

# JOSEPH M. AKANA MURPHY

*Updated October 18, 2021* ◇ Pronouns: He/him/his

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## SCIENTIFIC INTERESTS

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Exoplanet characterization and formation, applications of statistical modeling and machine learning

## EDUCATION

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### University of California, Santa Cruz

*Ph.D.* in Astronomy and Astrophysics

2019 - Expected 2024

Advisor: Professor Natalie Batalha

### Stanford University

*Master of Science* in Applied and Engineering Physics

2018 - 2019

*Bachelor of Science* in Physics

2014 - 2018

Minor in Mathematics

Advisors: Professor Bruce Macintosh, Dr. Ian Czekala

Thesis: *Inferring the Veiling Spectrum of the Pre-Main Sequence Star LkCa 15 with Gaussian Processes*

## SCIENTIFIC RESEARCH

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### Prioritizing TESS Targets for Atmospheric Characterization

2019 - present

A prioritization scheme to systematically search for the TESS targets that are best-suited for atmospheric follow-up with *JWST*.

### The TESS-Keck Survey

2019 - present

Observing and analysis support for the TESS-Keck Survey, a multi-institution collaboration with the goal of measuring the orbits and masses of 100 TESS planets with Keck-HIRES.

### Unveiling the Spectra of Young Stars with Gaussian Processes

2017 - 2019

Using Gaussian processes to model time-series spectroscopic observations of a young star, LkCa 15, we disentangle the stellar atmosphere from the spectrum of accretion, revealing time-variable, line-specific emission related to the infalling material.

## HONORS AND AWARDS

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National Science Foundation Graduate Research Fellowship

2019 - present

LSST Corporation Data Science Fellowship

2019 - present

Regents' Fellowship, University of California, Santa Cruz

Fall 2019, Winter 2020

Conference Travel Grant, Stanford University

2017

Thomas J. Watson Memorial Scholarship, IBM

2014 - 2018

## PROFESSIONAL EXPERIENCE

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### Graduate Student

Department of Astronomy and Astrophysics, University of California, Santa Cruz

2019 - present

### Research Assistant

Kavli Institute for Particle Astrophysics and Cosmology, Stanford University

2017 - 2019

### Research and Development Intern

Pathfinder Systems, Inc., Denver, CO

Summer 2016

### First and second author publications

3. **Murphy, J. M. A. et al.** “Another super-dense sub-Neptune in K2-182 b and refined mass measurements for K2-199 b and c.” [Accepted for publication in \*The Astronomical Journal\*, September 2021.](#)
2. Chontos, A., **Murphy, J. M. A. et al.** “The TESS-Keck Survey: Science Goals and Target Selection.” [In revision, July 2021.](#)
1. Scarsdale, N., **Murphy, J. M. A. et al.** “TESS-Keck Survey V. Twin sub-Neptunes Transiting the Nearby G Star HD 63935.” [Accepted for publication in \*The Astronomical Journal\*, July 2021.](#)

### Many-author publications

13. Barragán, O. *et al.* **including Murphy, J. M. A.** “The young HD 73583 (TOI-560) planetary system: Two 10-M<sub>⊕</sub> mini-Neptunes transiting a young, bright, and active K dwarf.” Submitted to *Astronomy & Astrophysics*, October 2021.
12. Dalba, P. A. *et al.* **including Murphy, J. M. A.** “The TESS-Keck Survey. VIII. Confirmation of a Transiting Giant Planet on an Eccentric 261-day Orbit with the Automated Planet Finder Telescope.” Submitted to AAS Journals, September 2021.
11. MacDougall, M. *et al.* **including Murphy, J. M. A.** “The TESS-Keck Survey. VI. Two Eccentric sub-Neptunes Orbiting HIP-97166.” [Accepted for publication in \*The Astronomical Journal\*, September 2021.](#)
10. Heidari, N. *et al.* **including Murphy, J. M. A.** “HD207897 b: A dense sub-Neptune transiting a nearby and bright K-type star.” [Accepted for publication in \*The Astronomical Journal\*, September 2021.](#)
9. Winters, J. *et al.* **including Murphy, J. M. A.** “A Second Planet Transiting LTT 1445A and a Determination of the Masses of Both Worlds.” [Submitted to \*The Astronomical Journal\*, August 2021.](#)
8. Lubin, J. *et al.* **including Murphy, J. M. A.** “TESS-Keck Survey IX: Masses of Three Sub-Neptunes Orbiting HD 191939 and the Discovery of a Warm Jovian Plus a Distant Sub-Stellar Companion.” [Accepted for publication in \*The Astronomical Journal\*, August 2021.](#)
7. Dai, F. *et al.* **including Murphy, J. M. A.** “TKS X: Confirmation of TOI-1444b and a Comparative Analysis of the Ultra-short-period Planets with Hot Neptunes.” [The Astronomical Journal, 162, 62, 2021.](#)
6. Rubenzahl, R. *et al.* **including Murphy, J. M. A.** “The TESS-Keck Survey IV: A Retrograde, Polar Orbit for the Ultra-Low-Density, Hot Super-Neptune WASP-107b.” [The Astronomical Journal, 161, 119, 2021.](#)
5. Weiss, L. *et al.* **including Murphy, J. M. A.** “The TESS-Keck Survey II: An Ultra-Short Period Rocky Planet and its Siblings Transiting the Galactic Thick-Disk Star TOI-561.” [The Astronomical Journal, 161, 56, 2021.](#)
4. Kosiarek, M. *et al.* **including Murphy, J. M. A.** “Physical Parameters of the Multiplanet Systems HD 106315 and GJ 9827.” [The Astronomical Journal, 161, 47, 2021.](#)
3. Dai, F. *et al.*, **including Murphy, J. M. A.** “The TESS-Keck Survey. III. A Stellar Obliquity Measurement of TOI-1726 c.” [The Astronomical Journal, 160, 193, 2020.](#)

