

# Joel Meyers

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CONTACT INFORMATION	Department of Physics Southern Methodist University 3215 Daniel Ave. Rm 102 Dallas, TX 75205-1437	<i>Phone:</i> (682) 240-3874 <i>E-mail:</i> jrmeyers@smu.edu <i>Website:</i> <a href="https://joelmeyers.github.io">https://joelmeyers.github.io</a> <i>Citizenship:</i> U.S. Citizen
RESEARCH INTERESTS	Early Universe Cosmology, Cosmic Microwave Background, Theoretical High Energy Physics	
RESEARCH EXPERIENCE	<b>Southern Methodist University</b> Department of Physics, 2018 - Present Assistant Professor  <b>Canadian Institute for Theoretical Astrophysics (CITA)</b> University of Toronto, 2012 - 2018 Senior Research Associate, Theoretical Cosmology  <b>Weinberg Theory Group and Texas Cosmology Center</b> University of Texas at Austin, 2006 - 2012 Theoretical Cosmology, Dissertation research conducted with Prof. Steven Weinberg	
EDUCATION	<b>The University of Texas at Austin</b> , Austin, Texas, USA Ph.D. in Physics, August 2012 <ul style="list-style-type: none"><li>• Dissertation Topic: <i>Inflation: Connecting Theory to Observation</i></li><li>• Advisor: Professor Steven Weinberg</li></ul> <b>University of Wisconsin</b> , Madison, Wisconsin, USA B.S. in Physics and Mathematics, May 2006 <ul style="list-style-type: none"><li>• Thesis Topic: <i>Cosmic Superstrings</i></li><li>• Thesis Advisor: Professor Gary Shiu</li></ul>	
COLLABORATIONS	<ul style="list-style-type: none"><li>• <b>CMB-S4</b>, 2015 - present, (Science Council Co-Chair 2020 - 2022, Light Relics Working Group Co-Lead 2018 - 2019)</li><li>• <b>Simons Observatory</b>, 2016 - present</li><li>• <b>PICO</b>, 2016 - present</li><li>• <b>CCAT-Prime</b>, 2016 - present</li></ul>	
HONORS AND AWARDS	<ul style="list-style-type: none"><li>• Beatrice and Vincent Tremaine Fellowship, 2016 - 2017</li><li>• Texas Cosmology Center Summer Research Fellowship, 2010</li><li>• A.D. Hutchison Student Endowment Fellowship, 2009 - 2010</li><li>• Phi Beta Kappa, University of Wisconsin, 2006</li></ul>	

## INVITED TALKS

- *CCAT-prime Collaboration Meeting*, Virtual Meeting, April 2020
- *Cosmology and Astro-particle Physics Workshop: CAP@Rice*, Rice University, October 2019
- *Topics in Cosmic Neutrino Physics*, Fermilab, October 2019
- *Institute for Advanced Study Astrophysics Seminar*, Princeton, NJ, May 2019
- *CMB-S4 Collaboration Workshop, Fermilab-2019*, Fermilab, March 2019
- *Building Astronomy in Texas Symposium 2019*, Dallas, TX, January 2019
- *CMB in HD*, Flatiron Institute, December 2018
- *nu Physics in the CMB*, University of California, San Diego, November 2018
- *University of Texas at Dallas Physics Colloquium*, October 2018
- *University of Texas at Austin Theory Group Seminar*, October 2018
- *CMB-S4 Collaboration Workshop, Princeton-2018*, Princeton University, September 2018
- *PICO Collaboration Science Meeting*, University of Minnesota May 2018
- *YITP Seminar*, Stony Brook University, April 2018
- *Rice University Physics Colloquium*, Houston, TX, February 2018
- *Southern Methodist University Physics Colloquium*, Dallas, TX, February 2018
- *Lake Louise Winter Institute 2018*, Lake Louise, Alberta, February 2018
- *Cosmology Lunch*, Institute for Advanced Study, Princeton, November 2017
- *Kavli CMB Lensing Workshop*, Stanford University, September 2017
- *CMB-S4 Collaboration Workshop, Harvard-2017*, Harvard University, August 2017
- *SLAC Summer Institute 2017*, SLAC, August 2017
- *Phenomenology 2017 Symposium*, Plenary Talk, University of Pittsburgh, May 2017
- *University of California Riverside Seminar*, March 2017
- *University of Illinois Theory Seminar*, February 2017
- *University of Texas at Austin Theory Group Seminar*, January 2017
- *Boston University Theory Seminar*, October 2016
- *CMB-S4 / Future Cosmic Surveys*, University of Chicago, September 2016
- *Cosmology with CMB-S4*, University of Chicago, September 2016
- *US Radio/Millimeter/Submillimeter Science Futures II*, Baltimore, Maryland, August 2016
- *Neutrinos and Light Particles in Cosmology*, University of California Berkeley, June 2016
- *Lawrence Berkeley National Laboratory Cosmology Lunch*, March 2016
- *Cosmology with CMB-S4 Workshop*, Lawrence Berkeley National Laboratory, March 2016
- *Johns Hopkins University Theory Seminar*, November 2015
- *Cosmology with CMB-S4*, University of Michigan, September 2015
- *California Institute of Technology TAPIR Seminar*, June 2015
- *Perimeter Institute Seminar*, May 2015
- *Testing Inflation with Large Scale Structure*, CITA, October 2014
- *University of Texas at Austin Theory Group Seminar*, May 2014
- *Istituto Nazionale di Fisica Nucleare Theory Seminar*, April 2014
- *St. Mary's University Astrophysics Seminar*, February 2014
- *University of Nevada, Las Vegas Theory Seminar*, December 2013
- *University of British Columbia Cosmology Seminar*, August 2013
- *Kavli Institute for Cosmological Physics Seminar*, University of Chicago, May 2013
- *University of Nottingham Cosmology Seminar*, April 2013
- *Kavli Institute for the Physics and Mathematics of the Universe Seminar*, November 2012
- *CITA Seminar*, University of Toronto, July 2012

