

Azadeh Moradinezhad Dizgah, Ph.D.

CONTACT INFORMATION

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RESEARCH INTERESTS

I am a theoretical cosmologist, broadly interested in studying the origin, the composition and the evolution of the universe by testing the theoretical models against the high-precision data from various cosmological observations. The primary direction of my research has been constraining the physics of the early universe using observations of cosmological large-scale structure (in particular galaxy clustering and line intensity mapping), as well as the cosmic microwave background. I am particularly interested in how the synergies between various cosmological probes can be optimally exploited to obtain the level precision of cosmological constraints not achievable by individual probes.

PROFESSIONAL EXPERIENCE

University of Geneva, Department of Theoretical Physics, Geneva, Switzerland
Senior Research Associate (Maître Assistant), February 2019 - Present

Harvard University, Department of Physics, Cambridge, MA, USA
Associate Scholar, February 2019 - October 2019
Postdoctoral Fellow, September 2016 - February 2019

University of Geneva, Department of Theoretical Physics, Geneva, Switzerland
Tomalla Postdoctoral Fellow, October 2013 - September 2016

The State University of New York at Buffalo, Department of Physics, NY, USA
Research and Teaching Assistant, September 2008 - June 2013

EDUCATION

The State University of New York at Buffalo, Buffalo, NY, USA

- Ph.D., Physics, June 2013
Defense date: May 3rd, 2013
Advisor: William H. Kinney
Ph.D. Thesis Title: *Cosmological perturbations and the physics of the early universe: Model-independent studies of viable scenarios*
- Advanced Graduate Certificate in Computational Science
(M.S. equivalent), June 2013

University of Tehran, Tehran, Iran

- Bachelor of Science, Physics, October 2007
Research Advisor: Hossein Mohseni Sajadi
Undergraduate Thesis Title: *A Review of Scalar Field Models of Dark Energy*

AWARDS

- The Tomalla postdoctoral Fellowship, The Tomalla Foundation for Gravity Research, University of Geneva, Switzerland, 2013-2016
- Fermilab Graduate Fellowship in Theoretical Physics, Fermi National Accelerator Laboratory, Batavia, IL, USA, 2011-2012
- Full Graduate Tuition Fellowship and Stipend, Department of Physics, The State University of New York at Buffalo, NY, USA, 2008-2013
- Frank B. Silvestro Fellowship, Department of Physics, The State University of New York at Buffalo, NY, USA, 2010, 2012

PROFESSIONAL
MEMBERSHIP

EUCLID Consortium, member of galaxy clustering science working group (SWG)
(most active in higher-order clustering statistics work-package)

PUBLICATIONS
(STARRED PUBLICATIONS
HAVE ALPHABETICAL
AUTHOR-LIST, WHILE
THE REST ARE ORDERED
BY CONTRIBUTION)

