Jessica (Jessie) Muir

Curriculum vitae

June 22, 2021

Work address:

KIPAC

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EMPLOYMENT

Starting Sept. 2021 - **Postdoctoral Fellow**, Perimeter Institute for Theoretical Physics.

Sept. 2018 - present. **Porat Fellow** - Institutional fellowship at KIPAC, Stanford University & SLAC.

EDUCATION

Ph.D. in Physics

Sept. 2013 - Aug. 2018. The University of Michigan, Ann Arbor, MI.

Advisor: Dragan Huterer

Thesis: “Towards precision cosmology on the largest observable scales.”

MPhil in Astronomy

Sept. 2012- Aug. 2013, Gonville and Caius College, the University of Cambridge. Cambridge, UK.

Advisor: Anne-Christine Davis, DAMTP.

Thesis: “Screened modified gravity around a Schwarzschild black hole.”

MASt in Applied Mathematics (Part III), awarded with distinction.

Sept. 2011 - Jul. 2012, Gonville and Caius College, the University of Cambridge. Cambridge, UK.

Graduate coursework

Aug. 2010- Aug. 2011, full time enrollment in physics Ph.D. program, Michigan State University.

B.S. in Physics and B.S. in Astrophysics, awarded with High Honors.

Aug. 2006- May 2010, Michigan State University.

Thesis: “Predicting neutrino mass constraints from galaxy cluster surveys." Advisor: Mark Voit.

HONORS AND AWARDS

2020 DES Builder, recognition of 2 yrs FTE work on collab. infrastructure, permanent data rights.

2020 Finalist for APS Cecilia Payne-Gaposchkin Doctoral Dissertation Award in Astrophysics.

2019 Rising Stars in Physics, nationally competitive workshop held at Stanford.

2019 Kent M. Terwilliger Memorial Thesis Prize, University of Michigan Department of Physics.

2018 Wirt & Mary Cornwell Prize, University of Michigan.

2018 Community Engagement Award, University of Michigan Department of Physics.

2017 Rackham Predoctoral Fellowship, University of Michigan - funding 2017-2018.

2015 Peter Franken Award, University of Michigan Department of Physics.
2013 Colegrove Fellowship, University of Michigan - funding 2013-2014.
2011 Rasmussen Graduate Fellowship, Michigan State University - funding 2010-2011.
2010 Marshall Scholarship, deferred until 2011, funded 2011-2013 at University of Cambridge.

2010 Thomas Osgood Award for Outstanding Senior in Physics or Astrophysics, MSU
2009 Barry Goldwater Scholarship
2009 Bruce VerWest Award for Outstanding Junior in Physics or Astrophysics, MSU
2009 Phi Beta Kappa
2009 Sigma Pi Sigma (Physics honors society)
2009 Hantel Endowed Fellowship for Undergraduate Research, MSU
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2008 College of Natural Science Competitive Scholarship for Study Abroad, MSU
2006 Distinguished Freshman Scholarship (4 years full tuition), MSU

PRESENTATIONS

Invited Talks

Feb 2021	Cosmology seminar, ETH Zurich (virtual)
Jan 2021	CCAPP Seminar, Ohio State University (virtual)
Dec 2020	Cosmology seminar, Perimeter Institute (virtual)
Aug 2020	HSC Weak Lensing group meeting, talk on DES blinding strategy (virtual)
July 2020	German Center for Cosmological Lensing (GCCL) seminar (virtual)
May 2020	SLACmass Neutrino group meeting, talk on neutrino cosmology, joint with Yuuki Omori
April 2020	APS April meeting Cecilia Payne-Gaposchkin dissertation award session (virtual)
Jan 2020	LSST-DESC Theory & Joint Probe telecon, talk on DES blinding strategy
Sept 2019	Intl. Symposium on Multi-particle Dynamics, Santa Fe (DES overview)
May 2019	Cahill Cosmology Journal Club, Caltech
May 2019	Astrophysics luncheon seminar, NASA JPL
March 2019	Cosmology seminar, Max Planck Institute for Astrophysics, Munich, Germany
March 2019	LSST-DESC Theory & Joint Probe telecon, contributor to discussion on blinding
Feb 2019	Friday Lunch Time Astrophysics Seminar, UC Santa Cruz
Feb 2018	Cosmology seminar, Perimeter Institute
Dec 2017	Cosmology seminar, Fermilab Center for Particle Astrophysics
Oct 2017	Astro lunch student seminar series, Case Western Reserve University
May 2017	Cosmology group meeting, NYU CCP
May 2017	Cosmology journal club, University of Pennsylvania
March 2017	INPA Seminar, Lawrence Berkeley National Laboratory
March 2017	Blind Analysis for High Stakes Survey Science workshop, SLAC

