

# Kris Pardo

(he/him/his)

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

[kpardo@caltech.edu](mailto:kpardo@caltech.edu)

## RESEARCH INTERESTS

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astrophysical tests of physics beyond the Standard Model ◦ gravitational waves, especially those from supermassive black holes ◦ particle dark matter theories ◦ dark energy theories, including modified gravity ◦ galactic dynamics ◦ active galactic nuclei

## EDUCATION

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### Princeton University

*Ph.D. in Astrophysical Sciences, Advisor: David Spergel* 2019

*M.A. in Astrophysical Sciences* 2016

### Furman University

*B.Sc. in Physics & Mathematics, Summa Cum Laude* 2014

## PROFESSIONAL EXPERIENCE

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Postdoctoral Research Scholar, Jet Propulsion Laboratory Sept. 2019 - present

## HONORS, AWARDS, & FELLOWSHIPS

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NSF Graduate Student Research Fellowship 2014 – 2019

Balzan Fellow, New College, Oxford University 2018

Phi Beta Kappa 2014

American Physical Society Minority Scholar 2010 – 2012

## SELECTED PUBLICATIONS

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**Pardo, K.**; Spergel, D.N., *What is the price of abandoning dark matter? Cosmological constraints on alternative gravity theories*, [Phys. Rev. Lett.](#), **125**, 211101 (2020)

Goulding, A.D.; **Pardo, K.**; Greene, J. E.; Mingarelli, C. M. F.; Nyland, K.; Strauss, M. 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)

**Pardo, K.**; Fishbach, M.; Holz, D.E.; Spergel, D. N., *Limits on the Number of Spacetime Dimensions from GW 170817*, [JCAP](#), **07**, 048 (2018)

## STUDENT MENTORING

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Yijun Wang (Ph.D. student, California Institute of Technology): Sept 2019 – present  
Co-advisor with Olivier Doré, & Tzu-Ching Chang on “Gravitational Wave Detection with Photometric Surveys” ([arXiv:2010.02218](https://arxiv.org/abs/2010.02218))

Yufeng Du (Ph.D. student, California Institute of Technology): Oct 2020 – present  
Co-advisor with Kathryn Zurek.

## TEACHING EXPERIENCE

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### Princeton University

Teaching Assistant, AST 204, *Topics in Modern Astronomy* Spring 2017  
Held office hours, wrote homework solutions, and graded problem sets.

Teaching Assistant, AST 301/PHY 321, *General Relativity* Fall 2015  
Taught problem sessions, wrote homework solutions, and graded problem sets.

### Furman University

Teaching Assistant, PHY 102, *Introduction to Electricity & Magnetism* Spring 2014  
Designed and led 4 lectures on optics, along with normal TA duties.

Lab Assistant, PHY 101 & 102, *Mechanics & Electromagnetism* Fall 2011 – Fall 2013  
Led undergraduate labs.

## SERVICE & INCLUSION EFFORTS

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Caltech Cosmology Journal Club Co-Organizer 2019 – present

Listening Session Facilitator, Jet Propulsion Laboratory 2020 – present  
Co-host diversity & inclusion discussions within the astrophysics section.

Co-Organizer NASA Fundamental Physics Program Virtual Townhall and Direct Detection of Dark Energy Splinter Session (Dec. 2020) 2020

MIT Summer Research Program Application Review Committee Member 2017 – present

Gender Group Facilitator, LGBT Center, Princeton University 2018 – 2019

Resident Graduate Student, Forbes College, Princeton University 2015 – 2019  
Resident advisor to 30 undergraduates per year. Encouraged a supportive residential environment; hosted star-gazing nights and social events.

Substitute Faculty Advisor, Forbes College, Princeton University 2018  
Asked to fill-in for a faculty member as a freshmen advisor.

Computational Astrophysics Seminar Co-Organizer 2016 – 2017  
With two other graduate students, proposed and received funding from the Princeton graduate school to run a seminar. Then invited speakers, advertised events, and chaired talks.

Princeton Astro Representative to Society for the Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS) Annual Conference 2015

## TELESCOPE TIME

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Co-I, Magellan/FOURSTAR (Princeton), 2 nights 2019  
*Probing the growth and build-up of the most massive black holes across cosmic time*

PI, Magellan/FOURSTAR (Princeton), 1 night 2019  
*Finding supermassive black hole pairs that can contribute to the gravitational wave background*

Co-I, Hubble Space Telescope/WFC3, Cycle 24, 2 orbits 2016  
*High spatial resolution imaging of AGN-driven super-bubbles in two low-redshift quasars*

PI, Chandra X-Ray Observatory/ACIS-S, Cycle 17, 66 ks 2015  
*Probing AGN Feedback on Nuclear and Galaxy-wide Scales*

## SCIENCE COMMUNICATION & OUTREACH

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Popular science articles/videos that feature my research:

