Benjamin **Cassese**

Post-Bacc Astronomy Researcher

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Education

(incoming Fall 2021) Columbia University Astronomy PhD Program

California Insitute of Technology (Caltech). BS, Planetary Science, History. 2020. GPA: 3.82
History Thesis: *No Special Genius: Federal litigation of partisan gerrymandering from 1970-present*.

Non-Research Employment

Geosciences Intern

Houston, TX

ExxonMobil — *Summer 2020*

- Created tools for structural restorations of subsurface reservoirs, then applied them to analyze the deposition history of the Sakhalin-1 oil fields

Lloyd v. Berkner Space Policy Intern

Washington, D.C.

National Academy of Science — *Summer 2019*

- Assisted in the preparation and publication of several federally commissioned technical reports on topics in astronomy and planetary science, including Astro2020, the Decadal Survey meant to guide federal astronomy funding levels over the next 10 years
- Wrote report summaries and highlights for public distribution.
- Attended and summarized congressional briefings on issues relevant to the space science community

Teaching Assistant (TA)

Caltech, GPS Division

Caltech's Division of Geological and Planetary Sciences — *2018, 2020*

- Taught recitation and lab sections, and created and grade homework assignments, Ge 1 and Ge/Ay 103. 1 of 2 undergraduates hired across the department to TA a non-freshman course in '19-'20. Overall teaching effectiveness of 5.0/5.0 as recorded by students on post-course survey

Admissions Ambassador

Caltech Admissions

Caltech Undergraduate Admissions — *June 2017 - June 2020*

- Lead guided tours of the Caltech campus to prospective students and their parents, answering questions about academics and student life
- Sit on event panels, assist in logical preparations for larger events, and occasionally present to potential donors

Research Experience

Post-Bacc Researcher

Caltech, Geological and Planetary Sciences

Brown Group — *Sept 2020 - Present*

- Will reduce and analyze Hubble Space Telescope visible reflectance spectra of all 4 Galilean satellites, creating maps of compositional differences and inputs for surface thermal models
- Expanding on my work on Io as an undergraduate, I will map volcanic plumes on Jupiter's innermost moon and flag both spatial and temporal variations

Undergraduate Researcher

Caltech, Geological and Planetary Sciences

Brown Group/de Kleer Group — *December 2018 - June 2020*

- Analysed Hubble Space Telescope visible reflectance spectra observations of Jupiter's moon Io to map compositional variations across volcanic plume deposits
- Assisted in remote observing sessions using the WM Keck Observatory (most recently on a campaign to observe irregular satellites)
- Assist in other data reduction/analysis, attend and present at regular group meetings

Stevenson Group — *June 2018 - January 2019*

- Independently created a mathematical model of fast-forming terrestrial exoplanet atmospheres to investigate the feasibility of creating an ocean via chemical reactions between rocky material and surrounding gas. This involved calculations in Python and Mathematica using routines of my own design
- Prepared and delivered a technical presentation, a general public presentation, and a poster presentation. Gave an oral presentation at AAS DPS 50 (professional research conference).

Kulkarni Group, Samuel P. and Francis Krown SURF Fellow — *Summer 2017*

- Independently investigated the completeness of the NED, PAN-STARRS, and SDSS sky catalogs to determine the feasibility of detecting electromagnetic radiation from a neutron star merger using Python, SQL, Mathematica, and Excel
- Used 2 hours of independent observing time on the Hale 200" telescope to collect supernovae spectra

Professional Engagement

Federal Relations Subcommittee; Undergraduate Member — *Washington, D.C.*

American Astronomical Society's Division of Planetary Science — *2018-Present*

- Participate in monthly telecons with the full subcommittee, organize action alerts/letter writing campaigns for DPS members
- Possibly participate in Congressional visits to inform lawmakers about the ongoing decadal survey

Presentations/Publications

Io's Surface Composition as Observed by Hubble — *Caltech*

Paper in preparation — *Ongoing*

Aiming to submit a paper co-authored with Prof. de Kleer in Fall 2020 to an AAS Journal.

DPS 50 Oral Presentation — *Knoxville, TN*

American Astronomical Society, Division of Planetary Science — *October, 2018*

- Feasibility of in-situ water production during fast-accreting super-earth formation, Cassese and Stevenson

Awards and Recognitions

2019	**Winner,** Beckman Political Science Grant- Competitive award to support summer endeavors in politics or policy	*Caltech*
2019	**Recipient,** Fritz B. Burns Prize- Awarded annually for academic excellence and great promise in the GPS Division	*Caltech*
2019	**Winner,** Perpall Speaking Competition- Annual research oral presentation competition for all Caltech undergrads	*Caltech*
2018	**Winner,** Gee Family Poster Competition- Poster equivalent of Perpall. Likely first to win both in same school year	*Caltech*
2018	**Awardee,** George W. Housner Student Discovery Fund- Funded continued research and conference travel	*Caltech*
2017	**Finalist,** Perpall Speaking Competition- Top 7 research oral presentations of Caltech undergraduates	*Caltech*

Selected Courses

The Formation and Evolution of Planetary Systems; Planetary Physics; Special Topics in Planetary Science (exoplanet detection techniques and introduction to formation mechanisms); Planet Structure and Evolution; Planetary Surfaces

Bayesian Statistics and Data Analysis; Computational Physics Laboratories 1,3; Learning Systems a,b (Introduction to machine learning); Machine Learning and Data Mining

Additional Activities

Student Gov't (House President as of 2019) — *Caltech*

Blacker House, Caltech — *2017 - 2020*

- Elected to lead and represent the members of Blacker House in all dealings with campus administration and to coordinate all internal House policies
- Sit on the Interhouse Committee with the seven other House Presidents to make up the most active branch of Caltech undergraduate student government, participate in discussions with administrators on proposed policy changes (required time varies from 2-20 hours/week)

Volunteer Science/Math Tutor — *Caltech*

Caltech RISE Program — *2016 - 2020*

- Volunteer tutor 3 hrs/week under served or struggling Pasadena middle and high school students

Rocketry Subteam Lead and Founding Member — *Caltech*

Aeronautics Subteam on PARSEC (Caltech's undergraduate rocketry team) — *2017 - 2019*

- Managed the team responsible for the design and fabrication of our rockets' air frames and parachutes
- Served on PARSEC's Executive Committee with leads of other subteams to set the direction of club and make systems-level design decisions

Other Interests

a cappella singing (member of Out of Context); theater; hiking/outdoors activities; emergency preparedness/health (am currently a certified Emergency Medical Responder (EMR), will receive EMT certification in February 2021)

References

Prof. Katherine de Kleer (Research advisor)
Assistant Professor of Planetary Science
Caltech, GPS Division
dekleer@caltech.edu

Prof. J. Morgan Kousser (Former Academic Advisor)
Professor of History and Social Science
Caltech, HSS Division
kousser@hss.caltech.edu