

# IAN WONG

## PLANETARY SCIENCE RESEARCHER

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## EDUCATION

|             |  |           |
|-------------|--|-----------|
| <b>PhD</b>  | <b>Caltech</b><br>Planetary Science<br><u>Thesis</u> : “Probing the Trojan-Hilda-KBO Connection: An Empirical Test of Dynamical Instability Models of Solar System Evolution”<br><u>Adviser</u> : Michael E. Brown | 2013–2018 |
| <b>B.A.</b> | <b>Princeton University</b><br>Independent concentration in Linguistics<br>Graduated <i>magna cum laude</i> (GPA: 3.98/4.00)   | 2008–2012 |

## RESEARCH POSITIONS

|   |                       |
|---|-----------------------|
| <b>Research Assistant Professor</b><br>Department of Physics, American University | August 2023–present   |
| <b>Postdoctoral Researcher</b><br>NASA Goddard Space Flight Center                | August 2023–present   |
| <b>NASA Postdoctoral Program Fellow</b><br>NASA Goddard Space Flight Center       | August 2021–July 2023 |

- Carrying out cutting-edge spectroscopic analyses and compositional modeling of middle and outer solar system minor bodies using Cycle 1 and 2 JWST observations to probe solar system evolution models and uncover the compositional landscape of the protoplanetary disk.
- Working as a data analysis lead for the JWST Solar System GTO team, with a focus on both spectroscopic and imaging observations of asteroids, comets, and Kuiper belt objects obtained with NIRSpec, NIRCams, and MIRI.
- Developing an open-source Python-based end-to-end spectral extraction tool for JWST NIRSpec and MIRI data.
- Expanding my support of the NASA *Lucy* mission through ground- and space-based spectroscopy of the Jupiter Trojan flyby targets and participation in occultation campaigns
- Continuing my involvement with the TESS Science Team through new exoplanet discoveries, long-term radial velocity monitoring of multi-planet systems, orbital decay searches, and exoplanet phase-curve analyses.
- Engaging the wider public with the latest updates from JWST through outreach activities and public lectures targeting all ages.

## 51 Pegasi b Postdoctoral Fellow

June 2018–July 2021

Department of Earth, Atmospheric and Planetary Sciences, MIT

- Joined the TESS Science Team and began an ongoing multi-year optical phase-curve survey of gas giants using TESS photometry. Obtained dozens of robust phase-curve measurements and uncovered a tentative trend between visible geometric albedo and dayside temperature for hot Jupiters.
- Co-developed ExoTEP – a multipurpose Python-based light-curve extraction and fitting tool for analyzing HST, Kepler, K2, Spitzer, TESS, JWST, and ground-based observations of exoplanet transits, secondary eclipses, and phase curves.
- Initiated a long-term study of active Centaurs, monitoring activity trends, measuring the colors of bare nuclei, and preparing for ongoing and future JWST observations.
- Joined the science team of the NASA *Lucy* flyby mission to the Jupiter Trojans and began ground-based support observations of the mission targets.

## Graduate Research Assistant

June 2013–May 2018

Division of Geological and Planetary Sciences, Caltech

- Carried out a multifaceted comparative study of middle and outer solar system minor body populations – Jupiter Trojans, Hildas, and small Kuiper belt objects – by leveraging archival photometry, wide-field survey imaging, and ground-based near-infrared spectroscopy to uncover and characterize the color bimodality in all three populations.
- Developed a self-consistent hypothesis explaining the color bimodality across the icy minor body populations within the framework of current dynamical instability models of solar system evolution.
- Carried out intensive atmospheric characterization of gas-giant exoplanets, including Spitzer secondary eclipses and full-orbit phase curves, as well as HST transmission spectroscopy.

