

Ryan Keeley

Academic Positions

Current Position

2018–Present **Korea Astronomy Space Science Institute**, *Postdoctoral Researcher*, Arman Shafieloo, Supervisor.

Former Positions

2014–2018 **University of California, Irvine**, *Graduate Research Assistant*, Prof. Kevork N. Abazajian, PI.

Education

2008–2012 **B.S. Physics and History**, *California Institute of Technology*, Pasadena, CA, .

2012–2016 **Masters Physics**, *University of California, Irvine*, Irvine, CA.

2012–2018 **PhD Physics**, *University of California, Irvine*, Irvine, CA, Advisor: Professor Kevork Abazajian.

Thesis Title: Cosmology and Astro-particle Physics: What is Dark Matter and What is Dark Energy?

Research Interests

Cosmological and Astro-Particle phenomenology, *Working at the interface between theory and observations.*

Dark energy, *Understanding the late-time acceleration of the Universe.*

Dark matter, *What is it? How does it interact?.*

Large Scale Structure, *How do dark matter haloes grow in the presence of beyond- Λ CDM physics.*

Small Scale Structure, *Does novel dark matter physics small scale anomalies.*

Inflation, *What is the physics of the early Universe.*

Statistics, *Developing and implementing model-independent/data-driven methods.*

International Collaborations

Dark Energy Spectroscopic Instrument, (*DESI*), Junior Member, <https://www.desi.lbl.gov/>.

Vera C. Rubin Observatory, (*LSST*), Junior Member, <https://www.lsst.org>.

LSST Dark Energy Science Collaboration, (*LSST-DESC*), Junior Member, <https://www.lsstdesc.org>.

Sloan Digital Sky Survey, (*SDSS*), Junior Member, <https://www.sdss.org>.

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Publications

NASA/ADS https://ui.adsabs.harvard.edu/search/q=author%3A%22Keeley%2C%20Ryan%20E.%22&sort=date%20desc%2C%20bibcode%20desc&p_=0.

Publications

- [1] * Ryan E. Keeley, Arman Shafieloo, Gong-Bo Zhao, Jose Alberto Vazquez, and Hanwool Koo. Reconstructing the Universe. *arXiv e-prints*, page arXiv:2010.03234, October 2020.
- [2] Hanwool Koo, Arman Shafieloo, Ryan E. Keeley, and Benjamin L'Huillier. Model selection and parameter estimation using the iterative smoothing method. *arXiv e-prints*, page arXiv:2009.12045, September 2020.
- [3] Ryan E. Keeley, Arman Shafieloo, Dhiraj Kumar Hazra, and Tarun Souradeep. Inflation Wars: A New Hope. *Journal of Cosmology and Astroparticle Physics*, June 2020.
- [4] Kevork N. Abazajian, Shunsaku Horiuchi, Manoj Kaplinghat, * Ryan E. Keeley, and Oscar Macias. † Strong constraints on thermal relic dark matter from Fermi-LAT observations of the Galactic Center. *Physical Review D*, 102(4):043012, August 2020.
- [5] Kai Liao, Arman Shafieloo, * Ryan E. Keeley, and Eric V. Linder. Determining Model-independent H_0 and Consistency Tests. *Astrophysical Journal, Letters*, 895(2):L29, June 2020.
- [6] Hanwool Koo, Arman Shafieloo, Ryan E. Keeley, and Benjamin L'Huillier. Model-independent Constraints on Type Ia Supernova Light-curve Hyperparameters and Reconstructions of the Expansion History of the Universe. *Astrophysical Journal*, 899(1):9, August 2020.
- [7] Kai Liao, Arman Shafieloo, * Ryan E. Keeley, and Eric V. Linder. A Model-independent Determination of the Hubble Constant from Lensed Quasars and Supernovae Using Gaussian Process Regression. *Astrophysical Journal, Letters*, 886(1):L23, November 2019.
- [8] * Ryan E. Keeley, Arman Shafieloo, Benjamin L'Huillier, and Eric V. Linder. Debiasing cosmic gravitational wave sirens. *Monthly Notices of the Royal Astronomical Society*, 491(3):3983–3989, January 2020.
- [9] * Ryan E. Keeley, Shahab Joudaki, Manoj Kaplinghat, and David Kirkby. Implications of a transition in the dark energy equation of state for the H_0 and σ_8 tensions. *Journal of Cosmology and Astroparticle Physics*, 2019(12):035, December 2019.
- [10] Arman Shafieloo, * Ryan E. Keeley, and Eric V. Linder. Will cosmic gravitational wave sirens determine the Hubble constant? *Journal of Cosmology and Astroparticle Physics*, 2020(3):019, March 2020.
- [11] Shahab Joudaki, Manoj Kaplinghat, * Ryan E. Keeley, and David Kirkby. Model independent inference of the expansion history and implications for the growth of structure. *Physical Review D*, 97(12):123501, Jun 2018.

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- [12] * Ryan E. Keeley, Kevork N. Abazajian, Anna Kwa, Nicholas L. Rodd, and Benjamin R. Safdi. What the Milky Way's dwarfs tell us about the Galactic Center extended gamma-ray excess. *Physical Review D*, 97(10):103007, May 2018.
- [13] Kevork N. Abazajian and * Ryan E. Keeley. Bright gamma-ray Galactic Center excess and dark dwarfs: Strong tension for dark matter annihilation despite Milky Way halo profile and diffuse emission uncertainties. *Physical Review D*, 93(8):083514, Apr 2016.
- [14] Manoj Kaplinghat, Ryan E. Keeley, Tim Linden, and Hai-Bo Yu. Tying Dark Matter to Baryons with Self-Interactions. *Physical Review Letters*, 113(2):021302, Jul 2014.