Contributed talks

May 2021	Plenary on testing beyond-LCDM theory, DES Collaboration meeting (virtual)
July 2020	KIPAC Tea talk, Stanford
Oct 2019	Cosmic Controversies Conference, University of Chicago
Jan 2019	Testing Gravity 2019, Simon Fraser University, Vancouver, BC, Canada
Oct 2018	KIPAC Tea talk, Stanford
Aug 2017	Physics Graduate Student Symposium, University of Michigan
March 2017	Galaxy cluster seminar, University of Michigan
Aug 2016	COSMO 2016, University of Michigan, Ann Arbor, Michigan
Jul 2016	Diving into the Dark, CAASTRO, Cairns, Australia
Jul 2011	Models and Data Initiative (MADAI) workshop, Michigan State University
Jan 2010	Midwest Conference for Undergraduate Women in Physics, Ohio State University

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TEACHING & Mentoring

Teaching

Summer 2021 Summer undergraduate research program at Stanford and SLAC (~50 students)
- Coordinated and co-taught Python and scientific computing bootcamp
- Gave introductory lecture on cosmology (upcoming)

July 2020 Guest lecturer, "The Origin and Development of the Cosmos," (Physics 16), Stanford
- Intro class for non-majors, taught one session of active-learning style online lectures

Fall 2017 Teaching Assistant, Intermediate Classical Mechanics (Physics 401), U. of Michigan.
- Developed Jupyter notebooks for computational assignments.
- Ran and developed activities for weekly discussion sessions.
- Guest lectured for two class sessions

Fall 2015 Instructor for Physics GRE prep courses at University of Michigan.

June 2015 Teaching assistant, Michigan Math and Science Scholars summer program
- "Mapping the Mysteries of the Universe" 2 week program for high school students.
- Prepared and presented interactive worksheets, labs, and demonstrations.
- Guest-lectured for one main class session.

Winter 2015 Grader, Quantum Field Theory II (Physics 523), University of Michigan.

Fall 2014 Grader, Quantum Field Theory I (Physics 513), University of Michigan.

June 2014 Teaching assistant, "Mapping the Mysteries of the Universe." (same as June 2015)

Mentoring

Summer 2020 Parth Garg, Stanford Physics Undergraduate Summer Research Program

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SERVICE

Professional service

Journal referee for: MNRAS, ApJ, A&A

Grant reviewer for: NASA ATP, NASA FINESST

Service for collaborations

Oct 2018 - present	Co-lead of DES analysis team for Year 3 analysis of beyond-wCDM models.
Nov 2018	Observer for the Dark Energy Survey.
Aug 2017	Observer for the Dark Energy Survey.