## OTHER PROFESSIONAL ACTIVITIES

|   |                     |
|---|---------------------|
| <b>Outreach mentor</b> , NASA <i>Lucy</i> mission Here 2 Observe program                  | 2023–present        |
| <b>Member</b> , JWST Solar System GTO team  | 2021–present        |
| <b>Reviewer/panelist</b> on various NSF, NOIRLab, NASA, HST, JWST proposal cycles         | 2021–present        |
| <b>Affiliate member</b> , NASA <i>Lucy</i> mission science team                           | 2018–present        |
| <b>Referee</b> , AJ, PSJ, A&A, Icarus, MNRAS  | 2016–present        |
| <b>Research adviser</b>   |                     |
| • Shiqi Chen: <i>Undergraduate Research Opportunities Program</i> , MIT                   | 2020–2021           |
| • Prajwal Niraula: <i>Graduate Generals Project</i> , MIT                                 | 2019–2021           |
| • Aakash Mishra: <i>Research in Science &amp; Engineering</i> , Boston University         | Summer 2018         |
| • Angelica Zhou: <i>Summer Undergraduate Research Fellowship</i> , Caltech                | Summer 2017         |
| • Yixiao Yan: <i>Summer Undergraduate Research Fellowship</i> , Caltech                   | Summer 2015         |
| <b>Member of Scientific Organizing Committee</b> , 52 <sup>nd</sup> Annual DPS Conference | 2020                |
| <b>Teaching assistant</b> , Caltech   | 2014–2018           |
| • Ge 103: Introduction to the Solar System  |                     |
| • Ge 108: Applications of Physics to the Earth Sciences                                   |                     |
| <b>Work intern</b> , Advanced Propulsion Laboratory, NASA Marshall Space Flight Center    | Fall 2012           |
| <b>Research intern</b>  |                     |
| - <i>Undergraduate Student Research Program</i> , Princeton University                    | Summer 2012         |
| - <i>Program in Plasma Science and Technology</i> , PPPL                                  | Summers 2010 & 2011 |

## FUNDING PROPOSALS

|   |           |
|---|-----------|
| JWST Cycle 2 DD Program #4621 (PI)                                    | 2024      |
| \$50,000+ ( <i>budget not finalized yet; standard minimum shown</i> ) |           |
| JWST Cycle 2 GO Program #3991 (co-I)                                  | 2023-2025 |
| \$50,000 [0.27 FTE]   |           |
| JWST Cycle 2 GO Program #3399 (co-I)                                  | 2023-2025 |
| \$57,494 [0.32 FTE]   |           |
| HST Cycle 25 GO-15249 (PI)  | 2018-2021 |
| \$108,107.80  |           |

## PUBLICATIONS

Full references are provided in my [NASA ADS Library](#)

### First- and second-author papers (30)

1. Wong I, Cook, J C, Stansberry J A, et al. “JWST/NIRSpec spectra of Salacia-Actaea and 2002 MS4 reveal crystalline H<sub>2</sub>O and CO<sub>2</sub> ices”. PSJ, in prep (2023).
2. Wong I, Brown M E, Emery J P, et al. “JWST near-infrared spectroscopy of the *Lucy* Jupiter Trojan flyby targets: Evidence for OH absorption, aliphatic organics, and CO<sub>2</sub>”. PSJ, submitted (2023).
3. Emery J P, Wong I, Stansberry J A, et al. “A tale of 3 dwarf planets: Compositions of Sedna, Gonggong, and Quaoar from JWST spectroscopy”. Icarus, submitted (2023).
4. Grundy W M, Wong I, Glein C R, et al. “Measurement of D/H and <sup>13</sup>C/<sup>12</sup>C ratios in methane ice on Eris and Makemake: Evidence for internal activity”. Icarus, in revision (2023).
5. Wong I & Brown M E. “Photometric validation and characterization of the Ennomos collisional family in the Jupiter Trojans”. AJ 165 15 (2023).
6. Wong I, Chachan Y, Knutson H A, et al. “The Hubble PanCET program: A featureless transmission spectrum for WASP-29b and evidence of enhanced atmospheric metallicity on WASP-80b”. AJ 164 30 (2022).
7. Wong I, Shporer A, Vissapragada S, et al. “TESS revisits WASP-12: Updated orbital decay rate and constraints on atmospheric variability”. AJ 163 175 (2022).
8. Wong I, Shporer A, Zhou G, et al. “TOI-2109: An ultrahot gas giant on a 16 hr orbit”. AJ 162 256 (2021).
9. Wong I, Kitzmann D, Shporer A, et al. “Visible-light phase curves from the second year of the TESS primary mission”. AJ 162 127 (2021).
10. Beatty T G, Wong I, Fetherolf T, et al. “The TESS phase curve of KELT-1b suggests a high dayside albedo”. AJ 160 211 (2020).
11. Wong I, Shporer A, Daylan T, et al. “Systematic phase curve study of known transiting exoplanet systems from Year 1 of the TESS Mission”. AJ 160 155 (2020).
12. Wong I, Shporer A, Kitzmann D, et al. “Exploring the atmospheric dynamics of the extreme ultra-hot Jupiter KELT-9b using TESS photometry”. AJ 160 88 (2020).
13. Wong I, Benneke B, Gao P, et al. “Optical to near-infrared transmission spectrum of the warm sub-Saturn HAT-P-12b”. ApJ 159 234 (2020).
14. Wong I, Benneke B, Shporer A, et al. “TESS phase curve of the ultra-hot Jupiter WASP-19b”. AJ 159 104 (2020).
15. Wong I, Shporer A, Becker J C, et al. “The full *Kepler* phase curve of the eclipsing hot white dwarf binary system KOI-964” ApJ 159 29 (2020).
16. Benneke B, Wong I, Piaulet C, et al. “Water vapor and clouds on the habitable-zone sub-Neptune exoplanet K2-18b”. ApJL 887 L14 (2019).
17. Wong I, Mishra A, & Brown M E “Photometry of active Centaurs: Colors of dormant active Centaur nuclei” AJ 157 225 (2019).