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White Papers and Letters of Interest

Inflation and Dark Energy from spectroscopy at $z > 2$, *arxiv:1903.09208*.

The Next Generation of Cosmological Measurements with Type Ia Supernovae, *arxiv:1903.05128*.

Messengers from the Early Universe: Cosmic Neutrinos and Other Light Relics, *arxiv:1903.04763*.

Gravitational wave cosmology and astrophysics with large spectroscopic galaxy surveys, *arxiv:1903.04730*.

Dark Matter Science in the Era of LSST, *arxiv:1903.04425*.

Primordial Non-Gaussianity, *arxiv:1903.04409*.

Invited Talks and Conferences

- October 2020 **Korea Astronomical Society Fall Meeting 2020**, *Model Independent Methods in Cosmology*, Online.
- September 2020 **Cosmology From Home**, *Model Independent Methods in Cosmology*, Online.
- June 2020 **Korea Astronomy and Space Science Institute Colloquium**, *Strong constraints on thermal relic dark matter from Fermi-LAT observations of the Galactic Center*, KASI, Daejeon, Korea.
- December 2019 **6th Korea-Japan Workshop on Dark Energy**, *Transitional Dark Energy: A solution to the H_0 tension*, Nagoya, Japan.
- October 2019 **Korea Astronomical Society Fall Meeting 2019**, *Pillars of the standard model of cosmology: dark energy and the cosmological constant*, KIAS, Seoul, Korea.
- September 2019 **CosKASI-ICG-NAOC-YITP Workshop 2019**, *Transitional Dark Energy: A solution to the H_0 tension*.
- August 2019 **COSMO19**, *Transitional Dark Energy: A solution to the H_0 tension*, Aachen, Germany.
- July 2019 **KITP UCSB Tensions between Early and Late Universe**, *Transitional Dark Energy: A solution to the H_0 tension*, Santa Barbara, CA, US.

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† covered in Scientific American

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- July 2019 **DESI Collaboration Meeting**, *Model independent methods in cosmology*, LBNL, Berkeley, CA, US.
- April 2019 **COSKASI 19**, *Transitional Dark Energy: A solution to the H_0 tension*, Jeju, Korea.
- February 2019 **Korea Astronomical Society Spring Meeting**, *Model independent inference of the expansion history and implications for the growth of structure*, Busan, Korea.
- November 2018 **KIAS structure formation workshop**, *Model independent inference of the expansion history and implications for the growth of structure*, KIAS, Seoul, Korea.
- October 2018 **CosKASI-ICG-NAOC-YITP Workshop 2018**, *Model independent inference of the expansion history and implications for the growth of structure*, NAOC, Beijing, China.
- August 2018 **5th Korea-Japan Workshop on Dark Energy**, *Model independent inference of the expansion history and implications for the growth of structure*, KASI, Daejeon, Korea.
- June 2018 **Conference on the Intersection of Particle and Nuclear Physics**, *Dark Matter Interpretation of the Galactic Center Gamma Ray Excess*, Palm Springs, CA, US.
- February 2018 **Texas A&M High Energy seminar**, *What the Milky Ways Dwarfs tell us about the Galactic Center extended excess*, College Station, TX, US.
- August 2017 **TeV Particle Astrophysics conference**, *What the Milky Way's Dwarfs tell us about the Galactic Center extended excess*, OSU, Columbus, OH, US.
- July 2017 **Summer Institute for Neutrino Theory**, *Summer School*, Virginia Tech, Blacksburg, VA, US.
- January 2017 **American Physical Society - April Meeting**, *Bright gamma-ray Galactic Center excess and dark dwarfs: Strong tension for dark matter annihilation despite Milky Way halo profile and diffuse emission uncertainties*, Washington DC, US.

Programming

Languages

Python
C
C++
C#
R

Software

- October 2017 **Cosmological expansion history inference using Gaussian processes**, DOI:10.5281/zenodo.999564.
- April 2019 **Cosmological expansion history inference with a 1% forecasted H_0 measurement using Gaussian processes**, DOI:10.5281/zenodo.3116772.

Teaching Experience

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2012–2018 **Physics Teaching Assistant**, *UC, Irvine*.

Taught various classes from the standard introductory labs and courses to the more specialized classes aimed at teaching physics and astronomy to non-science majors, to teaching upper division astronomy courses.

2016–2016 **Physics Instructor**, *UC, Irvine*.

Taught one of the introductory physics courses at UCI

Professional Affiliations and Service

Local Outreach

2016–2018 **Teaching through COSMOS program at UC, Irvine**.

Taught basic cosmology and particle physics to high school students, ran demonstrations for basic kinematics concepts, and designed a cloud chamber kit appropriate for the students to build themselves.

Organizing Conferences

December 7-10 2020 **7th Korea-Japan Workshop on Dark Energy**, *Chair of the LOC*, Online.

Refereed Journals

Physical Review Letters.

Physical Review D.

Monthly Notices of the Royal Astronomical Society.

The Astrophysical Journal.

European Physical Journal C.

Universe.

Societies

Member of American Physical Society, (APS).

Member of Korea Astronomical Society, (KAS).

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