

# Jessica (Jessie) Muir

Curriculum vitae

July 11, 2020

## 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. 2011, 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 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 U. 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
- 2008 Hantel Endowed Fellowship for Undergraduate Research, MSU
- 2008 College of Natural Science Competitive Scholarship for Study Abroad, MSU
- 2006 Distinguished Freshman Scholarship (4 years full tuition), MSU

## **PUBLICATIONS**

### ***Leading contribution, 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.94.045305. 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, based on master’s thesis. Led analytic calculations, observable test study, writing.*

### ***Other contributions***

#### ***Credited for work on analysis and/or writing***

- T. M. C. Abbott et al. [DES Collaboration], “Cosmological Constraints from Multiple Probes in the Dark Energy Survey.” Phys. Rev. Lett. no. 122, 171301 (2019). arXiv:1811.02375.  
- *Credited for contributions to DES Y1 “[...]Galaxy Clustering and Weak Lensing” paper.*

- T. M. C. Abbott et al. [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 (2018). arXiv:1810.02499.
- *Generated some figures, contributed to pipeline validation and re-analysis for referee response.*
- T. M. C. Abbott et al. [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 (2018). arXiv:1810.02322.
- *Credited for contributions to other DES Y1 papers, and as internal reviewer for Omori et al 2018.*
- 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 for cohesiveness, wrote results summaries, contributed mentoring for analysis.*
- T. M. C. Abbott et al. [DES Collaboration], “Dark Energy Survey Year 1 Results: Cosmological Constraints from Galaxy Clustering and Weak Lensing.” Phys.Rev. D98 (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 DES internal reviewer*
- Y. Omori et al. [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. 4, 043501 (2018). arXiv:1810.02322.
- 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. arXiv: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. arXiv: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. arXiv: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. arXiv:1710.05833.

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## PRESENTATIONS

### Invited Talks

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.

## **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 online lectures [upcoming]
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, “Mapping the Mysteries of the Universe” session of Michigan Math and Science Scholars summer program for high school students. Prepared and presented worksheets, labs, and demonstrations with Professor Jeff McMahon.
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**

Referee for: MNRAS, ApJ

Reviewer for: NASA ATP, NASA FINESST

### **Service for collaborations**

Oct 2018 - present      Co-lead of DES analysis team for Year 3 analysis of beyond- $\Lambda$ CDM models.

Nov 2018                Observing shift for the Dark Energy Survey.

March 2018             Internal reviewer for DES-SPT combined cosmology analysis paper.

Aug 2017                Observing shift for the Dark Energy Survey.

### **Departmental Service**

June 2020 - present    KIPAC management committee postdoc representative

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 departmental DEI committee. 2016.

May - Dec 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.

June-Aug. 2014 Physics Graduate Student Symposium, organizer, webmaster.

March 2014      Michigan Physics departmental poster session organizer.

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## **OUTREACH**

**Non-technical (outreach) talks**

July 2020	KIPAC public lecture series (online)
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, w. James Antonaglia & Adam Katcher
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 Michigan, LOC <ul style="list-style-type: none"><li>- Coordinated student poster and oral presentations.</li><li>- Grad student rep. on a panel about the experiences of women in physics.</li><li>- Represented astronomy and cosmology during a "science cafe" event.</li><li>- Designed buttons featuring pioneering women in physics with fellow graduate student, Veronica Policht, which were given to conference participants.</li></ul>
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, via SWIP. As part of organizing committee, arranged full day of physics-related activities for local girl scout troops.

**Other outreach while at the University of Cambridge**

March 2013	Created and ran after-school module on binary numbers at Castlehaven Community Association in London. Part of a class service project by 2011 Marshall Scholars.
Nov 2012	Cambridge Maths Circle open house. Assisted children visiting the Cambridge Center for Mathematical Studies with hands-on math activities.
Dec 2011	Cambridge Hands-On Science volunteer for event at Kingsfield Primary School 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></ul>
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- Directed and participated in >10 performances of a 45 minute show on quantum mechanics and nanotechnology. Led adaptation of existing script to make it accessible for younger audiences.
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## **OTHER RESEARCH EXPERIENCE**

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| 2012-2013 | MPhil research with Professor Anne-Christine Davis at U. Cambridge. Studied screened modified gravity around astrophysical black holes.  |
| 2009-2011 | Research assistant to Professor Mark Voit at Michigan State University. Added neutrino mass as a parameter to a galaxy cluster survey simulator, studied performance of simulator for forecasting. |
| 2008-2010 | Research assistant to Professor Joey Huston at Michigan State University. Analyzed the performance of jet reconstruction algorithms for the ATLAS experiment.                                      |
| 2009      | Summer student, working with Dr. Irene Vichou on ATLAS analysis, University of Michigan CERN REU.  |
| 2008      | Summer student, working with Dr. Pierre-Antoine Delsart on ATLAS analysis, LAPP, Annecy, France.   |
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## **OTHER TRAINING**

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| May 2019     | NextProf workshop at University of Michigan  |
| Jun-Jul 2008 | Certificate of French studies, Institut de Touraine, Tours, France. Study abroad program in French language through MSU. |
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## **LANGUAGES**

English (native speaker), French (conversational)