CONFERENCE  
CONTRIBUTIONS

- *April APS Meeting*, Virtual Meeting, April 2020
- *COSMO-16*, University of Michigan, August 2016
- *Rencontres de Moriond Cosmology*, March 2016
- *Cosmology on Safari*, January 2015
- *New Challenges for Early Universe Cosmologists*, Lorentz Center, August 2013
- *The Universe as Seen by Planck*, European Space Agency/European Space Research and Technology Centre, April 2013
- *Gravity and Cosmology 2012*, Yukawa Institute for Theoretical Physics, December 2012

- *Critical Tests of Inflation Using Non-Gaussianity*, Max Planck Institute for Astrophysics, November 2012
- *Inflationary Theory and its Confrontation with Data in the Planck Era*, Aspen Center for Physics, February 2012
- *DEUS: Current and Future Challenges of the Dark and Early Universes*, Dark Cosmology Centre, Niels Bohr Institute, August 2011
- *Cosmological Non-Gaussianity: Observations Confront Theory Workshop*, University of Michigan, May 2011
- *Primordial Features and Non-Gaussianities*, Harish-Chandra Research Institute, May 2011
- *Texas Cosmology Network Meeting*, University of Texas at Austin, October 2009

STUDENTS  
SUPERVISED

- **Eric Guzman**, Ph.D. Student at SMU, October 2018 - present
- **Noah Pearson**, Undergraduate at Southern Methodist University, May 2019 - present
- **Selim Hotinli**, Co-supervision with Andrew Jaffe, Ph.D. Student at Imperial College London, October 2016 - present
- **Alex Laguë**, Ph.D. Student at University of Toronto, Summer 2018 - present
- **Victor Chan**, Co-supervision with Renée Hložek and Alex van Engelen, Ph.D. Student at University of Toronto, Summer 2018 - present
- **Connor Sheere**, Co-supervision with Alex van Engelen and Daan Meerburg, Summer 2016 - present
- **Brayden Mon**, Co-supervision with Daan Meerburg and Alex van Engelen, Summer Undergraduate Research Program 2017 at CITA
- **Matthew Wilson**, Co-supervision with Dick Bond, Master's student in University of Toronto Physics Department, January - August 2016
- **Harrison Winch**, Co-supervision with Daan Meerburg and Alex van Engelen, Summer Undergraduate Research Program 2016 at CITA
- **Vivian Britto**, Summer Undergraduate Research Program 2014 at CITA
- **Derek Inman**, Co-supervision with Ue-Li Pen, Ph.D. Student at CITA, September 2013 - August 2014
- **Shenglin Jing**, Co-supervision with Ido Ben-Dayana, Undergraduate Student at CITA, September 2012 - August 2013

POSTDOCS  
SUPERVISED

- **Cynthia Trendafilova**, Southern Methodist University, September 2019 - present

