

# Jessica (Jessie) Muir

Curriculum vitae

Sept. 5, 2019

## Work address:

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## EMPLOYMENT

**Porat Fellow** - KIPAC, Stanford University/SLAC. Sept 2018 - present.

## EDUCATION

### Ph.D. in Physics

09/2013 - 08/2018. The University of Michigan, Ann Arbor, MI.  
Advisor: Professor Dragan Huterer  
Thesis: "Towards precision cosmology on the largest observable scales."

### MPhil in Astronomy

09/2012-08/2013, 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.

09/2011-07/2011, Gonville and Caius College, the University of Cambridge. Cambridge, UK.

### Graduate coursework

08/2010-08/2011, full time enrollment in physics Ph.D. program, Michigan State University.

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

08/2006-05/2010, Michigan State University.  
Thesis: "Predicting neutrino mass constraints from galaxy cluster surveys." Advisor: Mark Voit.

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## HONORS AND AWARDS

### Graduate

- 2019 Kent M. Terwilliger Memorial Thesis Prize - given annually to a graduate student for the most outstanding Ph.D. thesis in physics at the University of Michigan.
- 2018 Wirt & Mary Cornwell Prize - given annually to a graduate student at U. of Michigan who "during the four previous years, demonstrated the greatest intellectual curiosity and given most promise of original study and creative work in one of six disciplines - one being physics."
- 2018 Community Engagement Award, University of Michigan Department of Physics.
- 2017 Rackham Predoctoral Fellowship, University of Michigan - funding 2017-2018.
- 2015 Peter Franken Award - given annually to honor outstanding work by a first- or second-year Physics graduate student at U. of Michigan.

- 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
  - 2006 National Merit Scholarship
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## PUBLICATIONS

### *Published, leading contribution*

- 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.94.045303. 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.

### *Published, other contributions*

- 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 summary figures, contributed to pipeline validation discussions and referee response.*
- 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.*

- 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.*  
 - *Alphabetical, based on master’s thesis. Led analytic calculations, observable test study, writing.*

*DES internal reviewer for*

- 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.  
 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 on*

- 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.

*In prep*

- J. Muir et al. [DES Collaboration], “Blinding multi-probe cosmological experiments.” (2019)  
 - *Currently in DES internal review. Led analysis and writing..*

## PRESENTATIONS

### Invited Talks

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|------------|---|
| Sept 2019  | Intl. Symposium on Multi-particle Dynamics, Santa Fe (DES overview, upcoming) |
| 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     |
| 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**

Oct 2019      Cosmic Controversies Conference, University of Chicago (upcoming)  
 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  
 June 2017      DES Collaboration meeting, University of Chicago  
 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  
 May 2016      DES Collaboration meeting, SLAC  
 Jul 2011      Models and Data Initiative (MADAI) workshop, Michigan State University  
 Jan 2010      Midwest Conference for Undergraduate Women in Physics, Ohio State University

#### **Posters**

March 2017      Departmental poster session, University of Michigan  
 March 2016      Departmental poster session, University of Michigan  
 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**

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.  
 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)

## **SERVICE**

#### **Professional service**

Referee for: MNRAS, ApJ  
 2019 Reviewer for NASA FINESST ASTRO graduate fellowship applications.

#### **Service for collaborations**

Oct 2018 - present      Co-leader 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**

May 2019      KIPAC hack day organizer  
 Jan 2019 - present      KIPAC Cosmology seminar organizer.

Michigan Society for Women in Physics (SWIP) executive board (2015-2017), President 2017-2018.

- Managed budget 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 2015 - 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.  
 Summer 2014      Physics Graduate Student Symposium, organizer, webmaster.  
 March 2014      Michigan Physics departmental poster session organizer.

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## **OUTREACH**

### **Non-technical (outreach) talks**

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 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, Local Organizing Committee

- Coordinated student poster and oral presentations.
- Grad student rep. on a panel about the experiences of women in physics.
- Represented astronomy and cosmology during a “science cafe” event.
- Designed buttons featuring pioneering women in physics with fellow graduate student, Veronica Policht, which were given to conference participants.

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 Marshal 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

- Active volunteer throughout undergrad, Assistant physics director 2009-2010
- Coordinated and performed science demonstrations at schools throughout Michigan.
- Directed and participated in a 45 minute show on quantum mechanics and nanotechnology, adapting script to make it accessible for young audiences.

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## **OTHER RESEARCH EXPERIENCE**

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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## CONFERENCES AND WORKSHOPS ATTENDED

May 2019	DES Year 3 workshop, UAB, Barcelona, Spain
Jan 2019	Testing Gravity 2019, Simon Fraser University, Vancouver, BC, Canada
Oct 2018	DES Year 3 workshop, U. of Michigan, Ann Arbor, MI
May 2018	DES Collaboration meeting, Texas A&M U., College Station, TX
Sept 2017	Modified Gravity Software Implementation Meeting, JPL, Pasadena, CA
July 2017	Advances in Theoretical Cosmology in Light of Data, Nordita, Stockholm, Sweden
June 2017	DES Collaboration meeting, University of Chicago, Chicago, IL
March 2017	Blind Analysis in High-Stakes Survey Science, SLAC, Menlo Park, CA
Dec 2016	DES Collaboration meeting, Cambridge, UK
Aug 2016	COSMO 2016, Ann Arbor, MI
July 2016	Diving into the Dark, CAASTRO, Cairns, Australia
May 2016	DES Collaboration meeting, SLAC, Menlo Park, CA
July 2015	Theoretical and Observational Progress on Large-scale Structure of the Universe, MPA/ESO/MPE/Excellence Cluster Join Conference. Munich, Germany.
July 2015	Accurate Astrophysics. Correct Cosmology. UCL, London, UK.
Jan 2015	APS Conference for Undergraduate Women in PHysics (LOC), University of Michigan.
Sept 2014	Large Angle Anomalies; from a posteriori to a priori. Case Western Reserve University.
Sept 2013	Cosmology After Planck, University of Michigan, Ann Arbor, MI.
May 2013	Spontaneous Workshop on Cosmology, Cargèse, France.
Dec 2012	Annual Theory Meeting, Durham University, Durham, UK.
July 2011	Santa Fe Cosmology Workshop.
July 2011	Models and Data Initiative (MADAI) collaboration workshop, Michigan State U.
Jan 2010	Midwest Conference for Undergraduate Women in Physics, Ohio State University.
Jan 2009	Midwest Conference for Undergraduate Women in Physics, University of Illinois.
Feb 2009	Argonne National Lab ATLAS Analysis Jamboree.

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## OTHER TRAINING

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)