*To explain away dark matter, gravity would have to be really weird, cosmologists say*  
Adrian Cho, [Science](#) 11/20/20

*An Alternative to Dark Matter Passes Critical Test*  
Charlie Wood, Quanta Magazine 07/28/20

*Scientists Just Detected Two Supermassive Black Holes on a Collision Course*  
Seeker Media, [YouTube video](#) 09/16/19

*How to Detect Extra Dimensions*  
PBS Space Time, [YouTube video](#) 10/03/18

*If Extra Dimensions Do Exist, They Must Be Really, Really Small*  
Mara Johnson-Groh, Live Science 09/25/18

*Are We Closer to Finding a Fifth Dimension?*  
Matthew Francis, Daily Beast 02/08/18

*Researchers Check Space-Time to See if It's Made of Quantum Bits*  
Ramin Skibba, Quanta Magazine 06/21/17

Public Observing Host (English & Spanish), Princeton University 2014 – 2019

Public Talk for Princeton Area Alumni Association (*Invited*) Nov. 2018

## PROFESSIONAL ACTIVITIES

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Nancy Grace Roman Space Telescope, High-Latitude Survey Science Team, member

Gravity Observation and Dark energy Detection Explorer in the Solar System (NASA Advanced Concepts, Phase II study), member

American Astronomical Society (AAS), member

Referee for *Monthly Notices of the Royal Astronomical Society*

## TECHNICAL SKILLS

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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 LINK](#))

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### Published & Submitted

Wang, Y.; **Pardo, K.**; Chang, T., Doré, O., *Gravitational Wave Detection with Photometric Surveys*, submitted, [arXiv:2010.02218](#)

**Pardo, K.**, *Testing emergent gravity with isolated dwarf galaxies*, [JCAP, 12, 012 \(2020\)](#)

**Pardo, K.**; Spergel, D.N., *What is the price of abandoning dark matter? Cosmological constraints on alternative gravity theories*, [Phys. Rev. Lett., 125, 211101 \(2020\)](#)

**Pardo, K.**; Desmond, H.; Ferreria, P.G., *Testing self-interacting dark matter with galaxy warps*, [Phys. Rev. D., 100, 12 \(2019\)](#)

Goulding, A.D.; **Pardo, K.**; Greene, J. E.; Mingarelli, C. M. F.; Nyland, K.; Strauss, M. 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 \(2019\)](#)

**Pardo, K.**; Fishbach, M.; Holz, D.E.; Spergel, D. N., *Limits on the Number of Spacetime Dimensions from GW 170817*, [JCAP, 07, 048 \(2018\)](#)

**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, 2, 203 \(2016\)](#)

## Non-refereed

Ishak, M., Baker, T., Bull, P., et al. (incl. **Pardo, K.**), *Modified Gravity and Dark Energy models Beyond  $\omega(z)$  CDM Testable by LSST*, 2019, [arXiv:1905.09687](https://arxiv.org/abs/1905.09687)

## PRESENTATIONS

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### Invited

- Cosmology with the Roman Space Telescope's Exoplanet Microlensing Survey*  
Colloquium, University of Connecticut Feb. 2021  
CosmoLab, University of Southern California Oct. 2020
- Astrophysical Tests of Gravitation and Dark Matter*  
CCAPP Seminar, Ohio State University, OH Sept. 2018
- AGN in Dwarf Galaxies as a Gateway to the Growth of the First Massive BHs*  
Black Hole Workshop, Center for Computational Astrophysics (CCA) Dec. 2016

### Contributed

- Cosmology with the Roman Space Telescope's Exoplanet Microlensing Survey*  
Postdoc Seminar Series, Jet Propulsion Lab Nov. 2020
- Implications for the Stochastic Gravitational Wave Background from a Massive Binary Quasar*  
Physics Gravity Group Seminar, Princeton University Apr. 2019
- Constraining Self-Interacting Dark Matter with Galaxy Warps*  
KICP Seminar, University of Chicago, IL Feb. 2019  
American Astronomical Society Meeting (Seattle, WA) Jan. 2019  
Tea & Talk, Stanford University, CA Sept. 2018
- Astrophysical Tests of Gravitation and Dark Matter*  
BCCP Seminar, University of California at Berkeley, CA Oct. 2018  
Astrophysics Seminar, University of California at Irvine, CA Oct. 2018
- Testing Modified Gravity with Dwarf Galaxies and Gravitational Waves*  
Astrophysics Thursday Lunch Seminar (Thunch), Princeton University Apr. 2018  
Physics Gravity Group Seminar, Princeton University Mar. 2018
- Searching for Low-Mass AGN to  $z < 1$*   
American Astronomical Society Meeting (Orlando, FL) Jan. 2016  
Northeast Regional Quasar and AGN Meeting, Dartmouth College Jun. 2015