1. **Azadeh Moradinezhad Dizgah**, Matteo Biagetti, Emiliano Sefusatti, Vincent Desjacques, Jorge Noreña
Primordial non-Gaussianity from Biased Tracers: Likelihood Analysis of Real-Space Power Spectrum and Bispectrum
Accepted and in press in JCAP [arXiv:2010.14523]
2. Marcel Schmittfull and **Azadeh Moradinezhad Dizgah**,
Skew spectra in redshift-space
Accepted and in press in JCAP [arXiv:2010.14267]
3. Emanuele Castorina and **Azadeh Moradinezhad Dizgah**
Local Primordial Non-Gaussianities and Super-Sample Variance
JCAP 10 (2020) 007 [arXiv:2005.14677]
4. **Azadeh Moradinezhad Dizgah**, Hayden Lee, Marcel Schmittfull, Cora Dvorkin
Capturing Non-Gaussianity of the Large-Scale Structure with Weighted Skew-Spectra
JCAP 04 (2020) 011 [arXiv:1911.05763]
5. Benjamin Bose, Joyce Byun, Fabien Lacasa, **Azadeh Moradinezhad Dizgah**, Lucas Lombriser
Modelling the non-linear bispectrum in modified gravity
JCAP 02 (2020) 025 [arXiv:1909.02504]
6. **Azadeh Moradinezhad Dizgah**, Gabriele Franciolini, Antonio Riotto,
Primordial Black Holes from Broad Spectra: Abundance and Clustering
JCAP 11 (2019) 001 [arXiv:1906.08978]
7. **Azadeh Moradinezhad Dizgah**, Garrett Keating,
Line intensity mapping with [CII] and CO(1-0) as probes of primordial non-Gaussianity
APJ 872 (2019) no.2, 126 [arXiv:1805.10247]
8. **Azadeh Moradinezhad Dizgah**, Gabriele Franciolini, Alex Kehagias, Antonio Riotto,
Constraints on long-lived, higher-spin particles from galaxy bispectrum
Phys. Rev. D 98 (2018) no.6, 063520 [arXiv:1805.10247]
9. **Azadeh Moradinezhad Dizgah**, Garrett Keating, Anastasia Fialkov,
Probing Cosmic Origins with CO and [CII] Emission Lines
APJ Letters 870 (2019) no.1, L4 [arXiv:1801.10178]
10. **Azadeh Moradinezhad Dizgah**, Hayden Lee, Julian B. Munõz, Cora Dvorkin,
Galaxy Bispectrum from Massive Spinning Particles
JCAP 05 (2018) 013 [arXiv:1801.07265]
11. Kwan Chuen Chan, **Azadeh Moradinezhad Dizgah**, Jorge Noreña,
Bispectrum Supersample Covariance
Phys. Rev. D 97, 043532 (2018) [arXiv:1709.02473]
12. **Azadeh Moradinezhad Dizgah**, Cora Dvorkin,
Scale-Dependent Galaxy Bias from Massive Particles with Spin during Inflation
JCAP 01 (2018) 010 [arXiv:1709.02473]
13. Enea Di Dio, Hideki Perrier, Ruth Durrer, Giovanni Marozzi,
Azadeh Moradinezhad Dizgah, Jorge Noreña, Antonio Riotto,
Non-Gaussianities due to Relativistic Corrections to the Observed Galaxy Bispectrum
JCAP 03 (2017) 006 [arXiv:1611.03720]
14. **Azadeh Moradinezhad Dizgah**, Ruth Durrer,
Lensing corrections to the $E_g(z)$ statistics from large scale structure
JCAP 09 (2016) 035 [arXiv:1604.08914]

15. **Azadeh Moradinezhad Dizgah**, Kwan Chuen Chan, Jorge Noreña, Matteo Biagetti, Vincent Desjacques
Squeezing the halo bispectrum: a test of bias models,
JCAP 09 (2016) 030 [arXiv: 1512.06084]
- * 16. Alex Kehagias, **Azadeh Moradinezhad Dizgah**, Jorge Noreña, Hideki Perrier and Antonio Riotto,
A Consistency relation for the observed galaxy bispectrum and the local non-Gaussianity from relativistic corrections,
JCAP 08 (2015) 018 [arXiv:1503.04467].
- * 17. Alex Kehagias, **Azadeh Moradinezhad Dizgah**, Jorge Noreña, Hideki Perrier, Antonio Riotto,
A Consistency relation for the CMB B-mode polarization in the squeezed limit,
JCAP 10 (2014) 011 [arXiv:1407.6223].
18. Vincent Desjacques, **Azadeh Moradinezhad Dizgah**, Matteo Biagetti,
Ultraviolet background fluctuations with clustered sources,
Mon. Not. Roy. Astron. Soc. 444, no. 3, 2793 (2014) [arXiv:1406.6379].
- * 19. Alex Kehagias, **Azadeh Moradinezhad Dizgah**, Antonio Riotto,
Remarks on the Starobinsky model of inflation and its descendants,
Phys. Rev. D 89, no. 4, 043527 (2014) [arXiv:1312.1155].
20. **Azadeh Moradinezhad Dizgah**, Scott Dodelson, Antonio Riotto,
Imprint of primordial non-Gaussianity on dark matter halo profiles,
Phys. Rev. D 88, 063513 (2013) [arXiv:1307.2632].
21. **Azadeh Moradinezhad Dizgah**, Nikoly Gnedin, William Kinney,
Reionization history and CMB parameter estimation,
JCAP 05 (2013) 017 [arXiv:1211.7007].
- * 22. William Kinney, **Azadeh Moradinezhad Dizgah**, Brian Powell, Antonio Riotto,
Inflaton or Curvaton? Constraints on bimodal primordial spectra from mixed perturbations,
Phys. Rev. D 86, 023527 (2012) [arXiv:1203.0693].
23. William Kinney, Ghazal Geshnizjani, **Azadeh Moradinezhad Dizgah**,
Inflation, Or What? C12-03-10.2, p.179-184
Conference Proceedings: 47th Rencontres de Moriond on Cosmology,
- * 24. Ghazal Geshnizjani, William Kinney, **Azadeh Moradinezhad Dizgah**,
Horizon-preserving dualities and perturbations in non-canonical scalar field cosmologies,
JCAP 02 (2012) 015 [arXiv:1110.4640].
25. Ghazal Geshnizjani, William Kinney, **Azadeh Moradinezhad Dizgah**,
General conditions for scale-invariant perturbations in an expanding universe,
JCAP 11 (2011) 049 [arXiv:1107.1241].
- * 26. William Kinney, **Azadeh Moradinezhad Dizgah**,
Flow in cyclic cosmology,
Phys. Rev. D 82, 083506 (2010) [arXiv:1007.0753].