18. Wong I & Brown M E. “Multiband observations of a Patroclus-Menoetius mutual event: Constraints on surface inhomogeneity”. AJ 157 203 (2019).
19. Shporer A, Wong I, Huang C X, et al. “TESS full orbital phase curve of the WASP-18b system” AJ 157 178 (2019).
20. Wong I, Brown M E, Blacksborg J, Ehlmann B L, & Mahjoub A. “Hubble ultraviolet spectroscopy of Jupiter Trojans”. AJ 157 161 (2019).
21. Wong I, Brown M E, & Emery J P. “0.7-2.5  $\mu$ m spectra of Hilda asteroids”. AJ 154 104 (2017).
22. Wong I & Brown M E. “The bimodal color distribution of small Kuiper Belt objects”. AJ 153 145 (2017).
23. Wong I & Brown M E. “The color-magnitude distribution of Hilda asteroids: Comparison with Jupiter Trojans”. AJ 153 69 (2017).
24. Wong I & Brown M E. “A hypothesis for the color bimodality of Jupiter Trojans”. AJ 152 90 (2016).
25. Wong I, Knutson H A, Kataria T, et al. “3.6 and 4.5  $\mu$ m *Spitzer* phase curves of the highly irradiated hot Jupiters WASP-19b and HAT-P-7b”. ApJ 823 122 (2016).
26. Wong I & Brown M E. “The color-magnitude distribution of small Jupiter Trojans”. AJ 150 174 (2015).
27. Wong I, Knutson H A, Lewis, N K, et al. “3.6 and 4.5  $\mu$ m phase curves of the highly irradiated eccentric hot Jupiter WASP-14b”. ApJ 811 122 (2015).
28. Wong I, Brown M E, & Emery J P. “The differing magnitude distributions of the two Jupiter Trojan color populations”. AJ 148 112 (2014).
29. Wong I, Knutson H A, Cowan N B, et al. “Constraints on the atmospheric circulation and variability of the eccentric hot Jupiter XO-3b”. ApJ 794 134 (2014).
30. Wong I, Grigoriu A, Roslund J, Ho T S, & Rabitz H. “Laser-driven direct quantum control of nuclear excitations”. Phys. Rev. A 84 053429 (2011).

