

# Kris Pardo

(he/him/his)

ORCID: [0000-0002-9910-6782](https://orcid.org/0000-0002-9910-6782)

[kmpardo@usc.edu](mailto:kmpardo@usc.edu)

## RESEARCH INTERESTS

---

astrophysical tests of physics beyond the Standard Model ◦ gravitational waves ◦ particle dark matter theories ◦ dark energy theories, ◦ galactic dynamics ◦ active galactic nuclei

## PROFESSIONAL EXPERIENCE

---

<b>University of Southern California</b> Assistant Professor of Physics & Astronomy	Jan. 2023 – present
<b>California Institute of Technology</b> Postdoctoral Scholar in Theoretical Physics	Sept. 2022 – Dec. 2022
<b>Jet Propulsion Laboratory</b> Postdoctoral Research Scholar	Sept. 2019 – Aug. 2022

## EDUCATION

---

<b>Princeton University</b> <i>Ph.D. in Astrophysical Sciences, Advisor: David Spergel</i>	2019
<b>Furman University</b> <i>B.Sc. in Physics &amp; Mathematics, Summa Cum Laude</i>	2014

## HONORS, AWARDS, & FELLOWSHIPS

---

NSF Graduate Student Research Fellowship	2014 – 2019
Balzan Fellow, New College, Oxford University	2018

## EXTERNAL FUNDING

---

Co-I, NASA Roman Space Telescope Research Opportunities PI: T. Chang (JPL), “Detecting Microhertz Gravitational Waves with the Roman Space Telescope”	2023
PI, NASA Astrophysical Data Analysis Program (22-ADAP22-0160) “Detecting Gravitational Waves from Supermassive Black Holes with Kepler”	2022

## STUDENT & POSTDOC MENTORING

---

### Postdoc

Tal Adi 2024 – present

### Graduate Students

Mya Do (2nd year) 2023 – present

Eleanor Stuart (3rd year) 2023 – present

Benjamin Zhang (3rd year, USC) 2022 – present

Dimple Sarnaik (4th year) 2022 – present

### Undergraduate Students

Naaz Vemmerath Kulangara (WiSE Fellow) 2024 - present

Howard Chen (SOAR Fellow) 2024 - present

Kian Jagtiani 2024 - present

Jaime Alvarez (Fullerton College; now transferred to UC Berkeley Physics) 2023

Leah Vazsonyi (Caltech; now a PhD student at UNC-Chapel Hill) 2021 - 2022

### Graduate Student Committees

All students are/were USC Physics & Astronomy students, unless otherwise noted.

Candidacy Committees: Aryan Rahimieh (2024) • Remington Gerras (2023) • Adam He (2023) • Paul Menker (2023) • Trey Driskell (2023)

Dissertation Committees: Abdelrahman Haridy (2025) • Chi Xu (2024) • Yijun Wang (Caltech, Physics, 2024) • Jian Zhou (Mathematics, 2024)

## TEACHING EXPERIENCE

---

### University of Southern California

PHYS 430, *General Relativity & Gravitation* Spring 2024  
Upper-level undergraduate class for majors

ASTR 100, *The Universe* Spring 2023, Fall 2024  
Introductory undergraduate class for non-majors

Guest Lecturer for: BISC 483 (Spring 2023), PHYS 190 (Fall 2022, Fall 2023), PHYS 650 (Fall 2023, Fall 2024)

## SERVICE

---

Roman Space Telescope Galactic Bulge Time Domain Survey Definition Committee member	Dec. 2023 - present
NSF grant proposal review panel member	
NASA ROSES grant proposal review panel member	
Referee for <i>Monthly Notices of the Royal Astronomical Society</i> , <i>Physical Review D</i> , and <i>Physical Review Letters</i>	
Research mentor for <a href="#">USC's JumpStart Program</a>	2023 – present
Graduate Admissions Committee, USC Physics & Astronomy Department	2024 – present
Graduate Prelim Exam Committee, USC Physics & Astronomy Department	2023 – present
Colloquium Committee member, USC Physics & Astronomy Department	2023 – present
Co-organizer of USC's CosmoLab	2023 – present
Co-organizer of USC's Astrophysics Seminar	2023 – present
Co-organizer of USC's Cosmology Journal CLub	2023 – present

