

# Cole Meyer

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## EDUCATION

### University of Arizona, Tucson, AZ

*Ph.D. in Planetary Sciences, Minor in Optical Sciences (Thesis Advisor: Walt Harris)*

Expected 2030

*M.S. (en route) in Planetary Sciences*

Expected 2027

### Princeton University, Princeton, NJ

*A.B., Honors in Astrophysical Sciences with Service Focus*

May 2024

## RESEARCH EXPERIENCE

### de Kleer Group, Caltech, Pasadena, CA

*Research Assistant; Advisors: Prof. Katherine de Kleer, Maria Camarca*

Summer 2024

*Senior Thesis; Advisors: Prof. Katherine de Kleer, Prof. Chris Chyba, Maria Camarca*

Fall 2023 – Spring 2024

*Summer Undergraduate Research Fellowship; Advisors: Prof. Katherine de Kleer, Dr. Xander Thelen, Maria Camarca*

Summer 2023

- Searched ALMA archive data to identify nine calibration observations and generate high-resolution mm and sub-mm images of Callisto.
- Independently developed method to set flux scale and recover disk-integrated brightness temperature of flux density calibrator objects.
- Generated thermophysical models of Callisto using scripts developed by the de Kleer Group and compared features in constructed thermal images with models to infer global and local thermophysical properties.

### AstroTech Summer School, UC Berkeley, Berkeley, CA

*Participant*

Summer 2023

- Designed, prototyped, built, and tested low-resolution spectrograph capable of observing Io's sodium doublet throughout Jovian eclipse to study its sodium jet feature and auroral response to eclipse alongside four graduate students.
- Developed science objectives, development plan, and objective test plan to emulate real-world instrument development.
- Discussed and practiced developing collaborative, inclusive, and efficient teams within the astronomy community.

### Page Group, Princeton University, Princeton, NJ

*Junior Paper; Advisor: Dr. Lyman Page Jr.*

Spring 2023

- Employed techniques from Fourier analysis and general relativity to develop consistent mathematical basis on which to compare quadratic, maximum likelihood, and cross-only quadratic CMB lensing power spectrum estimation methods.
- Generated lensed CMB temperature maps using CAMB via NASA's LAMBDA web interface and recovered CMB lensing power spectrum using quadratic estimator to demonstrate practicality of estimation techniques.

### Research Methods in Astrophysics Course, Princeton University, Princeton, NJ

Fall 2022

- Reproduced and extended orbital analysis from a paper describing the discovery of a white dwarf companion to HD 159062 by developing theoretical orbital model, employing MCMC to explore orbital parameter space given radial velocity and astrometry data, and visualizing results from Emcee to propose likely orbital parameters for observed binary system.

### Space Physics Group, Princeton University, Princeton, NJ

*Junior Paper; Advisors: Dr. Dave McComas, Dr. Riddhi Bandyopadhyay*

Fall 2022

- Extended proton and electron heating rate estimates to near-Sun environment (0.06-0.25 AU) using new data from Parker Solar Probe (PSP) alongside internal energy conservation equations to unveil increasing proton-to-electron heating ratio at small heliocentric distances.
- Interpreted results to constrain potential coronal heating mechanisms and suggest von Kármán decay as a likely candidate.
- Submitted manuscript for publication in *The Astrophysical Journal Letters* and presented work at Princeton Research Day.

*Undergraduate Summer Research Program; Advisors: Dr. Dave McComas, Dr. Jamie Rankin*

Summer 2022

- Proposed and developed non-invasive, automated inspection system to use digital microscope and novel MATLAB analysis software for evaluating flight-readiness of attenuation grid and carbon foil candidates for NASA Solar Wind and Pickup Ion (SWAPI) instrument.
- Delivered daily updates, formal design proposal presentation, and final presentation to lab group; presented final results to other USRP participants and mentors.

### ALMA Observatory, Santiago, Chile

*Princeton International Internship Program; Advisors: Dr. Ed Fomalont, Dr. Bill Dent*

Summer 2021

- Organized a three-month observation period to investigate an unexpected positional offset drift affecting the array for over a decade and determine that temperature unexpectedly affected the array's calibration pipeline, leading to a direct improvement in the quality of data.
- Presented results to over thirty ALMA and NRAO astronomers via PowerPoint.

## TECHNICAL SKILLS

Python • MATLAB • Mathematica • LaTeX • Adobe Illustrator • Adobe Photoshop • Microsoft Office  
CASA • CDPP • UDS • CAMB • LAMBDA • JPL Horizons System  
Thin Film Deposition • Cleanroom Techniques • Laser Optics

## LEADERSHIP EXPERIENCE AND OUTREACH

### AST205: Planets in the Universe

Observation Assistant

September 2023 – Present

- Oversee distribution of 10 telescopes and 10 cameras for observing and astrophotography for over 85 students. Lead numerous observing sessions and taught students to use equipment and identify key astronomical objects.