TEACHING  
EXPERIENCE

**Instructor**

- Cosmology, Quantum Field Theory, General Physics, January 2019 - present, Southern Methodist University
- SLAC Summer Institute 2017, August 2017, SLAC
- Scientific Computing - Symbolic Computing, May 2016 and May 2017, CITA
- MCAT Physics, June 2007 - March 2009, Princeton Review, Austin, Texas

**Tutor**

- General Physics, June 2011 - August 2012, Austin, Texas
- Astronomy, August 2011 - August 2012, Austin, Texas
- MCAT Physics, August 2008 - January 2009, Princeton Review, Austin, Texas
- Calculus, Fall 2007, Austin, Texas

**Teaching Assistant**

- General physics, History of Science, Undergraduate Quantum Mechanics, Graduate Quantum Mechanics, Quantum Field Theory, Fall 2006 - Spring 2012, University of Texas at Austin

**SERVICE AND  
LEADERSHIP**

- **SMU Astrophysics Discussion:** Co-organizer, 2019 - present
- **SMU Theoretical HEP Discussion:** Co-organizer, 2018 - present
- **SMU Graduate Committee:** Member, 2018 - 2020
- **SMU Faculty Hiring Committee:** Member, 2018 - 2019
- **CMB-S4:** Science Council Co-Chair 2020 - present, Light Relics Working Group Co-Lead 2018 - 2019
- **CITA Cosmology Discussion:** Co-organizer, 2012 - 2018
- **CITA Blackboard Discussion:** Co-organizer, 2013 - 2018
- **CITA Postdoc Hiring Committee:** Member, 2013 - 2018
- **CITA Jamboree:** Co-organizer, 2014 - 2015
- **Journal Referee:**
  - Physical Review Letters
  - Physical Review D
  - Physical Review X
  - Journal of Cosmology and Astroparticle Physics

**WORKSHOPS  
ORGANIZED**

- *11th CMB-S4 Workshop: Cosmology and Astrophysics in the Next Decade, July 2020*
- *CMB in HD*, Flatiron Institute, December 2018
- *Neutrinos and (G)astrophysics in Large-Scale Structure*, CITA, December 2016

## PUBLICATIONS

**Note:** Author lists are alphabetical except those with an asterisk (\*).

1. K. Abazajian *et al.* [CMB-S4 Collaboration],  
*CMB-S4: Forecasting Constraints on Primordial Gravitational Waves*,  
arXiv:2008.12619 [astro-ph.CO].
2. (\*) B. Beringue, P. D. Meerburg, J. Meyers and N. Battaglia,  
*Cosmology with Rayleigh Scattering of the Cosmic Microwave Background*,  
arXiv:2008.11688 [astro-ph.CO].
3. S. C. Hotinli, M. C. Johnson and J. Meyers,  
*Optimal filters for the moving lens effect*,  
arXiv:2006.03060 [astro-ph.CO].
4. A. Laguë and J. Meyers,  
*Prospects and Limitations for Constraining Light Relics with Primordial Abundance Measurements*,  
Phys. Rev. D **101** (2020) no.4, 043509 arXiv:1908.05291 [astro-ph.CO].
5. K. Abazajian *et al.* [CMB-S4 Collaboration],  
*CMB-S4 Science Case, Reference Design, and Project Plan*,  
arXiv:1907.04473 [astro-ph.IM].
6. (\*) S. Hanany *et al.* [NASA PICO Collaboration],  
*PICO: Probe of Inflation and Cosmic Origins*,  
arXiv:1902.10541 [astro-ph.IM].
7. (\*) S. C. Hotinli *et al.*,  
*Transverse Velocities with the Moving Lens Effect*,  
Phys. Rev. Lett. **123**, no. 6, 061301 (2019) arXiv:1812.03167 [astro-ph.CO].
8. (\*) S. Foreman, P. D. Meerburg, J. Meyers and A. van Engelen,  
*Cosmic variance mitigation in measurements of the integrated Sachs-Wolfe effect*,  
Phys. Rev. D **99**, 083506 (2019) arXiv:1811.00529 [astro-ph.CO].
9. J. Aguirre *et al.* [Simons Observatory Collaboration],  
*The Simons Observatory: Science goals and forecasts*,  
JCAP **1902**, 056 (2019) arXiv:1808.07445 [astro-ph.CO].
10. (\*) G. J. Stacey *et al.*,  
*CCAT-prime: Science with an Ultra-widefield Submillimeter Observatory at Cerro Chajnantor*,  
arXiv:1807.04354 [astro-ph.GA].
11. R. de Putter, O. Doré, J. Gleyzes, D. Green and J. Meyers,  
*Dark Matter Interactions, Helium, and the CMB*,  
Phys. Rev. Lett. **122**, 041301, (2018) arXiv:1805.11616 [astro-ph.CO].
12. D. Green, P. D. Meerburg and J. Meyers,  
*Aspects of Dark Matter Annihilation in Cosmology*,  
JCAP **1904**, 025 (2019) arXiv:1804.01055 [astro-ph.CO].
13. (\*) S. Foreman, P. D. Meerburg, A. van Engelen and J. Meyers,  
*Lensing reconstruction from line intensity maps: the impact of gravitational nonlinearity*,  
JCAP **1807**, no. 07, 046 (2018) arXiv:1803.04975 [astro-ph.CO].