### Other co-author papers (29)

1. Protopapa S, Raut U, Wong I, et al. “Discovery of carbon dioxide and hydrogen peroxide on Charon’s stratified surface with JWST”. Nature Communications, submitted (2023).
2. Licandro J, Pinilla-Alonso N, Holler B J, et al. “Surface composition of Centaurs: Insights into the thermal evolution of TNOs”. Nature Astronomy, submitted (2023).
3. Pinilla-Alonso N, Brunetto R, de Prá M N, et al. “A DiSCo-TNOs portrait of the primordial Solar System”. Nature Astronomy, submitted (2023).
4. Glein C R, Grundy W M, Lunine J I, et al. “Moderate D/H ratios in methane ice on Eris and Makemake as evidence of hydrothermal or metamorphic processes in their interiors: Geochemical analysis”. Icarus, in revision (2023).
5. Rivkin A S, Thomas C A, Wong I, et al. “Near to mid-Infrared spectroscopy of (65803) Didymos as observed by JWST: Characterization observations supporting the Double Asteroid Redirection Test”. PSJ, accepted (2023).
6. Coulombe J-P, Benneke B, Challener R, et al. “A broadband thermal emission spectrum of the ultra-hot Jupiter WASP-18b”. Nature 620 292 (2023).
7. Piaulet C, Benneke B, Almenara J M, et al. “Evidence for the volatile-rich composition of a 1.5-Earth-radius planet”. Nature Astronomy 7 206 (2022).
8. Marschall R, Nesvorný D, Deienno R, et al. “Implications for the collisional strength of Jupiter Trojans from the Eurybates family”. AJ 164 167 (2022).
9. Niraula P, Shporer A, Wong I, & de Wit J. “Revisiting Kepler transiting systems: Unvetting planets and constraining relationships among harmonics in phase curves”. AJ 163 172 (2022).
10. Addison B C, Knudstrup E, Wong I, et al. “TOI-1431b/MASCARA-5b: A highly irradiated ultra-hot Jupiter orbiting one of the hottest & brightest known exoplanet host stars”. AJ 162 292 (2021).

11. Cabot S H C, Bello-Arufe A, Mendoça J M, et al. "TOI-1518b: A misaligned ultra-hot Jupiter with iron in its atmosphere". *AJ* 162 218 (2021).
12. Levison H F, Olkin C B, Noll, K S, et al. "Lucy Mission to the Trojan asteroids: Science goals". *PSJ* 2 171 (2021).
13. Guerrero N M, Seager S, Huang C X, et al. "The TESS Objects of Interest catalog from the TESS Prime Mission". *ApJS* 254 39 (2021).
14. Daylan T, Günther M N, Mikal-Evans T, et al. "TESS observations of the WASP-121b phase curve". *AJ* 161 131 (2021).
15. Crossfield I J M, Dragomir D, Cowan N B, et al. "Phase curves of hot Neptune LTT 9779b suggest a high-metallicity atmosphere with nonzero albedo". *ApJL* 903 L7 (2020).
16. Dragomir D, Crossfield I J M, Benneke B, et al. "Spitzer reveals evidence of molecular absorption in the atmosphere of the hot Neptune LT9779b". *ApJL* 903 L6 (2020).
17. Chachan Y, Jontof-Hutter D, Knutson H A, et al. "A featureless infrared transmission spectrum for the super-puff planet Kepler-79d". *AJ* 160 201 (2020).
18. Teske J, Días M R, Luque R, et al. "TESS reveals a short-period sub-Neptune sibling (HD 86226c) to a known long-period giant planet". *AJ* 160 96 (2020).
19. Huang C X, Quinn S N, Vanderburg A, et al. "TESS spots a hot Jupiter with an inner transiting Neptune". *ApJL* 892 L7 (2020).
20. Mansfield M, Bean J L, Stevenson K B, et al. "Evidence for H<sub>2</sub> dissociation and recombination heat transport in the atmosphere of KELT-9b". *ApJL* 888 L15 (2020).
21. Chachan Y, Knutson H A, Gao P, et al. "A *Hubble* PanCET study of HAT-P-11b: A cloudy Neptune with a low atmospheric metallicity" *AJ* 158 244 (2019).
22. Zhou G, Huang C X, Bakos G Á, et al. "Two new HATNet hot Jupiters around A stars, and the first glimpse at the occurrence rate of hot Jupiters from *TESS*" *AJ* 158 141 (2019).
23. Benneke B, Knutson H A, Lothringer J, et al. "A Sub-Neptune atmosphere with solar water abundance, strong methane depletion, and Mie-scattering aerosols". *Nature Astronomy* 3 813 (2019).
24. Rodriguez J E, Quinn S N, Huang C X, et al. "An eccentric massive Jupiter orbiting a sub-giant on a 9.5 day period discovered in the *Transiting Exoplanet Survey Satellite* Full Frame Images". *ApJ* 157 191 (2019).
25. Poston M J, Mahjoub A, Ehlmann B L, et al. "Visible near-infrared spectral evolution of irradiated mixed ices and application to Kuiper Belt objects and Jupiter Trojans". *ApJ* 856 124 (2018).
26. Ingalls J G, Krick J E, Carey S J, et al. "Repeatability and accuracy of exoplanet eclipse depths measured with post-cryogenic *Spitzer*". *AJ* 152 44 (2016).
27. Krick J E, Ingalls J, Carey S, et al. "*Spitzer* IRAC sparsely sampled phase curve of the exoplanet WASP-14b". *ApJ* 824 27 (2016).
28. Beichman, C, Livingston, J, Werner W, et al. "*Spitzer* observations of exoplanets discovered with the *Kepler* K2 mission". *ApJ* 822 39 (2016).
29. Buhler, P B, Knutson H A, Batygin, K, et al. "Dynamical constraints on the core mass of hot Jupiter HAT-P-13b". *ApJ* 821 26 (2016).