WHITE PAPERS
AND PORPOSALS

1. Pete Barry, Clarence Chang, Abigail Crites, Kirit S. Karkare, Garrett K. Keating, Jeff McMahon, **Azadeh Moradinezhad Dizgah**, Erik Shirokoff *et al.*
Cosmology with Millimeter-Wave Line Intensity Mapping, Snowmass2021 Letter of Interest
https://www.snowmass21.org/docs/files/summaries/CF/SNOWMASS21-CF4_CF5_Karkare-242.pdf
2. Pete Barry, Clarence Chang, Abigail Crites, Kirit S. Karkare, Garrett K. Keating, Jeff McMahon, **Azadeh Moradinezhad Dizgah**, Erik Shirokoff *et al.* *Primordial Non-Gaussianity with Millimeter-Wave Line Intensity Mapping*, Snowmass2021 Letter of Interest

https://www.snowmass21.org/docs/files/summaries/CF/SNOWMASS21-CF5_CF6_Karkare-245.pdf

3. Pete Barry, Clarence Chang, Abigail Crites, Kirit S. Karkare, Garrett K. Keating, Jeff McMahon, **Azadeh Moradinezhad Dizgah**, Erik Shirokoff *et al.*
Millimeter-Wave Line Intensity Mapping Facilities, Snowmass2021 Letter of Interest
https://www.snowmass21.org/docs/files/summaries/CF/SNOWMASS21-CF6_CF4_Karkare-246.pdf
4. Pete Barry, Clarence Chang, Abigail Crites, Kirit S. Karkare, Garrett K. Keating, Jeff McMahon, **Azadeh Moradinezhad Dizgah**, Erik Shirokoff *et al.*
Synergies between Millimeter-Wave Line Intensity Mapping with Radio, Optical and Microwave Observations, Snowmass2021 Letter of Interest
https://www.snowmass21.org/docs/files/summaries/CF/SNOWMASS21-CF6_CF4_MoradinezhadDizgah-248.pdf
5. Jacques Delabrouille ..., **Azade Moradinezhad Dizgah** *et al.*
Microwave spectro-polarimetry of matter and radiation across space and time
ESA VOYAGE 2050, (proposal for L-class ESA mission) [arXiv:1909.01591]
6. Marta Silva, Ely Kovetz, Garrett Keating, **Azadeh Moradinezhad Dizgah**, Matthieu Bethermin, Patrick C. Breyse, Kirit Karkare, José Bernal, and Jacques Delabrouille, *Mapping large-scale structure evolution over cosmic time*, ESA Voyage-2050 White Paper, [arXiv:1908.07533]
7. Daniel Meerburg, ..., **Azadeh Moradinezhad Dizgah** *et al.*
Primordial non-Gaussianity,
Astro2020 Science White Paper [arXiv:1903.04409]

