

# JOSEPH M. AKANA MURPHY

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## EDUCATION

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### University of California, Santa Cruz

*Ph.D.* in Astronomy and Astrophysics

2019–Expected June 2024

Advisor: Professor Natalie Batalha

### Stanford University

*Master of Science* in Applied and Engineering Physics, Depth in Computer Science

2018–2019

*Bachelor of Science* in Physics, Minor in Mathematics

2014–2018

Advisors: Professor Bruce Macintosh, Dr. Ian Czekala

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

## HONORS AND AWARDS

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National Science Foundation Graduate Research Fellowship

2019–present

National Osterbrock Leadership Program Fellowship

2021–present

ARCS Foundation Scholarship, Northern California Chapter

2022–2023

LSST Corporation Data Science Fellowship

2019–2022

Regents' Fellowship, University of California

Fall 2019, Winter 2020

Conference Travel Grant, Stanford University

2017

Thomas J. Watson Memorial Scholarship, IBM

2014–2018

## OBSERVING EXPERIENCE

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10-meter Keck I telescope (HIRES) - 65 nights

January 2020–present

## PUBLICATIONS — Click [here](#) to view on NASA ADS.

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### First and second author publications

30. **Murphy, J. M. A.** *et al.* “The TESS-Keck Survey. XVI. Mass Measurements for 12 Planets in Eight Systems.” [Accepted for publication in \*The Astronomical Journal\*, 2023.](#)
29. Chontos, A., **Murphy, J. M. A.** *et al.* “The TESS-Keck Survey: Science Goals and Target Selection.” [The \*Astronomical Journal\*, 163, 297, 2022.](#)
28. **Murphy, J. M. A.** *et al.* “Another Superdense Sub-Neptune in K2-182 b and Refined Mass Measurements for K2-199 b and c.” [The \*Astronomical Journal\*, 162, 294, 2021.](#)
27. Scarsdale, N., **Murphy, J. M. A.** *et al.* “TESS-Keck Survey. V. Twin Sub-Neptunes Transiting the Nearby G Star HD 63935.” [The \*Astronomical Journal\*, 162, 215, 2021.](#)

### Significant contribution

26. 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 Substellar Companion.” [The \*Astronomical Journal\*, 163, 101, 2022.](#)
25. 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.](#)

## Many-author publications

24. Blunt, S. *et al.* **including Murphy, J. M. A.** “Overfitting Affects the Reliability of Radial Velocity Mass Estimates of the V1298 Tau Planets.” *The Astronomical Journal*, 166, 62, 2023.
23. Dai, F. *et al.* **including Murphy, J. M. A.** “A Mini-Neptune Orbiting the Metal-poor K Dwarf BD+29 2654.” *The Astronomical Journal*, 166, 49, 2023.
22. MacDougall, M. *et al.* **including Murphy, J. M. A.** “The TESS-Keck Survey. XV. Precise Properties of 108 TESS Planets and Their Host Stars.” *The Astronomical Journal*, 166, 33, 2023.
21. Deeg, H. J. *et al.* **including Murphy, J. M. A.** “TOI-1416: A system with a super-Earth planet with a 1.07d period.” *Accepted for publication in Astronomy & Astrophysics*, 2023.
20. Hon, M. *et al.* **including Murphy, J. M. A.** “A close-in giant planet escapes engulfment by its star.” *Nature*, 618, 2023.
19. Knudstrup, E. *et al.* **including Murphy, J. M. A.** “Radial velocity confirmation of a hot super-Neptune discovered by TESS with a warm Saturn-mass companion.” *Monthly Notices of the Royal Astronomical Society*, 519, 2023.
18. Brinkman, C. L. *et al.* **including Murphy, J. M. A.** “TOI-561 b: A Low-density Ultra-short-period “Rocky” Planet around a Metal-poor Star.” *The Astronomical Journal*, 165, 88, 2023.
17. Van Zandt, J. E. *et al.* **including Murphy, J. M. A.** “TESS-Keck Survey XIV: Two giant exoplanets from the Distant Giants Survey.” *The Astronomical Journal*, 165, 60, 2023.
16. Dai, F. *et al.* **including Murphy, J. M. A.** “TOI-1136 is a Young, Coplanar, Aligned Planetary System in a Pristine Resonant Chain.” *The Astronomical Journal*, 165, 33, 2023.
15. El Mufti, M. *et al.* **including Murphy, J. M. A.** “TOI 560: Two Transiting Planets Orbiting a K Dwarf Validated with iSHELL, PFS, and HIRES RVs.” *The Astronomical Journal*, 165, 10, 2023.
14. MacDougall, M. *et al.* **including Murphy, J. M. A.** “The TESS-Keck Survey. XIII. An Eccentric Hot Neptune with a Similar-mass Outer Companion around TOI-1272.” *The Astronomical Journal*, 164, 97, 2022.
13. Barragán, O. *et al.* **including Murphy, J. M. A.** “The young HD 73583 (TOI-560) planetary system: Two 10- $M_{\oplus}$  mini-Neptunes transiting a young, bright, and active K dwarf.” *Monthly Notices of the Royal Astronomical Society*, 514, 2022.
12. Turtelboom, E. *et al.* **including Murphy, J. M. A.** “The TESS-Keck Survey. XI. Mass Measurements for Four Transiting sub-Neptunes orbiting K dwarf TOI-1246.” *The Astronomical Journal*, 163, 293, 2022.
11. Winters, J. *et al.* **including Murphy, J. M. A.** “A Second Planet Transiting LTT 1445A and a Determination of the Masses of Both Worlds.” *The Astronomical Journal*, 163, 168, 2022.
10. Grunblatt, S. K. *et al.* **including Murphy, J. M. A.** “TESS Giants Transiting Giants II: The hottest Jupiters orbiting evolved stars.” *The Astronomical Journal*, 163, 120, 2022.
9. 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.” *The Astronomical Journal*, 163, 61, 2022.
8. Heidari, N. *et al.* **including Murphy, J. M. A.** “HD 207897 b: A dense sub-Neptune transiting a nearby and bright K-type star.” *Astronomy & Astrophysics*, 658, A176, 2022.
7. MacDougall, M. *et al.* **including Murphy, J. M. A.** “The TESS-Keck Survey. VI. Two Eccentric sub-Neptunes Orbiting HIP-97166.” *The Astronomical Journal*, 162, 265, 2021.