14. (\*) S. C. Hotinli, J. Frazer, A. H. Jaffe, J. Meyers, L. C. Price and E. R. M. Tarrant,  
*Effect of reheating on predictions following multiple-field inflation*,  
Phys. Rev. D **97**, no. 2, 023511 (2018) arXiv:1710.08913 [astro-ph.CO].
15. (\*) J. Meyers, P. D. Meerburg, A. van Engelen and N. Battaglia,  
*Beyond CMB Cosmic Variance Limits on Reionization with the Polarized SZ effect*,  
Phys. Rev. D **97**, no. 10, 103505 (2018), **Editor's Suggestion** arXiv:1710.01708  
[astro-ph.CO].
16. P. D. Meerburg, J. Meyers and A. van Engelen,  
*Reconstructing the Primary CMB Dipole*,  
Phys. Rev. D **96**, no. 8, 083519 (2017) arXiv:1704.00718 [astro-ph.CO].
17. P. D. Meerburg, J. Meyers, K. M. Smith and A. van Engelen,  
*Reconstructing CMB Fluctuations and the Mean Reionization Optical Depth*,  
Phys. Rev. D **95**, no. 12, 123538 (2017) arXiv:1701.06992 [astro-ph.CO].
18. (\*) C. Sheere, A. van Engelen, P. D. Meerburg and J. Meyers,  
*Establishing the Origin of CMB B-mode Polarization*,  
Phys. Rev. D **96**, no. 6, 063508 (2017) arXiv:1610.09365 [astro-ph.CO].
19. K. N. Abazajian *et al.* [CMB-S4 Collaboration],  
*CMB-S4 Science Book, First Edition*,  
arXiv:1610.02743 [astro-ph.CO].
20. R. de Putter, O. Doré, D. Green and J. Meyers,  
*Single-Field Inflation and the Local Ansatz: Distinguishability and Consistency*,  
Phys. Rev. D **95**, no. 6, 063501 (2017) arXiv:1610.00785 [hep-th].
21. D. Green, J. Meyers and A. van Engelen,  
*CMB Delensing Beyond the B Modes*,  
JCAP **1712** (2017) no.12, 005 arXiv:1609.08143 [astro-ph.CO].
22. (\*) P. D. Meerburg, J. Meyers, A. van Engelen and Y. Ali-Haïmoud,  
*CMB B-Mode Non-Gaussianity*,  
Phys. Rev. D **93**, 123511 (2016) arXiv:1603.02243 [astro-ph.CO].
23. D. Baumann, D. Green, J. Meyers and B. Wallisch,  
*Phases of New Physics in the CMB*,  
JCAP **1601**, 007 (2016) arXiv:1508.06342 [astro-ph.CO].
24. (\*) P. D. Meerburg, R. Hložek, B. Hadzhiyska and J. Meyers,  
*Multiwavelength Constraints on the Inflationary Consistency Relation*,  
Phys. Rev. D **91**, no. 10, 103505 (2015) arXiv:1502.00302 [astro-ph.CO].
25. M. Alvarez *et al.*,  
*Testing Inflation with Large Scale Structure: Connecting Hopes with Reality*,  
arXiv:1412.4671 [astro-ph.CO].
26. V. Britto and J. Meyers,  
*Monthly Modulation in Dark Matter Direct-Detection Experiments*,  
JCAP **1511**, 006 (2015) arXiv:1409.2858 [astro-ph.CO].
27. J. Meyers and E. R. M. Tarrant,  
*Perturbative Reheating After Multiple-Field Inflation: The Impact on Primordial Ob-*  
*servables*,  
Phys. Rev. D **89**, no. 6, 063535 (2014) arXiv:1311.3972 [astro-ph.CO].