Departmental Service

June 2020 - present	Postdoc representative to KIPAC management committee.
Sept 2018 - present	Stanford inclusive physics reading group. Led 3 discussions.
Jan 2019 - May 2020	KIPAC cosmology seminar organizer.
Dec - Jan 2019	Stanford astrophysics graduate admissions committee
May 2019	KIPAC hack day organizer
March 2019	Organizer of Stanford Physics lunch for International Women's Day

2013-2018 Michigan Society for Women in Physics (SWIP)

- Executive board 2015-2017, President 2017-2018.
- Managed budget and budget proposals 2015-2018.
- With other board members, oversaw project documenting the history of early alumnae of Michigan Physics, publishing findings on posters for department hallways. (2017-2019)
- With Society for Physics Students (SPS) Advocacy chair, established a new graduate-undergraduate peer mentoring program, 2016.
- Coordinated LGBTQ+ Allyship workshops for members of the physics department via the UM Spectrum center, in Feb 2015 and Dec 2016 with >50 attendees each.
- With other graduate students, met with department chair about initiatives related to diversity, equity, and inclusion (DEI), prompting creation of DEI committee. 2016.

Fall 2015	Michigan Cosmology journal club organizer
March 2015	Michigan Physics departmental poster session organizer.
2014 -2015	Physics graduate council, class representative. Established a peer mentoring program for incoming graduate students.
Summer 2014	Physics Graduate Student Symposium, organizer, webmaster.
March 2014	Michigan Physics departmental poster session organizer.

OUTREACH

Non-technical (outreach) talks

July 2020	KIPAC public lecture series (online: https://youtu.be/FDKzkWo0ucQ)
Dec 2018	Astronomy on Tap, San Francisco
May 2018	Astronomy on Tap, Bryan, Texas
Oct 2017	Cleveland Astronomical Society Meeting, Independence, Ohio
Sept 2016	Science Saturdays, Cultivate Coffee and Taphouse, Ypsilanti, Michigan
April 2015	Saturday Morning Physics, U. of Michigan (recording: https://youtu.be/X5dwaToe1Q0)
May 2013	Departing Scholars Colloquium, Marshall Aid Commemoration Commission, London.
Dec 2012	Cafe Julienne Science Night, Cambridge, UK

Other outreach while at Stanford

Oct 2019 SLAC Community day volunteer

Other outreach while at the University of Michigan

Jul 2017 Portal to the Public mini-fellowship at the Detroit Zoo, Spring and Summer 2017.

Oct 2016 Physics consultant for Michigan student production of play, "Constellations."

Aug-Sept 2016 Contributed artwork to Darkbites social media campaign, and calendar, for DES.

June 2016 Summers Knoll Demo day. Coordinated physics activities for ~30 students in grades 1-5.

March 2016 4-H Demo day on electricity and magnetism. Ann Arbor, Michigan.

Nov 2015 FEMMES outreach capstone event at the University of Michigan, for middle school girls from surrounding communities. Via SWIP, coordinated two physics activity stations.

May 2015 Michigan Physics Olympiad, judge for pasta bridge event, via SWIP.

Jan 2015 APS Conference for Undergraduate Women in Physics at U. of Michigan, LOC

Nov 2014 FEMMES outreach capstone event (same as Nov 2015).

May 2014 Michigan Physics Olympiad, judge for pasta bridge event, via SWIP.

Nov 2013 Girl Scout Physics day organizer, via SWIP.

Other outreach while at the University of Cambridge

March 2013 Created an after-school module at Castlehaven Community Association in London. Part of a class service project by 2011 Marshall Scholars.

Nov 2012 Cambridge Maths Circle open house volunteer.

Dec 2011 Cambridge Hands-On Science volunteer for event in Peterborough, UK.

Other outreach while at the Michigan State University

2006-2011 Michigan State University Science Theatre

- Active volunteer throughout undergrad, Assistant physics director 2009-2010
- Coordinated and performed science demonstrations at schools throughout Michigan.
- Directed and participated in >10 performances of a 45 minute show on quantum mechanics and nanotechnology. Led adaptation or existing script to make it accessible for younger audiences.