6. 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.
5. 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.
4. 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.
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.

## SUCCESSFUL TELESCOPE PROPOSALS

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### Co-Investigator

5. KPF/Keck, PI: Dressing, C., “The TESS-Keck Survey 2.0: Diving Deeper into the Planetary Mass Regime with the Keck Planet Finder.” 6 nights, 2023B.
4. HIRES/Keck, PI: Batalha, N., “Are Water Worlds Ubiquitous in the Milky Way?” 4.5 nights, 2023A.
3. HIRES/Keck, PI: Batalha, N., “Simultaneous Radial Velocity and Photometric Monitoring of an Evaporating Sub-Neptune.” 1 night, 2022B.
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.

## SUCCESSFUL COMPUTING RESOURCE PROPOSALS

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### Principal Investigator

The following programs make use of the **Expanse** supercomputer at the San Diego Supercomputer Center through the National Science Foundation’s Advanced Cyberinfrastructure Coordination Ecosystem: Services & Support (ACCESS) program and its predecessor, the eXtreme Science and Engineering Discovery Environment (XSEDE).

3. ACCESS Explore, “A Mass and Radius Catalog of Small TESS Planets Amenable to Atmospheric Characterization with JWST.” 200,000 core hours, January 2023.
2. ACCESS Startup Allocation Supplement, “A Mass and Radius Catalog of Small TESS Planets Amenable to Atmospheric Characterization with JWST.” 5,000 core hours, November 2022.
1. XSEDE Startup Allocation, “A Mass and Radius Catalog of Small TESS Planets Amenable to Atmospheric Characterization with JWST.” 10,000 core hours, 500 GB memory, January 2022.

## ADVISING AND TEACHING EXPERIENCE

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### Students advised

Ms. Sarah Lange, UCSC undergraduate, Koret Scholarship Award winner      October 2021–present  
A superdense sub-Neptune orbiting TOI-1824.

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

## SCIENTIFIC PRESENTATIONS

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### Contributed Talks

7. *12 New Planets from the TESS-Keck Survey*, The Other Worlds Laboratory (OWL) Exoplanet Summer Program, 2023 July 11.
6. *The Masses and Radii of Eight Sub-Neptunes Amenable to Atmospheric Characterization*, Exoplanets IV, 2022 May 5.
5. *Superdense Sub-Neptunes? The Curious Case of K2-182 b*, Bay Area Exoplanet Meeting #39, 2021 December 3.
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, 360.19, 2019](#).
1. *Disentangling spectra of young stars*, [AAS Meeting 231, 339.08, 2018](#).

## OUTREACH

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### Volunteering

Mentor, Latitude High School, Oakland, CA      Fall 2022  
Advised 10th grade computer science students as they developed a math-based video game.

## Invited Public Talks

4. *Observing Exoplanets in the Era of JWST*, Morristown High School (NJ) STEM Academy Meeting, 2023 February 22.
3. *Uncovering the Nature of Exoplanets with Ground- and Space-based Telescopes*, Morristown High School (NJ) STEM Academy Meeting, 2022 February 9.
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.

## Miscellaneous Presentations

Splinter session co-leader, *AAS National Osterbrock Leadership Program (NOLP)*, AAS Meeting 241.

## SOFTWARE

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tessla: [github.com/murphyjm/tessla](https://github.com/murphyjm/tessla)

A joint photometry and radial velocity modeling framework for exoplanets.