28. J. Meyers,  
*Non-Gaussian Correlations Outside the Horizon in Local Thermal Equilibrium*,  
arXiv:1212.4438 [astro-ph.CO].
29. J. Meyers and N. Sivanandam,  
*Adiabaticity and the Fate of Non-Gaussianities: The Trispectrum and Beyond*,  
Phys. Rev. D **84**, 063522 (2011) arXiv:1104.5238 [astro-ph.CO].
30. J. Meyers and N. Sivanandam,  
*Non-Gaussianities in Multifield Inflation: Superhorizon Evolution, Adiabaticity, and the Fate of  $f_{\text{NL}}$* ,  
Phys. Rev. D **83**, 103517 (2011) arXiv:1011.4934 [astro-ph.CO].
31. W. Fischler and J. Meyers,  
*Dark Radiation Emerging After Big Bang Nucleosynthesis?*,  
Phys. Rev. D **83**, 063520 (2011) arXiv:1011.3501 [astro-ph.CO].

### Astro2020 Decadal Survey White Papers

The papers in this section were written for the Astro2020 Decadal Survey of Astronomy and Astrophysics. Papers for which I was among the primary authors are indicated by (†).

32. (\*) N. Sehgal, *et al.*,  
*CMB-HD: Astro2020 RFI Response*,  
arXiv:2002.12714 [astro-ph.CO].
33. T. Herter *et al.*,  
*The CCAT-Prime Submillimeter Observatory*,  
Bull. Am. Astron. Soc. **51**, no. 7, 213 (2019) arXiv:1909.02587 [astro-ph.IM].
34. (\*) S. Hanany *et al.*,  
*PICO: Probe of Inflation and Cosmic Origins*,  
Bull. Am. Astron. Soc. **51**, no. 7, 194 (2019) arXiv:1908.07495 [astro-ph.IM].
35. (\*) J. Carlstrom *et al.*,  
*CMB-S4*,  
Bull. Am. Astron. Soc. **51**, no. 7, 209 (2019) arXiv:1908.01062 [astro-ph.IM].
36. (\*) A. Lee *et al.* [Simons Observatory Collaboration],  
*The Simons Observatory*,  
Bull. Am. Astron. Soc. **51**, no. 7, 147 (2019) arXiv:1907.08284 [astro-ph.IM].
37. (\*) N. Sehgal *et al.*,  
*CMB-HD: An Ultra-Deep, High-Resolution Millimeter-Wave Survey Over Half the Sky*,  
Bull. Am. Astron. Soc. **51**, no. 7, 6 (2019) arXiv:1906.10134 [astro-ph.CO].
38. (†)(\*) E. B. Grohs, J. R. Bond, R. J. Cooke, G. M. Fuller, J. Meyers and M. W. Paris,  
*Big Bang Nucleosynthesis and Neutrino Cosmology*,  
Bull. Am. Astron. Soc. **51**, no. 3, 412 (2019) arXiv:1903.09187 [astro-ph.CO].

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- 39. (†)(\*) D. Green *et al.*,  
*Messengers from the Early Universe: Cosmic Neutrinos and Other Light Relics*,  
Bull. Am. Astron. Soc. **51**, no. 3, 159 (2019) arXiv:1903.04763 [astro-ph.CO].
  - 40. (\*) S. Shandera *et al.*,  
*Probing the origin of our Universe through cosmic microwave background constraints  
on gravitational waves*,  
Bull. Am. Astron. Soc. **51**, no. 3, 338 (2019) arXiv:1903.04700 [astro-ph.CO].
  - 41. (\*) P. D. Meerburg *et al.*,  
*Primordial Non-Gaussianity*,  
Bull. Am. Astron. Soc. **51**, no. 3, 107 (2019) arXiv:1903.04409 [astro-ph.CO].
  - 42. (\*) N. Sehgal *et al.*, *Science from an Ultra-Deep, High-Resolution Millimeter-Wave  
Survey*,  
Bull. Am. Astron. Soc. **51**, no. 3, 43 (2019) arXiv:1903.03263 [astro-ph.CO].

### Conference Proceedings

- 43. J. Meyers,  
*Cosmic Neutrinos and Other Light Relics*,  
arXiv:1605.05575 [astro-ph.CO].