

# Jessica (Jessie) Muir

Curriculum vitae

Jan. 7, 2021

## Work address:

KIPAC

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## EMPLOYMENT

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.

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## HONORS AND AWARDS

### Postdoc

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.

### Graduate

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.

### **Undergraduate**

- 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

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## **PRESENTATIONS**

### **Invited Talks**

- Jan 2021 CCAPP Semianr, 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**

- 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

### Posters

July 2015	“Theoretical and Observational Progress on Large-scale Structure of the Universe,” conference, MPA, Munich, Germany
July 2015	“Accurate Astrophysics. Correct Cosmology.” Conference, UCL, London, UK.

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## TEACHING & Mentoring

### Teaching

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

Grant reviewer for: NASA ATP 2019, NASA FINESST 2019

### Service for collaborations

Oct 2018 - present	Co-lead of DES analysis team for Year 3 analysis of beyond- $\Lambda$ CDM 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.
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Sept 2018 - present	Active participant in Stanford inclusive physics reading group. Led 2 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) <ul style="list-style-type: none"> <li>- Executive board 2015-2017, President 2017-2018.</li> <li>- Managed budget and budget proposals 2015-2018.</li> <li>- With other board members, oversaw project documenting the history of early alumnae of Michigan Physics, publishing findings on posters for department hallways. (2017-2019)</li> <li>- With Society for Physics Students (SPS) Advocacy chair, established a new graduate-undergraduate peer mentoring program, 2016.</li> <li>- Coordinated LGBTQ+ Allyship workshops for members of the physics department via the UM Spectrum center, in Feb 2015 and Dec 2016 with &gt;50 attendees each.</li> <li>- With other graduate students, met with department chair about initiatives related to diversity, equity, and inclusion (DEI), prompting creation of DEI committee. 2016.</li> </ul>
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: <a href="https://youtu.be/FDKzkWo0ucQ">https://youtu.be/FDKzkWo0ucQ</a> )
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: <a href="https://youtu.be/X5dwaToe1Q0">https://youtu.be/X5dwaToe1Q0</a> )
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
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### 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
	<ul style="list-style-type: none"> <li>- Active volunteer throughout undergrad, Assistant physics director 2009-2010</li> <li>- Coordinated and performed science demonstrations at schools throughout Michigan.</li> <li>- Directed and participated in &gt;10 performances of a 45 minute show on quantum mechanics and nanotechnology. Led adaptation of existing script to make it accessible for younger audiences.</li> </ul>

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## **OTHER TRAINING**

May 2019	NextProf workshop at University of Michigan
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## **LANGUAGES**

English (native speaker), French (conversational)

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## PUBLICATIONS

Summary: 15 published papers, 3769 total citations, h-index 11. [[stats from inspirehep](#) on Jan. 7, 2021]

### Leading contributions

#### Submitted

**J. Muir**, E. Baxter, V. Miranda, C. Doux, A. Ferté, C. D. Leonard, D. Huterer, B. Jain, P. Lemos, M. Raveri, S. Nadathur, et al. [DES Collaboration], “DES Y1 results: Splitting growth and geometry to test  $\Lambda$ CDM.” Accepted to Phys.Rev.D., [arXiv:2010.05924](#)  
- *Led analysis and writing.*

#### Published

**J. Muir**, G. M. Bernstein, D. Huterer, F. Elsner, E. Krause, A. Roodman, 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.*

**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.*

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.*

**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.*

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

#### Credited for analysis and/or writing

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.*

A. Chen et al. [DES Collaboration], “Constraints on Decaying Dark Matter with DES-Y1 and external data.” (2020) [arXiv:2011.04606](#).  
- *Contributed mentoring for analysis through role as DES extended model Analysis Team leader.*

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.*

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](https://doi.org/10.1103/PhysRevD.99.123505), [arXiv:1810.02499](https://arxiv.org/abs/1810.02499).

- *Generated some figures, contributed to pipeline validation and re-analysis for referee response.*

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](https://doi.org/10.1103/PhysRevD.100.043501).

[arXiv:1810.02342](https://arxiv.org/abs/1810.02342).

- *DES internal reviewer*

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](https://doi.org/10.1103/PhysRevD.100.023541), [arXiv:1810.02322](https://arxiv.org/abs/1810.02322).

- *Credited for contributions to other DES Y1 papers, and as internal reviewer for Omori et al 2019.*

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](https://doi.org/10.3847/1538-4357/aacaf7), [arXiv:1806.02515](https://arxiv.org/abs/1806.02515).

- *Edited manuscript for cohesiveness, wrote results summaries, contributed mentoring for analysis.*

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](https://doi.org/10.1103/PhysRevD.98.043526), [arXiv:1708.01530](https://arxiv.org/abs/1708.01530).

- *Ran MCMC chains for final analysis, generated summary plots and tables for paper.*

#### Credited as a DES builder

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](https://arxiv.org/abs/2012.12826)

S. Everett et al. [DES Collaboration], “Dark Energy Survey Year 3 Results: Measuring the Survey Transfer Function with Balrog.” (2020). [arXiv:2012.12825](https://arxiv.org/abs/2012.12825)

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](https://arxiv.org/abs/2012.08569)

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](https://arxiv.org/abs/2012.08568)

N. MacCrann et al. [DES Collaboration], “DES Y3 results: Blending shear and redshift biases in image simulations.” (2020). [arXiv:2012.08567](https://arxiv.org/abs/2012.08567)

J. Myles et al. [DES Collaboration], “Dark Energy Survey Year 3 Results: Redshift Calibration of the Weak Lensing Source Galaxies.” (2020). [arXiv:2012.08566](https://arxiv.org/abs/2012.08566)

C. Doux et al. [DES Collaboration], “Dark Dark Energy Survey internal consistency tests of the joint cosmological probes analysis with posterior predictive distributions.” (2020). [arXiv:2011.03410](https://arxiv.org/abs/2011.03410).

C. To et al. [DES Collaboration], “Dark Energy Survey Year 1 Results: Cosmological Constraints from Cluster Abundances, Weak Lensing, and Galaxy Correlations.” Submitted to PRL (2020).

[arXiv:2010.01138](https://arxiv.org/abs/2010.01138).

#### Credited as a DES observer

- M. Soares-Santos et al. [DES Collaboration], “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](https://doi.org/10.3847/2041-8213/aa9059). [arXiv:1710.05459](https://arxiv.org/abs/1710.05459)
- P. S. Cowperthwaite et al. “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](https://doi.org/10.3847/2041-8213/aa8fc7). [arXiv:1710.05840](https://arxiv.org/abs/1710.05840).
- B. P. Abbott et al. [LIGO Scientific, Virgo, 1M2H, DLT40, Las Cumbres Observatory, VINROUGE, and MASTER Collaborations], “A gravitational-wave standard siren measurement of the Hubble constant,” *Nature*, [doi:10.1038/nature24471](https://doi.org/10.1038/nature24471). [arXiv:1710.05835](https://arxiv.org/abs/1710.05835).
- 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](https://doi.org/10.3847/2041-8213/aa91c9). [arXiv:1710.05833](https://arxiv.org/abs/1710.05833).