

SHASHANK DHOLAKIA

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EDUCATION

Ph.D Candidate in Astrophysics

May 2022 - Present

Mapping stars, planets and their environments

University of Queensland

B.A. Astrophysics

August 2017 - Dec 2021

Minor in CalTeach Science & Math Education

University of California, Berkeley

High School Diploma

July 2013 - June 2017

Wilcox High School

RESEARCH POSITIONS

Undergraduate Researcher, Flatiron Institute

Fall 2020 - Feb 2022

Topic: Fast transit models for rapidly-rotating stars (see paper 3)

Advisor: Dr. Rodrigo Luger

Research Intern, NASA AMES

Summer 2020

Topic: Earth analogs from *Kepler* mission

Funding: SETI Institute

Advisor: Dr. Jack Lissauer

Research Intern, Mazin Lab

Summer 2020

Topic: Microwave Kinetic Inductance Detector (MKID) simulations

Funding: University of California, Santa Barbara

Advisor: Prof. Ben Mazin

Undergraduate Researcher, PALS Group, UC Berkeley

January 2017 - Dec 2021

Topic: Long-period planets in *K2* and *TESS* (see paper 2)

Advisor: Prof. Courtney Dressing

Research Intern, NASA AMES

Summer 2017

Topic: Planets in stellar clusters

Funding: SETI Institute

Advisor: Dr. Ann Marie Cody

Research Intern, NASA AMES

July 2015 - June 2018

Topic: Discovery and follow-up of planet 2MASS J06101557+2436535 (see paper 1)

Advisor: Dr. Ann Marie Cody and Dr. Steve Howell

PUBLICATIONS

- [5] **Dholakia, Shashank.**; Dholakia, Shishir; Pope, Benjamin JS; *A General, Differentiable Transit Model for Ellipsoidal Occulters: Derivation, Application, and Forecast of Planetary Oblateness and Obliquity Constraints with JWST* Submitted ApJ, 2024
- [4] Lanthermann, C.; ten Brummelaar, T.; Tuthill, P.; Anugu, N.; Ligon, E. R.; Schaefer, G.; Gies, D.; **Dholakia, S.**; Taras, A. *Silmaril: final design and on-sky performance* SPIE Proceedings, 2024
- [3] **Dholakia, Shashank.**; Luger, Rodrigo; Dholakia, Shishir; *Efficient and Precise Transit Light Curves for Rapidly Rotating, Oblate Stars* ApJ, 2022

- [2] Dholakia, S.¹; **Dholakia, S.¹**; Mayo, A. W.; Dressing, C. D.; *Constraining Orbital Periods from Nonconsecutive Observations: Period Estimates for Long-Period Planets in Six Systems Observed by K2 During Multiple Campaigns*. Astron. J, 2020.
- [1] **Dholakia, S.¹**; Dholakia, S.¹; Cody, A.M; Howell, S. B.; Johnson, M. C.; Isaacson, H.; Everett, M. E.; Ciardi, D. R.; Howard, A. W; Shporer, A.; *A Substellar Companion to a Hot Star in K2's Campaign 0 Field*. PASP, 2019.

TALKS AND POSTERS

Invited Talks

- *A Search for Exoplanets in the Open Cluster Messier 35 and Koposov 62 Using a Novel Large-Scale Photometric Algorithm for the K2 Mission*. Kepler & K2 Mission Science Team, NASA AMES Research Center, CA, July. 2015.
- *A Search for Exoplanets in the Open Cluster Messier 35 and Koposov 62 Using a Novel Large-Scale Photometric Algorithm for the K2 Mission*. Lick Observatory VAN Talks, CA, Oct. 2015.
- *Citizen Science and Photometry on Exoplanets*. San Jose Astronomical Association Imaging SIG Talks, CA, May. 2016.

Contributed Talks

- *Harmonix: Analytic interferometry of rotating stars*. CHARA Science Meeting, NOIRLab, Arizona, March. 2024.
- *Mapping stellar surfaces to solve the Transit Light Source Effect* Australian Exoplanet Workshop, Sydney, NSW, Sept. 2023.
- *Constraining spin-orbit angles photometrically using a transit model for exoplanets orbiting rapidly-rotating stars*. ASA Annual Science Meeting, Hobart, Tasmania, June. 2022.
- *Mind the Gap: Period Constraints for Long Period Planets in Overlapping Fields with K2*. Bay Area Exoplanet Meeting, NASA AMES Research Center, CA, Sept. 2019.
- *A Substellar Companion to a Hot Star in K2's C0 M35 Field*. Bay Area Exoplanet Meeting, NASA AMES Research Center, CA, March 2018.
- *A Substellar Companion to a Hot Star in K2's C0 M35 Field*. CIPS Seminar Talk, Berkeley, CA, Feb 2018.

