>)	January 2022
The Pennsylvania State University CEHW Astronomy Seminar (<i>webinar</i>)	November 2021
National Society of Black Physicists Innovate Seminar Series (<i>webinar</i>)	September 2021
American Physical Society: “Quarks to Cosmos” (<i>webinar</i>)	April 2021
NASA JPL Exoplanet Seminar (<i>webinar</i>)	March 2021
Exoplanet Explorers (ExoExplorers) Science Series (<i>webinar</i>)	February 2021
College of Charleston, Department of Physics and Astronomy Colloquium (<i>webinar</i>)	October 2020

RESEARCH TALKS (*INVITED)

- *Astrobiology/JWST Session (Exoplanet Hunters: The Collaborative Search for the Expected Unexpected with JWST), National Academy of Sciences Kavli Frontiers in Science Symposium, March 2023, Irvine, California
- The Atmospheric Retrieval of a Planetary-Mass Companion (contributed talk), *Great Lakes Exoplanet Area Meeting (GLEAM)*, November 2022, Columbus, Ohio
- Is LTT 1445 Ab a Cold Habitable World or a Hycean World?: An Exploration with Twinkle (contributed talk), *National Society of Black Physicists Meeting*, November 2022, Charlottesville, Virginia
- Is LTT 1445 Ab a Cold Habitable World or a Hycean World?: An Exploration with Twinkle (contributed talk), # 54th *Division of Planetary Science Meeting*, October 2022, London, Ontario
- Is LTT 1445 Ab a Cold Habitable World or a Hycean World?: An Exploration with Twinkle (contributed talk), *Other Worlds Laboratory Exoplanet Summer Program*, June 2022, UC Santa Cruz
- Is LTT 1445 Ab a Cold Habitable World or a Hycean World?: An Exploration with Twinkle (contributed talk), *Emerging Researchers in Exoplanet Science (ERES) Conference VII*, August 2022, Pennsylvania State University
- *Detectability of Biosignatures in Temperate Gas Dwarfs with Twinkle (contributed talk), *Twinkle and the Next Generation of Exoplanet Scientists Conference*, September 2021
- Detecting Biosignatures in the Atmospheres of Gas Dwarf Planets with the James Webb Space Telescope (contributed talk), *AbGradCon*, September 2021
- Constraining Detection Limits for Potential Biosignatures in super-Earth Atmospheres with JWST (contributed talk), *ExoPAG 23*, January 2021, virtual due to COVID-19
- Detecting Biosignatures in the Atmospheres of Gas Dwarf Planets with the James Webb Space Telescope (contributed talk), *Bay Area Exoplanet Meeting*, June 2021, virtual due to COVID-19
- Constraining Detection Limits for Potential Biosignatures in super-Earth Atmospheres with JWST (contributed talk), *National Society of Black Physicists*, November 2020, virtual due to COVID-19
- 2M0443+3723 B: A Young Companion at the Substellar Boundary with Potential Membership in the β Pictoris Moving Group (contributed talk), *National Society of Black Physicists*, November 2019, Providence, RI
- Detecting Biosignatures in the Atmospheres of Gas Dwarf Planets with the James Webb Space Telescope, *Edward F. Hayes Graduate Research Forum*, April 2021

Can We Detect Ammonia in the Atmospheres of super-Earths with the James Webb Space Telescope?, *Black In Physics 3MT Competition*, October 2020

RESEARCH POSTERS

“Low to High Resolution Retrievals of Brown Dwarfs: What Can We Learn?” (University of Exeter, UK), *ExoClimes VI*, June 2023

“Retrieving Cloudy L-Dwarfs: A Nearby Planetary-Mass Companion BD+60 1417B and Its Red Twin W0047” (Les Houches, France), *Cloud Academy III*, March 2023

“Retrieval of the BD+60 1417B system: A nearby planetary-mass companion” (Seattle, Washington), *American Astronomical Society, AAS Meeting #241*, January 2023

“Is LTT 1445 Ab a Hycean World or a cold Haber World? Exploring the Potential of Twinkle to Unveil its Nature”, *Black In Physics Poster Session*, October 2022

“Exploring the Lower Boundary of the Radius Valley with Twinkle: Studying Atmospheric Composition and Detecting Biosignatures of a Terrestrial-like planet LTT 1445 Ab”, *Forming and Exploring Habitable Worlds*, November 2022 (virtual)

“A Data Driven Approach to Unlocking Planet Formation: The Atmospheric Retrieval of the BD+60 1417 System” (Toulouse, France) - Cool Stars Conference, July 2022

“A Data Driven Approach to Unlocking Planet Formation: The Atmospheric Retrieval of the BD+60 1417 System” (Athens, Greece) - International High Performance Computing Summer School, June 2022

“Detecting Biosignatures in the Atmospheres of Gas Dwarf Planets with the James Webb Space Telescope” (Virtual) - BlackInX Conference, July 2021

“Characterizing a New Candidate Benchmark Brown Dwarf Companion in the β Pic Moving Group” (National Harbor, Maryland) - American Astronomical Society, AAS Meeting #231, January 2018