## CONFERENCE AND SEMINAR TALKS

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1. “Studying small bodies with JWST: New insights into solar system history near and far”, *EPL Seminar, Carnegie Institution for Science, Washington D.C., 2023*. [\[invited talk\]](#)
2. “The complex surface and atmospheric properties of Triton revealed by JWST/NIRSpec”, *55<sup>th</sup> DPS Meeting, San Antonio, Texas, 2023*.
3. “Studying small bodies with JWST: New insights into solar system history near and far”, *First Year of JWST Science Conference, Baltimore, Maryland, 2023*. [\[invited talk\]](#)
4. “Exploring the compositional diversity of large Kuiper belt objects with JWST”, *Asteroids, Comets, and Meteors, Flagstaff, Arizona, 2023*.
5. “The complex compositional landscape of the outer protoplanetary disk revealed through JWST GTO observations of large Kuiper belt objects”, *STScI Spring Symposium, Baltimore, Maryland, 2023*.
6. “Transiting Exoplanet Science with JWST”, *AAS Meeting #241, Seattle, Washington, 2023*. [\[invited talk\]](#)
7. “Kuiper Belt Science with JWST”, *JWST First Science Results Conference, Baltimore, Maryland, 2022*.
8. “TESS in the Extended Mission: A powerful tool for time-domain exoplanet science”, *TESS Science Team Meeting #29, Cambridge, Massachusetts, 2022*.
9. “Observational confirmation and characterization of the Ennomos collisional family”, *54<sup>th</sup> DPS Meeting, London, Canada, 2022*.
10. “TOI-2109b: The shortest period gas giant yet discovered”, *CHAMPS Early Career Highlight Seminar, online conference, 2022*.
11. “Observational confirmation and characterization of the Ennomos collisional family”, *53<sup>rd</sup> DPS Meeting, online conference, 2021*.
12. “TOI-2109b: The shortest period gas giant yet discovered”, *TESS Science Conference 2, online conference, 2021*.
13. “Ultra-hot Jupiters in the era of TESS”, *JPL Exoplanet Journal Club, 2021*. [\[invited talk\]](#)
14. “Exoplanet phase curves from TESS: Results from the Primary Mission and future prospects”, *AAS Meeting #237, online conference, 2021*.
15. “Exoplanet phase curves from TESS: Results from the Primary Mission and future prospects”, *52<sup>nd</sup> DPS Meeting, online conference, 2020*.
16. “Icy bodies in the middle and outer Solar System: Tracers of planetary migration”, *Star and Planet Formation Colloquium, University of Michigan, 2020*. [\[invited talk\]](#)
17. “Systematic phase curve study of known transiting systems from the TESS Primary Mission”, *Exoplanets III, online conference, 2020*.
18. “Phase curve studies of known transiting systems with TESS”, *TESS Science Conference 1, Cambridge, Massachusetts, 2019*.
19. “UV spectroscopy of Jupiter Trojans”, *50<sup>th</sup> DPS Meeting, Knoxville, Tennessee, 2018*.
20. “The Trojan-Hilda-KBO connection: An observational test of solar system evolution models”, *The Transneptunian Solar System, Coimbra, Portugal, 2018*. [\[invited talk\]](#)
21. “The Trojan-Hilda-KBO connection: An observational test of solar system evolution models”, *AGU Fall Meeting, New Orleans, Louisiana, 2017*.
22. “The Trojan-Hilda-KBO connection: An observational test of solar system evolution models”, *49<sup>th</sup> DPS Meeting, Provo, Utah, 2017*.
23. “Near-infrared transmission spectra of three cool giant gas exoplanets”, *ExSoCal, Pasadena, California, 2016*.
24. “Multiband Spitzer phase curves of three highly-irradiated hot Jupiters”, *AAS Meeting #227, Kissimmee, Florida, 2016*. [\[invited talk\]](#)
25. “The color-magnitude distribution of small Kuiper Belt objects”, *47<sup>th</sup> DPS Meeting, National Harbor, Maryland, 2015*.



