

JOSEPH M. AKANA MURPHY

Updated July 22, 2022 ◇ Pronouns: He/him/his

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SCIENTIFIC INTERESTS

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

EDUCATION

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

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.

Prioritizing TESS Targets for Atmospheric Characterization

2019 - 2021

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

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

ARCS Foundation Scholarship, Northern California Chapter

2022 - 2023

XSEDE Startup Allocation (10,000 core hours, 500 GB memory)

2022 - 2023

Osterbrock Leadership Program Fellowship, University of California, Santa Cruz

2021 - present

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

OBSERVING EXPERIENCE

10-meter Keck I telescope (HIRES) - 58 half-nights

January 2020 - present

PROFESSIONAL EXPERIENCE

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

PUBLICATIONS ([Link to NASA ADS search results](#))

First and second author publications

19. Chontos, A., **Murphy, J. M. A.** *et al.* “The TESS-Keck Survey: Science Goals and Target Selection.” *The Astronomical Journal*, 163, 297, 2022.
18. **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.
17. 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

16. 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.
15. 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

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.” [Accepted for publication in The Astronomical Journal](#), June 2022.
13. 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.
12. Barragán, O. *et al.* **including Murphy, J. M. A.** “The young HD 73583 (TOI-560) planetary system: Two 10-M_⊕ mini-Neptunes transiting a young, bright, and active K dwarf.” *Monthly Notices of the Royal Astronomical Society*, 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

Co-Investigator

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.

ADVISING AND TEACHING EXPERIENCE

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

Contributed Talks

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

Invited Public Talks

3. *Exoplanets: Detecting and Characterizing Worlds Beyond the Solar System*, 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.