OTHER TRAINING

May 2019 NextProf workshop at University of Michigan

LANGUAGES

English (native speaker), French (conversational)

PUBLICATIONS

Summary from NASA ADS bibliography as of June 22, 2021:

Refereed:	19 papers,	4199 total citations,	h-index 12
All:	39 papers,	4280 total citations,	h-index 13

Leading contributions

6. **J. Muir**, E. Baxter, V. Miranda, C. Doux, A. Ferté, C. D. Leonard, D. Huterer, B. Jain, et al. [DES Collaboration], "DES Y1 results: Splitting growth and geometry to test ΛCDM." Phys. Rev. D. 103, no. 2, 023528 (2021), doi:10.1103/PhysRevD.103.023528, arXiv:2010.05924
   Led analysis and writing.
5. **J. Muir**, G. M. Bernstein, D. Huterer, et al. [DES Collaboration], "Blinding multi-probe cosmological experiments." MNRAS 494 (2020) 3, 4454-4470. doi:10.1093/mnras/staa965, arXiv:1911.05929
   Led analysis and writing.
4. **J. Muir**, S. Adhikari, and D. Huterer, "Covariance of CMB anomalies." Phys.Rev. D98 (2018) no. 2, 023521, doi:10.1103/PhysRevD.98.023521, arXiv:1806.02354
   Led analysis and writing.
3. N. Weaverdyck, **J. Muir**, and D. Huterer. "Integrated Sachs-Wolfe map reconstruction in the presence of systematic errors." Phys. Rev. D. 97, no. 4, 043515 (2018), doi:10.1103/PhysRevD.97.043515, arXiv:1709.08661.
   Created software for simulation and analysis, contributed writing and mentoring for analysis.
2. **J. Muir** and D. Huterer. "Reconstructing the Integrated Sachs-Wolfe map with galaxy surveys." Phys. Rev. D. 94, no. 4, 045305 (2016) , doi:10.1103/PhysRevD.94.043503. arXiv:1603.06586.
   Created software for simulation and analysis, led writing and analysis.
1. A. C. Davis, R. Gregory, R. Jha, and **J. Muir**. "Astrophysical black holes in screened modified gravity." JCAP 1408, 033 (2014). doi:10.1088/1475-7516/2014/08/033. arXiv:1402.4737.
   Alphabetical author list. Led analytic calculations, observable test study, writing.

Other contributions

19. DES Collaboration, "Dark Energy Survey Year 3 Results: Cosmological Constraints from Galaxy Clustering and Weak Lensing." (2021) arXiv:2105.13549
    Created and supported infrastructure for summary-statistic level blinding, validated massive neutrino modeling approach, ran MCMC chains, contributed to writing and plots.
18. E. Krause et al. [DES Collaboration], "Dark Energy Survey Year 3 Results: Multi-Probe Modeling Strategy and Validation" (2021) arXiv:2105.13548
    Credited for neutrino modeling validation, contributions to broader DES Y3 analysis.
17. M. Rodríguez-Monroy et al. [DES Collaboration], "Dark Energy Survey Year 3 Results: Galaxy clustering and systematics treatment for lens galaxy samples" (2021) arXiv:2105.13540
    Ran MCMC chains, credited for blinding infrastructure, contributions to broader DES Y3 analysis.

16. A. Porredon et al. [DES Collaboration], "Dark Energy Survey Year 3 results: Cosmological constraints from galaxy clustering and galaxy-galaxy lensing using the MagLim lens sample" (2021) arXiv:2105.13546

Ran MCMC chains, credited for blinding infrastructure, contributions to broader DES Y3 analysis.