26. “Multiband *Spitzer* phase curves of three highly-irradiated hot Jupiters”, *11<sup>th</sup> Rencontres du Vietnam, Planetary Systems: A Synergistic View, Quy Nhon, Vietnam, 2015.*
27. “Sub-populations among the Jupiter Trojans”, *Asteroids, Comets, and Meteors, Helsinki, Finland, 2014.*

## PUBLIC TALKS

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1. “A revolution in solar system astronomy with JWST”, *Cosmic Explorations Speaker Series, Lunar and Planetary Institute, 2023.*
2. “Opening a new chapter of exoplanet science with JWST”, *Astronomy Club, Penn State Berks, 2022.*
3. “Opening a new chapter of exoplanet science with JWST”, *Edelman Planetarium, Rowan University, 2021.*
4. “Opening a new chapter of exoplanet science with JWST”, *Brown Planetarium, Ball State University, 2021.*

## CONFERENCE POSTERS

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1. “JWST observations of the *Lucy* flyby targets: New spectroscopic constraints on Jupiter Trojan composition”, *Asteroids, Comets, and Meteors, Flagstaff, Arizona, 2023.*
2. “TOI 618: A benchmark multi-planet system discovered using TESS photometry and long-term RV monitoring”, *AAS Meeting #241, Seattle, Washington, 2023.*
3. “TESS in the Extended Mission: A powerful tool for time-domain exoplanet science”, *Exoplanets IV, Las Vegas, Nevada, 2022.*
4. “Exoplanet phase curves from TESS: Results from the Primary Mission and future prospects”, *TESS Science Conference 2, online conference, 2021.*
5. “TESS in the Solar System: Refining asteroid light curves with long-baseline photometry”, *EPSC-DPS Joint Meeting, Geneva, Switzerland, 2019.*
6. “Phase curve studies of known transiting systems with TESS”, *Extreme Solar Systems IV, Reykjavik, Iceland, 2019.*
7. “A comparison of Hildas and Jupiter Trojans using photometry, spectroscopy, and size distributions”, *48<sup>th</sup> DPS Meeting, Pasadena, California, 2016.*
8. “Near-infrared transmission spectra of three cool giant gas exoplanets”, *ExoClimes, Squamish, Canada, 2016.*
9. “The color-magnitude distribution of small Jupiter Trojans”, *46<sup>th</sup> DPS Meeting, Tucson, Arizona, 2014.*

## OBSERVING EXPERIENCE

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(PI programs, unless otherwise indicated)

### James Webb Space Telescope (JWST)

- Cycle 2 DD Program #4621 (4.0 hours, NIRSpec)  
“Time-sensitive observations of Chiron: a unique active Centaur beyond 15 AU”

### Hubble Space Telescope (HST)

- Cycle 25 GO-15249 (7 orbits, STIS)  
“An observational test of the dynamical instability hypothesis in the Solar System”

### Gemini South

- 2023A (1.5 hours, GMOS)

“Proving surface inhomogeneities on Patroclus-Menoetius through hemispherically-resolved spectroscopy”