2. Cloutier, R. *et al.* including Murphy, J. M. A. “TOI-1235 b: A Keystone Super-Earth for Testing Radius Valley Emergence Models around Early M Dwarfs.” *The Astronomical Journal*, 160, 22, 2020.
1. Dalba, P. A. *et al.* including Murphy, J. M. A. “The TESS-Keck Survey. I. A Warm Sub-Saturn-mass Planet and a Caution about Stray Light in TESS Cameras.” *The Astronomical Journal*, 159, 241, 2020.

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## OBSERVING EXPERIENCE

10-meter Keck I telescope (HIRES) - 48 half nights January 2020 - present

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## SUCCESSFUL TELESCOPE PROPOSALS

### Co-Investigator

2. STIS/*HST*, PI: Loyd, R. O. P., “Leveraging High Radial Velocities to Get to the Core of Planetary Lyman-alpha Transits.” 12 orbits, Cycle 29.
1. MAROON-X/Gemini North, PI: Crossfield, I., “Mass and Spin-Orbit Alignment of a Temperate Neptune.” 14.7 hours, 2021B.

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## ADVISING AND TEACHING EXPERIENCE

### Students advised

Ms. Sarah Lange, UCSC undergraduate October 2021 - present  
 The masses of attractive atmospheric targets from the TESS-Keck Survey.

Ms. Bronwen Hardee, UCSC undergraduate June 2020 - January 2021  
 Constructing a high-fidelity exoplanet mass and radius catalog.

### Volunteer Instructor

*Introduction to Astronomy Research* Summer 2020, 2021  
 GitHub repositories: [2020](#), [2021](#)

### Teaching Assistant

Astronomy 119: *Introduction to Scientific Computing*, UCSC Spring 2020  
 Physics 43: *Electricity and Magnetism*, Stanford University Spring 2019  
 Physics 41: *Mechanics*, Stanford University Winter 2019  
 Physics 41A: *Mechanics*, Stanford University Winter 2018

### Course Instructor

Physics 91SI: *Practical Computing for Scientists*, Stanford University Spring 2017

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## SCIENTIFIC PRESENTATIONS

### Contributed Talks

4. *The TESS-Keck Survey: Building a Statistical Sample of Sub-Neptunes Primed for Atmospheric Characterization*, TESS Science Conference II, 2021 August 3.
3. *Sub-Neptune Diversity in the Exoplanet Mass-Radius Diagram: The masses of three K2 sub-Neptunes and preliminary analysis of atmospheric targets from the TESS-Keck Survey*, UCSC FLASH Seminar, 2021 May 21.
2. *The TESS-Keck Survey: Building a Statistical Sample of Sub-Neptunes Primed for Atmospheric Characterization*, TESS Science Team Meeting #25, 2021 March 25.
1. *The TESS-Keck Survey: Building a Statistical Sample of Sub-Neptunes Primed for Atmospheric Characterization*, [Bay Area Exoplanet Meeting #36](#), 2021 March 5.

## Posters

2. *Inferring the spectrum of accretion onto LkCa 15 with Gaussian Processes*, [AAS Meeting 233](#), poster 360.19, 2019.
1. *Disentangling spectra of young stars*, [AAS Meeting 231](#), poster 339.08, 2018.

## OUTREACH

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### Invited Public Talks

2. *Exoplanets: Detecting and Characterizing Worlds Beyond the Solar System*, Morristown High School (NJ) STEM Academy Meeting, 2021 April 7.
1. *Piecing Together the Universe with Generative Models*, Astronomy on Tap - Santa Cruz, 2020 March 5.