DEI & OUTREACH CONFERENCE CONTRIBUTIONS

#AbolishQuals: Barriers to Success for Graduate Students of Color in Astronomy (Seattle, Washington), American Astronomical Society #241th Meeting - special session, January 2023

The ExoExplorers: Early-Career Perspectives on the Intersection of Exoplanet Science and DEIA in Astronomy (Seattle, Washington), American Astronomical Society #241th Meeting - special session, January 2023

The Impact of Grassroot Organizations: A Tale of the Retention through the Black Space Community (Ashley L. Walker, **Phillips, C**, Ronald S. Gamble Jr., Bryne Hadnott, KeShawn Ivory, Dakotah Tyler, Robert Washington III), (Seattle, Washington), American Astronomical Society #241th Meeting, iPoster, January 2023

Black In Astro: A Grassroots Organization to Celebrate and Amplify the Black Experience in Space-Related Fields (Columbus, Ohio), Great Lakes Exoplanet Area Meeting (GLEAM), November 2022

“Equity & Inclusivity Efforts of the Department of Astronomy at The University of Texas at Austin” (Austin, Texas) - Women in Astronomy IV Conference, July 2017

TEACHING APPOINTMENTS

- **Academic Facilitator, URSA Program**
Polaris Program, The Ohio State University

Columbus, OH
Summer 2021 & Summer 2022

⇒ Created and implemented physics and astronomy curriculum, along with teaching and leading discussions during daily courses focused on exoplanets for incoming underrepresented first-year undergraduates to OSU

- **Teaching Assistant, ASTR 1141, “Life in the Universe”** Columbus, OH
Department of Astronomy, The Ohio State University Fall 2020 & Spring 2021
⇒ Introductory course with focus on astrobiology and nature of life in the universe
- **Teaching Assistant, ASTR 3350, “Astronomical Observation and Data Analysis”** Columbus, OH
Department of Astronomy, The Ohio State University Fall 2020
⇒ Undergraduate course with focus on modern astronomy with contemporary data analysis methods implemented in the Python programming language
- **Teaching Assistant, ASTR 309N, “Lives and Deaths of Stars”** Austin, TX
Department of Astronomy, The University of Texas at Austin Spring 2019
⇒ Undergraduate course on supernovas, white dwarfs, neutron stars, and black holes
- **Teaching Assistant, ASTR 321, “The Future of Humanity”** Austin, TX
Department of Astronomy, The University of Texas at Austin Spring & Fall 2018
⇒ Upper-division undergraduate writing astronomy course based on technological advancement. Graded and provided constructive feedback on written assignments
- **Teaching Assistant, ASTR 309C, “Birth of Stars & Planets”** Austin, TX
Department of Astronomy, The University of Texas at Austin Fall 2017
⇒ Undergraduate astronomy course focused on star & planet formation

RESEARCH ADVISING

- **Phoenix Sarian - UC Santa Cruz Lamat Institute REU Program**
Co-advising with Anusha Pai Asnodkar and Dr. ZJ Zhang July 2023 -

ADVISING & MENTORING

- **Simons-NSBP Scholars Program** New York, NY
Graduate Fellow— informal mentor to undergraduate scholars Summer 2022, Summer 2023
- **The SciAccess Zenith Mentorship Program** Columbus, OH
Informal graduate student mentor for high school student in Space Science Mentoring Program Fall 2020
- **TAURUS Summer Research Program** Austin, TX
Informal graduate student mentor and developed imposter syndrome graduate student panel seminar 2017-2018

PROFESSIONAL SERVICE

- **Black In Astro**
Vice-president of [BlackInAstro](#) 2020 - Present
- **Executive Secretary**
NASA Review Panel 2021, 2022
- **Black In Physics**
Documentation lead for Black In Physics Week 2021, 2022
- **The Ohio State University Department of Astronomy Diversity Committee**
Graduate student representative 2019 - Present

PRESS/MEDIA COVERAGE

2022-2023 College of Arts and Sciences Award Winners Announced (Link)	2023
Caprice Phillips wins P.E.O. Scholar Award (Link)	2023
Royal Astronomical Society Unveils 2023 Award Winners (Link)	2023
The Representation of Blackness in Astronomy - Nature Astronomy Q&A (Link)	2022
Beth Brown Memorial Award Winners for 2022 (Link)	2022
Astrobits: It's #BlackSpaceWeek 2022 (Link)	2022
AAS NOVA: Atmospheres of Small Planets Through a Big Telescope (Link)	2022
Astrobits: Atmospheres of Small Planets Through a Big Telescope (Link)	2021
Popular Science Magazine Interview (Link)	2021
Exploring Potential Biosignatures with Twinkle (Link)	2021
"Twinkle" satellite to scan for potentially habitable worlds (Link)	2021
Scientists May Detect Signs of Extraterrestrial Life in the Next 5 to 10 Years (Link)	2021
Astrobits: #BlackInAstro Experiences - Caprice Phillips (Link)	2021
AAS Journal Author Series (Youtube Video)	2020