### Magellan Observatory

- 2019A+2019B+2020A+2021A (2.5 nights, IMACS, LDSS-3)  
“Colors of active Centaurs: A window into KBO formation and composition”
- 2020A+2021A (1 night, IMACS)  
“Probing the purported Ennomos collisional family in the Jupiter Trojans”
- 2019B+2020B (3 nights, PFS)  
“Exploring the desert: Precise radial velocity confirmation of TESS sub-Saturn candidates”

### Cerro Tololo Inter-American Observatory (CTIO)

- 2022A+2022B+2023A (30 hours, CHIRON)  
“Radial velocity characterization of the massive outer companions in the TOI-618 and TOI-2488 systems”
- 2021B (10 hours, CHIRON)  
“Long-term RV monitoring of the benchmark multiplanet system TOI-618”
- 2019A+2019B+2020A (80 hours, CHIRON)  
“Exploring the desert: Precise radial velocity confirmation of TESS sub-Saturn candidates”

### NASA Infrared Telescope Facility (IRTF)

- 2020B+2021B (4 nights, SpeX)  
“Constraining the composition and origin of Hilda asteroids: Exploring the 3-micron feature”
- 2016A+2016B (7 nights, SpeX)  
“Near-infrared spectra of bright Hilda asteroids: Probing the Hilda-Trojan connection”

### Palomar 200-inch Hale Telescope

- 2017A+2017B (4 nights, LFC)  
“Colors and activity of Centaurs”
- 2018A (2 nights, WASP)  
“Photometric observations of mutual events of the Trojan binary Patroclus-Menoetius”

### Co-I programs and other observing experience:

- 25.5 hours on JWST Cycle 1 (NIRSpec, MIRI)
- 42.1 hours on JWST Cycle 2 (NIRSpec)
- 30 orbits on HST Cycle 31 (WFC3)
- 4 nights at Palomar 200-inch Hale Telescope (LFC),
- 3 nights at Subaru Telescope (SuprimeCam, Hyper SuprimeCam)
- 5 nights at Keck Observatory (NIRSPEC)

## TECHNICAL SKILLS

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**Programming:** Python (expert), IDL (advanced), MATLAB (intermediate), FORTRAN (intermediate)

**Developer tools:** Git/GitHub, Jira

**Libraries:** NumPy, SciPy, Astropy, Matplotlib, pandas, scikit-learn, emcee, dynesty

**Applications:** LaTeX, Overleaf, Microsoft Office, ArcGIS, LabVIEW

**Laboratory work:** basic machine shop skills, laboratory electronics, lasers



## REFERENCES

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### Michael Brown

Professor of Planetary Astronomy  
Division of Geological and Planetary Sciences  
California Institute of Technology  
1200 E California Blvd  
Pasadena, CA 91125

[mbrown@caltech.edu](mailto:mbrown@caltech.edu)

*Relationship: PhD thesis adviser and collaborator on solar system small bodies research*

### Heather Knutson

Professor of Planetary Science  
Division of Geological and Planetary Sciences  
California Institute of Technology  
1200 E California Blvd  
Pasadena, CA 91125

[hknutson@caltech.edu](mailto:hknutson@caltech.edu)

*Relationship: Graduate research adviser and collaborator on exoplanet atmospheric characterization*

### Avi Shporer

Research Scientist  
MIT Kavli Institute  
Massachusetts Institute of Technology  
77 Massachusetts Ave.  
Cambridge, MA 02139

[shporer@space.mit.edu](mailto:shporer@space.mit.edu)

*Relationship: TESS Science Team member and collaborator on exoplanet research*

### Richard Binzel

Professor of Planetary Sciences  
Department of Earth, Atmospheric and Planetary Sciences  
Massachusetts Institute of Technology  
77 Massachusetts Ave.  
Cambridge, MA 02139

[rpb@mit.edu](mailto:rpb@mit.edu)

*Relationship: NASA Lucy Mission Science Team member and former postdoctoral fellowship supervisor*

### Stefanie Milam

Research Scientist  
Astrochemistry Laboratory (Code 691)  
NASA Goddard Space Flight Center  
Greenbelt, MD 20771

[stefanie.n.milam@nasa.gov](mailto:stefanie.n.milam@nasa.gov)

*Relationship: Current postdoc supervisor, JWST Deputy Project Scientist for Planetary Science, and lead coordinator of JWST Solar System GTO programs*