15. A. Amon et al. [DES Collaboration], "Dark Energy Survey Year 3 Results: Cosmology from Cosmic Shear and Robustness to Data Calibration" (2021) arXiv:2105.13543
    Credited for blinding infrastructure, contributions to broader DES Y3 analysis.
14. L. Secco, S. Samuroff, et al. [DES Collaboration], "Dark Energy Survey Year 3 Results: Cosmology from Cosmic Shear and Robustness to Modeling Uncertainty" (2021) arXiv:2105.13544
    Credited for blinding infrastructure, contributions to broader DES Y3 analysis.
13. J. Prat et al. [DES Collaboration], "Dark Energy Survey Year 3 Results: High-precision measurement and modeling of galaxy-galaxy lensing." (2021) arXiv:2105.13541
    Credited for blinding infrastructure, contributions to the broader DES Y3 analysis.
12. C. Sánchez, J. Prat, et al. [DES Collaboration], "Dark Energy Survey Year 3 Results: Exploiting small-scale information with lensing shear ratios." (2021) arXiv:2105.13542
    Credited for contributions to the broader DES Y3 analysis.
11. S. Pandey et al. [DES Collaboration], "Dark Energy Survey Year 3 Results: Constraints on cosmological parameters and galaxy bias models from galaxy clustering and galaxy-galaxy lensing using the redMaGiC sample." (2021) arXiv:2105.13545
    Credited for contributions to the broader DES Y3 analysis.
10. N. Jeffrey, M. Gatti, et al. [DES Collaboration], "Dark Energy Survey Year 3 results: curved-sky weak lensing mass map reconstruction." (2021) arXiv:2105.13539
    Credited for contributions to the broader DES Y3 analysis.
9. S. Lee et al. [DES Collaboration], "Probing gravity with the DES-CMASS sample and BOSS spectroscopy." (2021) arXiv:2104.14515
    Credited for infrastructure contributions for DES Y1 extended model analysis.
8. P. Lemos, M. Raveri, et al. [DES Collaboration], "Assessing tension metrics with Dark Energy Survey and Planck data." (2020) arXiv:2012.09554.
    DES internal reviewer.
7. A. Chen et al. [DES Collaboration], "Constraints on Decaying Dark Matter with DES-Y1 and external data." Phys. Rev. D 103, no.12, 123528 (2021). doi:10.1103/PhysRevD.103.123528. arXiv:2011.04606.
    Contributed mentoring for analysis through role as DES extended model Analysis Team leader.
6. DES Collaboration, "Cosmological Constraints from Multiple Probes in the Dark Energy Survey." Phys. Rev. Lett. no. 122, 171301 (2019). doi:10.1103/PhysRevLett.122.171301. arXiv:1811.02375.
    Credited for contributions to DES Y1 "[...]Galaxy Clustering and Weak Lensing" paper.
5. DES Collaboration, "Dark Energy Survey Year 1 Results: Constraints on Extended Cosmological Models from Galaxy Clustering and Weak Lensing." Phys. Rev. D 99, no. 12, 123505 (2019). doi:10.1103/PhysRevD.99.123505. arXiv:1810.02499.
    Generated some figures, contributed to pipeline validation and re-analysis for referee response.
4. Y. Omori et al. [DES and SPT Collaborations], "Dark Energy Survey Year 1 Results: Tomographic cross-correlations between Dark Energy Survey galaxies and CMB lensing from South Pole Telescope+Planck." Phys. Rev. D 100, no. 4, 043501 (2019). doi:10.1103/PhysRevD.100.043501. arXiv:1810.02342.
    DES internal reviewer.

3. DES and SPT Collaborations,"Dark Energy Survey Year 1 Results: Joint Analysis of Galaxy Clustering, Galaxy Lensing, and CMB Lensing Two-point Functions." Phys. Rev. D 100, no. 2, 023541 (2019). doi:10.1103/PhysRevD.100.023541. arXiv:1810.02322.
   Credited for contributions to DES Y1 analysis, and as internal reviewer for Omori et al 2019.
2. X. Li et al. "The Quest for the Inflationary Spectral Runnings in the Presence of Systematic Errors." Astrophys. J. 862 (2018) no. 2, 137, doi:10.3847/1538-4357/aacaf7, arXiv:1806.02515.
   Edited manuscript, wrote results summaries, contributed mentoring for analysis.
1. DES Collaboration, "Dark Energy Survey Year 1 Results: Cosmological Constraints from Galaxy Clustering and Weak Lensing." Phys. Rev. D 98 (2018) no. 4, 043526, doi:10.1103/PhysRevD.98.043526, arXiv:1708.01530.
   Ran MCMC chains for final analysis, generated summary plots and tables for paper.