## TELESCOPE TIME

---

Co-I, Magellan/FOURSTAR (Princeton), 2 nights <i>Probing the growth and build-up of the most massive black holes across cosmic time</i>	2019
PI, Magellan/FOURSTAR (Princeton), 1 night <i>Finding supermassive black hole pairs that can contribute to the gravitational wave background</i>	2019
Co-I, Hubble Space Telescope/WFC3, Cycle 24, 2 orbits <i>High spatial resolution imaging of AGN-driven super-bubbles in two low-redshift quasars</i>	2016
PI, Chandra X-Ray Observatory/ACIS-S, Cycle 17, 66 ks <i>Probing AGN Feedback on Nuclear and Galaxy-wide Scales</i>	2015

## SCIENCE COMMUNICATION & OUTREACH

---

Panelist for the USC Sidney Harman Polymath Academy Retreat (“Music Theory and Mathematical Physics”)	Mar. 2024
Wrote a <a href="#">popular science article</a> about Carolyn Herschel <i>Caroline Herschel was England's first female professional astronomer, but still lacks name recognition two centuries later</i> , The Conversation	Aug. 2023
Worked with a choreographer and professional dancers to create a dance based on gravitational waves, <a href="#">Awe &amp; Wonder</a> , <a href="#">Review</a>	2023

Popular science articles/videos that feature my research:

<i>To explain away dark matter, gravity would have to be really weird, cosmologists say</i> Adrian Cho, <a href="#">Science</a>	11/20/20
<i>An Alternative to Dark Matter Passes Critical Test</i> Charlie Wood, Quanta Magazine	07/28/20
<i>Scientists Just Detected Two Supermassive Black Holes on a Collision Course</i> Seeker Media, <a href="#">YouTube video</a>	09/16/19
<i>How to Detect Extra Dimensions</i> PBS Space Time, <a href="#">YouTube video</a>	10/03/18
<i>If Extra Dimensions Do Exist, They Must Be Really, Really Small</i> Mara Johnson-Groh, Live Science	09/25/18
<i>Are We Closer to Finding a Fifth Dimension?</i> Matthew Francis, Daily Beast	02/08/18
<i>Researchers Check Space-Time to See if It's Made of Quantum Bits</i> Ramin Skibba, Quanta Magazine	06/21/17

## TECHNICAL SKILLS

---

Coding: Proficient in Python, C++, Mathematica. Experience with packages: emcee, pymc3, cobaya, CLASS, CAMB, scikit-learn. My open source code is available on [my github page](#).

Instruments: Experience with FOURSTAR (IR imager), MAGE (optical spectrograph), and IMACS (multi-object spectrograph) on the Magellan Telescopes at Las Campanas Observatory.

## PUBLICATIONS ([ADS](#) | [iNSPIRE HEP](#) | [Google Scholar](#))

---

† indicates papers that use particle physics (alphabetical) author ordering.

### Published & Submitted

17. Daniel, Matthias; **Pardo, Kris**; Sagunski, Laura, *Forecasted Detection Limits on the (Dark) Matter Density in Supermassive Black Hole Binaries for LISA*, [arXiv:2501.13601](#), submitted
16. Zhang, Benjamin; **Pardo, Kris**; Wang, Yijun; Bouma, Luke; Chang, Tzu-Ching; Doré, Olivier, *A Fast Bayesian Method for Coherent Gravitational Wave Searches with Relative Astrometry*, submitted