Poster Presentations

- **Dholakia S.**; Dholakia, S.; Pope, BJS; *Unraveling the information content of planetary oblateness in transit light curves* Extreme Solar Systems V, Mar 2024.
- **Dholakia S.**; Luger R.; Dholakia S.; *Efficient transit light curves for oblate and rapidly rotating stars*. TESS Sci Con II, Aug 2021.
- **Dholakia, S.**; Dholakia, S.; Mayo, A. W.; Dressing, C. D.; *Mind the Gap 2: Period Constraints for Long-Period Planets in Overlapping Fields*. Kepler-K2 Science Conference V, March 2019.
- Dholakia, S.; **Dholakia, S.**; Mayo, A. W.; Dressing, C. D.; *Mind the Gap 1: New Constraints for Six Planet Candidate Systems in K2 C5, C16, and C18 data* Kepler-K2 Science Conference V, March 2019.
- **Dholakia, S.¹**; Dholakia, S.¹; Cody, A.M; *A Search for Exoplanets in the Open Star Clusters Messier 35 and Koposov 62 Using A Photometric Algorithm for the K2 Mission*. AAS 229, Grapevine TX, Jan 2017.

AWARDS

- Malin Awards 2023 Highly Commended (Solar System category)
- 1st Place Grand Award in Physics, Intel International Science and Engineering Fair (2015)
- California State Science Fair Project of the Year (2015)
- Pricilla and Bart Bok Award 1st place, Intel International Science and Engineering Fair (2016 & 2015)
- Young Astronomy Photographer of the Year (Royal Greenwich Observatory) (2014)

RESEARCH SKILLS & EXPERIENCE

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|------------------------|--|
| Observation | Photometry, Optical Interferometry, Doppler Imaging, Speckle Interferometry, AO Imaging, RV Spectroscopy |
| Software | Python (JAX, Astropy, Scipy, Pandas, etc.), LaTeX |
| Instrumentation | Polarimeters, soldering, breadboard circuits, telescope control |
| Other | Astrophotography |

Relevant Coursework:

Astrophysical Techniques (ASTRON203), Astro Data Science Lab (ASTRON128), Intro to Optical Eng. (EE118), Optical and IR Astro Lab (ASTRON 120), Planetary Astrophysics (ASTRON162), Stellar Astrophysics (ASTRON160), Quantum Mechanics (PHYS5c, PHYS137a), Intro to Experimental Physics (PHYS 5b PHYS5c), Structure and Interpretations of Computer Science (CS61a).

Awarded Telescope Time:

PI: CHARA Array (2024A), 3 nights; Optical interferometry
PI: AAT Veloce (2024A), 3 nights, Doppler imaging
Co-I: CHARA Array (2023B), 3 nights; Optical interferometry (PI P. Tuthill)
Co-I: Gran Telescopio Canarias (2019B), 2 nights; Doppler tomography (PI E. Palles)
Co-I: Gemini/GRACES (2018B), 10 hours; Doppler tomography (PI M. Johnson)
Co-I: NASA-Keck (2017A), 1 night; Radial velocity spectroscopy (PI A. M. Cody)
Co-I: LCOGT 0.4m (2016B), 6 hours; Transit photometry (PI D. Ciardi)

Observed on:

CHARA Array (SPICA/MIRC-X/MYSTIC): Optical Long-Baseline Interferometry
AAT 3.9-meter/Veloce: Doppler Imaging
WIYN 3.5-meter/DSSI: Speckle Interferometry
Lick ShaneAO/ShARCS: Adaptive Optics Imaging
Leuschner 30": Transit photometry
iTelescope 17" CDK: Transit photometry
10", 4" refractor & others: Transit photometry, low-res spectroscopy, astrophotography, outreach public viewing

Analyzed or Reduced Data From:

JWST: Aperture Masking Interferometry, Spectroscopy, Photometry
Kepler Space Telescope: Photometry, Images
Transiting Exoplanet Survey Satellite (TESS): Photometry, Images
Spitzer Space Telescope: Photometry, Images
W. M. Keck Observatory: Radial velocity spectra
LCOGT 0.4-meter telescope, iTelescope 0.5-meter: Transit photometry

STUDENTS MENTORED:

Ryan White (Undergraduate 3rd year project), Spring 2022

TEACHING AND OUTREACH

Astro[sound]bites

Mar 2024-Present

- Co-host for the astrobites-affiliated podcast. Three co-hosts explain and discuss recent developments in astronomy. Episodes published bimonthly.

Beginner's Guide to the Universe

Fall 2019-Spring 2021

- Created and co-taught a 2-unit DeCal class on physics/astrophysics for nonmajors called Beginner's Guide to the Universe (along with students Nicholas Rui, Shishir Dholakia).

Berkeley Astro Nights

Fall 2018- Fall 2019

- Operated portable telescopes and rooftop 17" telescope monthly for Berkeley Astro Nights. Objects observed included Jupiter, Saturn, Venus, Andromeda Galaxy (M31).

CalTeach Field Placements

Fall 2019-Spring 2021

- Visited and taught 1st-12th graders science for five semesters at local Berkeley public schools (Thousand Oaks Elementary, Willard Middle School, Roosevelt Middle School, Albany High, El Cerrito High).

¹Equal contribution to the work or jointly given talk