INVITED TALKS

- Institute of Research in Fundamental Physics (IPM) , School of Astronomy weekly seminars, Meeting Held Remotely, Tehran, Iran, February 2021
Primordial non-Gaussianity from galaxy statistics
- EUCLID consortium Higher Order Statistics work-package telecon, November 2020
Primordial non-Gaussianity from Biased Tracers: Likelihood Analysis of Real-Space Power Spectrum and Bispectrum
- Sharif University, Cosmology Seminars, Meeting Held Remotely, Tehran, Iran, August 2020
Late time universe as a probe of cosmic origins
- Queen Mary University of London, SPA Cosmology Seminars, Meeting held via Zoom, London, UK, July 2020
Late time universe as a probe of cosmic origins
- Max Planck Institute for Astrophysics (MPA) Cosmology Seminars, Meeting held via Zoom, Munich, Germany, July 2020
Local Primordial Non-Gaussianities and Super-Sample Variance
- Princeton/IAS Cosmology Lunch, Meeting held via Zoom, Princeton, NJ, USA, April 2020 (Joint Cosmology Seminars of Institute of Advanced Study and Princeton University)
Intensity mapping with CO and CII as probes of primordial non-Gaussianity
- Dutch theoretical cosmology Meeting, University of Groningen, Groningen, Netherlands, March 2020
Primordial non-Gaussianity (PNG) with the large-scale structure across cosmic times
- Theoretical High Energy Physics Seminars, The Technical University of Munich, Munich, Germany, October 2019
Cosmological imprints of new massive particles with spin during inflation
- The Non-Gaussian Universe workshop (keynote lecture), The Stephen Hawking Centre for Theoretical Cosmology (etc), University of Cambridge, Cambridge, UK, September 2019

Observational Tests of Primordial non-Gaussianity

- Workshop on Dynamics of large-scale structure formation (overview talk),
Munich Institute of Astro- and Particle Physics (MIAAP), Munich, Germany, July 2019
Primordial non-Gaussianity with large-scale structure: galaxy surveys & intensity mapping
 - Cosmology Seminars, University of Amsterdam (UvA),
Amsterdam, Netherlands, April 2019
Intensity mapping with emission lines as probes of primordial non-Gaussianity
 - Cosmology and Astrophysics Seminar, The Center for Particle Cosmology,
University of Pennsylvania, Philadelphia, PA, USA, October 2018
Intensity mapping with CO(1-0) and CII as probes of primordial non-Gaussianity
 - Galaxies & Cosmology Seminars, Harvard-Smithsonian Center for Astrophysics (CfA),
Harvard University, Cambridge, MA, USA, March 2018
Line intensity mapping as a probe of primordial non-Gaussianity
 - The Institute for Theory and Computation (ITC) Luncheons,
Harvard University, Cambridge, MA, USA, April 2017
Signatures of extra particles during inflation on clustering statistics of galaxies
 - Cosmology Seminar Series, The Berkeley Center For Cosmological Physics (BCCP),
University of California Berkeley, Berkeley, CA, USA, March 2017
Primordial non-Gaussianity from large scale structure: prospects and challenges
 - Physics Seminar series, Department of Physics,
The State University of New York at Buffalo, Buffalo, NY, USA, February 2017
Primordial non-Gaussianity (PNG) from large scale structure: prospects and challenges
 - Cosmology and Galaxies Seminars, Harvard-Smithsonian Center for Astrophysics (CfA),
Harvard University, Cambridge, MA, USA, October 2016
Squeezing the halo bispectrum: Test of bias modeling
 - High Energy, Cosmology and Astroparticle Physics (HECAP) seminars,
International Center for Theoretical Physics (ICTP), Trieste, Italy, March 2016
Squeezing the galaxy bispectrum: Test of bias models
 - Astrophysics-Cosmology Seminars, Center for Particle Cosmology,
University of Pennsylvania, Philadelphia, PA, USA, November 2012
The Physics of the early universe from the CMB and large-scale structure
 - Cosmology Seminars, Department of Astrophysics,
Princeton University, Princeton, NJ, USA, November 2012
The Physics of the early universe from the CMB and large-scale structure
 - Kavli Institute for Particle Astrophysics and Cosmology,
Stanford University, CA, USA, November 2012
The Physics of the early universe from the CMB and large-scale structure
 - INPA Seminars, The Institute for Nuclear and Particle Astrophysics (INPA),
Lawrence Berkeley National Laboratory, Berkeley, CA, USA, November 2012
The physics of the early universe from the CMB and large-scale structure
 - Particle/Astrophysics and CERCA seminars,
Case Western Reserve University, Cleveland, OH, USA, September 2012
The interplay between high and low redshift universe
- CONTRIBUTED TALKS
- Lines in Large-scale structure, Marseille, France, July 2019
Line intensity mapping as a probe of primordial non-Gaussianity
 - Cosmo Gold, Institute d'Astrophysique de Paris, Paris, France, June 2019
Line intensity mapping as a probe of primordial non-Gaussianity