### Princeton Undergraduate Research Journal

Co-Editor-in-Chief

January 2023 – Present

- Fundraised over \$6,500 from various campus departments to revive previously inactive undergraduate research journal.
- Selected and led over 45 students and 50 faculty members to collect 50 article submissions, perform multiple rounds of peer review and selection, and identify top four articles for publication for [Spring 2023](#) and Fall 2023 issues.

### Princeton Astronomy Club

Founder, Special Projects Chair

January 2023 – Present

- Obtained funding for two amateur club telescopes to be used for STEM outreach and education. Taught two hour-long workshops on “Telescopes and Observing” to twenty Princeton undergraduates, and developed telescope certification program.

Founder, President

December 2021 – January 2023

- Presented funding proposals to student government, collaborated with professors and various departments to coordinate dome telescope operation, and promoted club events via designing, printing, and distributing flyers, buttons, and stickers to the student body.

### Princeton University

Residential College Advisor

August 2022 – Present

- Ensure a safe, inclusive, and engaging community for all residential college students by fostering community, encouraging holistic personal development, and promoting safety, citizenship, and health and wellness. Have advised 9 upperclassmen and 28 first-year students.

### SPLASH – Student Teacher

April 2023

- Developed curriculum and taught an hour-long class to ten high school students for the purposes of STEM education.

### Princeton University Science Olympiad – Event Volunteer

March 2023

### Princeton Rocketry Club

High Power Rocketry Club – Mechanical Subteam Co-lead

September 2020 – August 2021

- Led mechanical subteam through design of payload sled to house sensors and Go-Pro camera for post-launch analysis of a 62.5 lbs rocket, launched with the goal of achieving L1 certification from the National Association of Rocketry.

## PUBLICATIONS

Bandyopadhyay, R., [Meyer, C. M.](#), et al. (2023). Estimates of proton and electron heating rates extended to the near-Sun environment. *The Astrophysical Journal Letters*, 955(2), L28. <https://doi.org/10.3847/2041-8213/acf85e>

[Meyer, C. M.](#), et al. (2024). Revealing Callisto’s Near Subsurface Thermophysical Properties with ALMA Calibrator Data. *In prep.*

Camarca, M., de Kleer, K., Butler, B., Thelen, A., [Meyer, C. M.](#), et al. (2024). A Multi-Frequency Global View of Callisto’s Thermal Properties from ALMA. *In prep.*

## SELECTED PRESENTATIONS

[Meyer, C. M.](#) (2024). *Thermal Imagery of Callisto using ALMA Calibrator Data*. Lunar and Planetary Laboratory Conference 2024, Tucson, AZ, United States.

[Meyer, C. M.](#) (2024). *Dumpster Diving: Thermal Imagery of Callisto Using ALMA Calibrator Data*. Princeton Research Day, Princeton, NJ, United States. <https://tinyurl.com/mu4zasr7>.

[Meyer, C. M.](#) (2024). *Thermal Imagery of Callisto using ALMA Calibrator Data*. 243<sup>rd</sup> American Astronomical Society Meeting, New Orleans, LA, United States.

[Meyer, C. M.](#), Camarca, M., Thelen, A. E., de Kleer, K. (2023). *Thermal Imagery of Callisto from ALMA Calibrator Data*. Caltech Summer Undergraduate Research Fellowship (SURF) Symposium, Pasadena, CA, United States.

[Meyer, C. M.](#), Li, J., Klangboonkrong, K., Abeynayake, S., Pujary, V. (2023). *OBserving Sodium Doublet in Io’s Aurorae (OBSiDIAn)*. AstroTech Spectrograph Symposium, Berkeley, CA, United States.

[Meyer, C. M.](#) (2023). *Estimates of heating rates in the near-Sun environment*. Princeton Research Day, Princeton, NJ, United States. <https://tinyurl.com/3p9r45mk>.

[Meyer, C. M.](#) (2022). *Automating inspection of attenuation grids and carbon foils*. Princeton Undergraduate Summer Research Program (USRP) Symposium, Princeton, NJ, United States. <https://tinyurl.com/29xaf76n>.

[Meyer, C. M.](#) (2021). *Investigating the nature of antenna position offset drift*. ALMA Observatory Final Presentations.

## AWARDS/HONORS

Best Graduate Student Talk – Lunar and Planetary Laboratory Conference

August 2024

NSF Graduate Research Fellow

April 2024

Outstanding Presentation Award – Princeton Research Day

May 2023, May 2024

Service Focus Fellow – Pace Center for Civic Engagement, Public Interest Technology Cohort

June 2021 – May 2022

Arete Fellow – Princeton Effective Altruism

December 2020 – May 2021

Service Leadership Alumnus – Pace Center for Civic Engagement

October 2020