Credited as a DES builder or observer

13. G. Zacharegkas et al. [DES Collaboration], "Dark Energy Survey Year 3 results: Galaxy-halo connection from galaxy-galaxy lensing." (2021). arXiv:2106.08438
12. R. Cawthon et al. [DES Collaboration], "Dark Energy Survey Year 3 Results: Calibration of Lens Sample Redshift Distributions using Clustering Redshifts with BOSS/eBOSS." (2020). arXiv:2012.12826
11. S. Everett et al. [DES Collaboration], "Dark Energy Survey Year 3 Results: Measuring the Survey Transfer Function with Balrog." (2020). arXiv:2012.12825
10. M. Gatti, G. Giannini, et al. [DES Collaboration], "Dark Energy Survey Year 3 Results: Clustering Redshifts -- Calibration of the Weak Lensing Source Redshift Distributions with redMaGiC and BOSS/eBOSS." (2020). arXiv:2012.08569
9. O. Friedrich et al. [DES Collaboration], "Dark Energy Survey Year 3 Results: Covariance Modelling and its Impact on Parameter Estimation and Quality of Fit." (2020). arXiv:/2012.08568
8. N. MacCrann et al. [DES Collaboration], "DES Y3 results: Blending shear and redshift biases in image simulations." (2020). arXiv:2012.08567
7. J. Myles et al. [DES Collaboration], "Dark Energy Survey Year 3 Results: Redshift Calibration of the Weak Lensing Source Galaxies." (2020). arXiv:2012.08566
6. C. Doux et al. [DES Collaboration], "Dark Dark Energy Survey internal consistency tests of the joint cosmological probes analysis with posterior predictive distributions." MNRAS 503, no.2, 2688-2705 (2021). doi:10.1093/mnras/stab526. arXiv:2011.03410.
5. C. To et al. [DES Collaboration], "Dark Energy Survey Year 1 Results: Cosmological Constraints from Cluster Abundances, Weak Lensing, and Galaxy Correlations." Phys. Rev. Lett. 126, 141301 (2021). doi:10.1103/PhysRevLett.126.141301. arXiv:2010.01138.
4. B. P. Abbott et al. [Ligo Scientific, Virgo, 1M2H, DECam GW-EM, DES, DLT40, Las Cumbres Observatory, VINROUGE, and MASTER Collaborations], "A gravitational-wave standard siren measurement of the Hubble constant." Nature 551, no.7678, 85-88 (2017). doi:10.1038/nature24471. arXiv:1710.05835 *(observer)*
3. M. Soares-Santos et al. [DES and DECam GW-EMCollaborations], "The Electromagnetic Counterpart of the Binary Neutron Star Merger LIGO/Virgo GW170817. I. Discovery of the Optical Counterpart Using the Dark Energy Camera." Astrophys. J. 848, no. 2, L16 (2017). doi:10.3847/2041-8213/aa9059. arXiv:1710.05459 *(observer)*

2. P. S. Cowperthwaite et al. [DES Collaboration] “The Electromagnetic Counterpart of the Binary Neutron Star Merger LIGO/Virgo GW170817. II. UV, Optical, and Near-infrared Light Curves and Comparison to Kilonova Models,” Astrophys. J. 848, no. 2, L17 (2017). doi:10.3847/2041-8213/aa8fc7. arXiv:1710.05840 *(observer)*

1. B. P. Abbott et al. [LIGO Scientific and Virgo Collaborations and others], “Multi-messenger Observations of a Binary Neutron Star Merger," Astrophys. J. 848, no. 2, L12 (2017) doi:10.3847/2041-8213/aa91c9. arXiv:1710.05833 *(observer)*