- Cosmological Signals from Cosmic Dawn to the Present, Aspen Center for Physics, Aspen, CO, USA, February 2018, *Probing Cosmic Origins with CO and [CII] intensity mapping*
- Statistics of Extrema in Large Scale Structure, Lorentz Center, Leiden, Netherlands, March 2016, *Squeezing the galaxy bispectrum: Test of bias models*
- Swiss cosmo days, EPFL, Switzerland, February 2016, *Squeezing the galaxy bispectrum: Test of bias models*
- Workshop on cosmic acceleration, Carnegie Mellon University, Pittsburgh, PA, August 2012, *General conditions for scale-invariant perturbations in an expanding universe*
- Santa Fe 2012 Cosmology Summer Workshop, Santa Fe, NM, July 2012, *Constraints on mixed inflaton-curvaton perturbations from CMB*
- Theoretical Advanced Study Institute in Elementary Particle Physics, Boulder, CO, June 2012, *General Conditions for scale-invariant perturbations in an expanding universe*
- 15th East Coast Gravity Meeting, Syracuse, NY, April 2012, *Constraints on mixed inflaton-curvaton perturbations from CMB*
- Prospect in Theoretical Physics 2011, Institute of Advanced Study, Princeton, NJ, July 2011, *General conditions for scale-invariant perturbations in an expanding universe*
- Santa Fe 2011 Cosmology Summer Workshop, Santa Fe, NM, July 2011, *General conditions for scale-invariant perturbations in an expanding universe*
- Rust Belt Cosmology Workshop, SUNY at Buffalo, NY, January 2011, *Flow in cyclic cosmology*
- Santa Fe 2010 Cosmology Summer Workshop, Santa Fe, NM, July 2010, *Flow in cyclic cosmology*

TEACHING
EXPERIENCE

- University Of Geneva:** Teaching Assistant
Undergraduate Level Mathematical Methods in Physics, 2015
Undergraduate Level Statistical Physics, 2014
- The State University of New York at Buffalo:** Teaching Assistant
Undergraduate Introductory Physics, 2011 - 2012
Undergraduate Level Classical Mechanics, 2010
Graduate Level Statistical Mechanics, 2009
Basic Physics Lab in Classical Mechanics, 2008
Basic Physics Lab in Electrostatics and Optics, 2008

PLANNING AND
SERVICE

- Science Reviewer on EUCLID BK-GC Maturity Assessment to evaluate the Maturity level for EUCLID LE3-GC-Bispectrum processing function (PF), current
- Reviewer on NASA Astrophysics Database Program (ADAP) Proposal Panel Review, 2018
- Referee for Journal of Cosmology and Astroparticle Physics (JCAP)
- Referee for Monthly Notices of the Royal Astronomical Society (MNRAS)
- Referee for Physical Review D Journal
- Organizer of Cosmology and Particle Physics Seminars, University of Geneva, 2020-2021
- Co-organizer of Cosmology and Particle Physics Seminars, University of Geneva, 2019-2020
- Co-organizer of Cosmology Journal Clubs, University of Geneva, 2019-2020
- Co-organizer of ECU Meetings, University of Geneva, 2019-2020. 2020-2021 (Joint bimonthly meeting between cosmology groups at EPFL, CERN and UNIGE),