15. Stuart, Eleanor; **Pardo, Kris**, *Constraints on the dark matter-baryon interaction cross section from galaxy cluster thermodynamics*, [arXiv:2411.18706](#), submitted
14. Gallardo, Patricio; **Pardo, Kris**; Philcox, Oliver; + the ACT Collaboration *The Atacama Cosmology Telescope: A Test of the Gravitational Force Law on Cosmological Scales Using the Kinematic Sunyaev-Zeldovich Effect*, submitted
13. † Du, Yufeng; Murgui, Clara; **Pardo, Kris**; Wang, Yikun; Zurek, Kathryn M., *Contrast Loss from Astrophysical Backgrounds in Space-Based Matter-Wave Interferometers*, [arXiv:2308.02634](#)
12. † Mitridate, Andrea; **Pardo, Kris**; Trickle, Tanner; Zurek, Kathryn M., *Effective Field Theory for Dark Matter Absorption on Single Phonons*, [Phys. Rev. D, 109, 1, 015010 \(2024\)](#)
11. † Du, Yufeng; Murgui, Clara; **Pardo, Kris**; Wang, Yikun; Zurek, Kathryn M., *Atom Interferometer Tests of Dark Matter*, [Phys. Rev. D, 106, 9, 095041 \(2022\)](#)
10. Wang, Yijun; **Pardo, Kris**; Chang, Tzu-Ching; Doré, Olivier, *Constraining the Stochastic Gravitational Wave Background with Photometric Surveys*, [Phys. Rev. D, 106, 8, 084006 \(2022\)](#)
9. Casey-Clyde, J. Andrew; Mingarelli, Chiara M. F.; Greene, Jenny E.; **Pardo, Kris**; Nañez, Morgan; Goulding, Andy D., *A Quasar-based Supermassive Black Hole Binary Population Model: Implications for the Gravitational Wave Background*, [ApJ, 924, 2, 93 \(2022\)](#)
8. **Pardo, Kris**; Doré, Olivier, *Detecting dark matter subhalos with the Nancy Grace Roman Space Telescope*, [Phys. Rev. D, 104, 10, 103531 \(2021\)](#)
7. Wang, Yijun; **Pardo, Kris**; Chang, Tzu-Ching; Doré, Olivier, *Gravitational wave detection with photometric surveys*, [Phys. Rev. D, 103, 8, 084007 \(2021\)](#)
6. **Pardo, Kris**, *Testing emergent gravity with isolated dwarf galaxies*, [J. Cosmology Astropart. Phys., 2020, 12, 012 \(2020\)](#)
5. **Pardo, Kris**; Spergel, David N., *What is the Price of Abandoning Dark Matter? Cosmological Constraints on Alternative Gravity Theories*, [Phys. Rev. Lett., 125, 21, 211101 \(2020\)](#)
4. **Pardo, K.**; Desmond, H.; Ferreira, P. G., *Testing self-interacting dark matter with galaxy warps*, [Phys. Rev. D, 100, 12, 123006 \(2019\)](#)
3. Goulding, Andy D.; **Pardo, Kris**; Greene, Jenny E.; Mingarelli, Chiara M. F.; Nyland, Kristina; Strauss, Michael A., *Discovery of a Close-separation Binary Quasar at the Heart of a  $z \sim 0.2$  Merging Galaxy and Its Implications for Low-frequency Gravitational Waves*, [ApJL, 879, 2, L21 \(2019\)](#)
2. **Pardo, Kris**; Fishbach, Maya; Holz, Daniel E.; Spergel, David N., *Limits on the number of spacetime dimensions from GW170817*, [J. Cosmology Astropart. Phys., 2018, 7, 048 \(2018\)](#)

1. **Pardo, K.**; Goulding, A. D.; Greene, J. E.; Somerville, R. S.; Gallo, E.; Hickox, R. C.; Miller, B. P.; Reines, A. E.; Silverman, J. D., *X-Ray Detected Active Galactic Nuclei in Dwarf Galaxies at  $0 < z < 1$* , *ApJ*, **831**, 2, 203 (2016)

### Non-refereed

2. **Pardo, Kris**; Chang, Tzu-Ching; Doré, Olivier; Wang, Yijun, *Gravitational Wave Detection with Relative Astrometry using Roman's Galactic Bulge Time Domain Survey*, [arXiv:2306.14968](https://arxiv.org/abs/2306.14968)
1. Ishak, Mustapha; Baker, Tessa; Bull, Philip; Pedersen, Eske M.; Blazek, Jonathan; Ferreira, Pedro G.; Leonard, C. Danielle; Lin, Weikang; Linder, Eric; **Pardo, Kris**; Valogiannis, Georgios, *Modified Gravity and Dark Energy models Beyond  $w(z)$ CDM Testable by LSST*, [arXiv:1905.09687](https://arxiv.org/abs/1905.09687)

### SELECTED INVITED TALKS

---

IPTA Collaboration Meeting (external speaker), Sesto, Italy	Jun. 2024
Astronomy Colloquium, Columbia University	Nov. 2023
Colloquium, Carnegie Observatories	Sept. 2023
Astrophysics Seminar, IPMU, University of Tokyo	Sept. 2023
Gravitational Wave Probes of Physics Beyond Standard Model 2 (International Online Conference)	Dec 2022
Astro Seminar, UC Davis	May 2022
Seminar, UC Merced	Mar. 2022
Special Seminar, Brown University	Feb. 2022
Colloquium, University of North Carolina, Chapel Hill	Oct. 2021
Colloquium, University of Southern California	Feb. 2021
Atomic Interferometer White Paper Workshop, NASA Biological & Physical Sciences	Jun. 2021
Cosmic Structure Science Interest Group Update, APS Meeting	Apr. 2021
Astronomy Seminar, University of Connecticut	Feb. 2021