INVITED OUTREACH

<ul style="list-style-type: none"> Panelist for Space Balls Monthly Movie Nights - Science Fiction vs Science Fact <i>Invited panelist guest to discuss Space Balls movie and exoplanets</i> 	Virtual November 2022
<ul style="list-style-type: none"> Black In Science Podcast <i>Guest on podcast about being Black In Astronomy</i> 	Virtual November 2022
<ul style="list-style-type: none"> Friends of Ohio State Astronomy and Astrophysics (FOSAA) event <i>"Detecting Potential Biosignatures in the Atmospheres of Gas Dwarfs with JWST"</i> 	Virtual October 2021
<ul style="list-style-type: none"> Columbus School for Girls <i>Speaker on research and journey in astronomy</i> 	Virtual April 2021
<ul style="list-style-type: none"> The Big Fib Podcast <i>Podcast featuring stars & planets</i> 	Virtual June 2021
<ul style="list-style-type: none"> Science Around Cincy <i>Invited Guest for YouTube series</i> 	Columbus, OH June 2021
<ul style="list-style-type: none"> Dear Grad Student Podcast <i>Guest on podcast discussing graduate school general experiences</i> 	Virtual September 2020
<ul style="list-style-type: none"> Space Draft: Tucson's Flavor of Astronomy on Tap <i>Virtual public talk: "Super-Earths to Brown Dwarfs: Mysterious In-between Objects"</i> 	Virtual July 2020
<ul style="list-style-type: none"> Making Space for All Webinar Series <i>Talk on exoplanets and habitability for inclusive and accessible astronomy webinar series</i> 	Virtual May 2020
<ul style="list-style-type: none"> Movement Consulting <i>Invited speaker for discussion of unspoken rules of academia</i> 	Virtual July 2020

INVITED PANELS

<ul style="list-style-type: none"> Disney STRANGE WORLD Stem and Sci Fi Panel <i>Panelist on chat about the intersections between science fact and fiction</i> 	Virtual November 2022
<ul style="list-style-type: none"> American Geological Union <i>Invited panelist for exoplanet science with JWST</i> 	Virtual October 2021
<ul style="list-style-type: none"> APS Public Engagement Webinar Series <i>Invited panelist for talk on social media</i> 	Virtual July 2021

- **Committee on the Status of Minorities in Astronomy AAS Panel** Columbus, OH
Virtual Panelist for Anti-Blackness in Astronomy January 2021
- **BlackInPhysics Panel** Columbus, OH
Virtual panelist for undergraduate discussion: "How to be a Successful Student" October 2020
- **Women in Space Panel** Virtual
Live Q&A about astronomy careers for elementary, middle and high school students September 2020

SELECTED OUTREACH

- **#BlackSpaceWeek Organizer** Virtual
Developed and helped organize workshops and professional events June 2021 - Present
- **Black In Astro Travel Grants** March - May 2023
Developed and co-led evaluation for sponsored travel grants
- **Case Western University - Physics Underrepresented Minority Students Group** Virtual
Online Q&A for undergraduates and graduate students about graduate school journey and experiences October 2022
- **Black In Astro Undergraduate Research Competition** Virtual
Co-organized & moderated undergraduate research competition November 2021
- **StriveHigher Inc** Virtual
Women's Herstory month: meet an astrophysicist and astronomer March 2021
- **Girls in STEM Program: Sponsored by the Museum of Discovery** Virtual
Presented a mentoring talk with girls aged 12-15 March 2021
- **Q&A Session with JWST** Virtual
Instagram outreach for JWST February 2021
- **Westview High School** Virtual
Discussed with high school physics class about astronomy career February 2021
- **The Women+ of Color Project** Virtual
Volunteer statement of purpose reading/feedback for program attendees October 2020
- **The Columbus Astronomical Society** Virtual
Presented a virtual talk with graduate students on the history of women in astronomy March 2020
- **Sequoia and Kings Canyon National Park** Mineral King, CA
Designed evening program on natural skies & pop-up activities on natural skies & natural sounds Summer 2019
- **UT Austin College of Natural Sciences** Austin, TX
Presented a poster on Black Women in Astronomy for the Black Excellence in STEM Festival 2019
- **Capital of Texas Undergraduate Research Conference** Austin, TX
Graduate student judge 2018

SCIENTIFIC COLLABORATIONS

Twinkle Science Consortium, The Keck Planet Imager and Characterizer (KPIC) Team, Backyard Worlds: Planet 9 extended science team

PROFESSIONAL SOCIETIES

American Astronomical Society	Junior Member
National Society of Black Physicists	Full Member
Division of Planetary Sciences	Junior member

REFERENCES

Ji Wang (email: wang.12220@osu.edu)

Department of Astronomy

The Ohio State University

McPherson Laboratory 140 West 18th Avenue

Columbus OH, 43210-1173

Jackie Faherty (email: jfaherty17@gmail.com)

American Museum of Natural History

Department of Astrophysics

79th Street and Central Park West

New York, NY 10023

Laura Lopez (email: lopez.513@osu.edu)

Department of Astronomy

The Ohio State University

McPherson Laboratory 140 West 18th Avenue

Columbus OH, 43210-1173