

Hayden Lee

CONTACT INFORMATION	Department of Physics and Astronomy, University of Pennsylvania, 209 South 33rd Street, Philadelphia, PA 19104, United States	haydenhl@sas.upenn.edu +1 (339) 215-6911 haydenhylee.github.io
RESEARCH INTERESTS	Inflation, cosmological correlators, scattering amplitudes, conformal field theory, holography, effective field theory, large-scale structure.	
POSITIONS	University of Pennsylvania , Department of Physics and Astronomy <i>Assistant Professor</i>	2024–present
	University of Chicago , Kavli Institute for Cosmological Physics <i>Postdoctoral Fellow</i>	2021–2024
	Harvard University , Department of Physics <i>Postdoctoral Fellow</i>	2017–2021
EDUCATION	University of Cambridge , DAMTP <i>PhD in Theoretical Physics</i>	2013–2017
	<ul style="list-style-type: none">• Thesis: High-Energy Aspects of Inflationary Cosmology• Advisor: Prof. Daniel Baumann	
	University of Cambridge , DAMTP <i>MSt (Part III) in Theoretical Physics (Distinction)</i>	2012–2013
	University of Canterbury , Department of Physics and Astronomy <i>BSc Hons in Mathematical Physics (First Class)</i>	2009–2011
VISITING POSITIONS	HKUST, Jockey Club Institute for Advanced Study	2017–2018
	University of Amsterdam, Institute of Physics	2015–2017
HONORS & AWARDS	KICP Fellowship	2021–2024
	Cambridge Trust Scholarship	2012–2017
	William Georgetti Scholarship	2012–2016
	Lord Rutherford Memorial Research Fellowship	2012–2015
	Sims Empire Scholarship	2012–2015
	Freemasons University Scholarship	2011
	University of Canterbury Alumni Scholarship	2011
	Haydon Prize	2010
	William Brent Wilson Memorial Prize	2010
PUBLICATIONS	[22] D. Baumann, H. Goodhew, and H. Lee, “Kinematic Flow for Cosmological Loop Integrands,” arXiv:2410.17994 [hep-th]	
	[21] H. Lee, “Tensor Integrals in the Large-Scale Structure,” arXiv:2410.13931 [astro-ph]	
	[20] H. Lee and X. Wang, “Amplitude Basis for Conformal Correlators,” <i>JHEP</i> 03 (2024) 147, arXiv:2312.17312 [hep-th]	

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- [19] N. Arkani-Hamed, D. Baumann, A. Hillman, A. Joyce, H. Lee, and G. L. Pimentel, “Kinematic Flow and the Emergence of Time,” [arXiv:2312.05300](#) [[hep-th](#)]
- [18] N. Arkani-Hamed, D. Baumann, A. Hillman, A. Joyce, H. Lee, and G. L. Pimentel, “Differential Equations for Cosmological Correlators,” [arXiv:2312.05303](#) [[hep-th](#)]
- [17] D. Anbajagane, C. Chang, H. Lee, and M. Gatti, “Primordial Non-Gaussianities with Weak Lensing: Information on Non-Linear Scales in the Ulagam Full-Sky Simulations,” *JCAP* 03 (2024) 062, [arXiv:2310.02349](#) [[astro-ph.CO](#)]
- [16] K. Inomata, H. Lee, and W. Hu, “Synchronizing the Consistency Relation,” *JCAP* 08 (2023) 021, [arXiv:2304.10559](#) [[astro-ph.CO](#)]
- [15] H. Lee and X. Wang, “Cosmological Double-Copy Relations,” *Phys.Rev.D* 108 (2023) 6, [arXiv:2212.11282](#) [[hep-th](#)]
- [14] D. Munshi, H. Lee, C. Dvorkin, and J. D. McEwan “Weak Lensing Trispectrum and Kurt-Spectra,” *JCAP* 11 (2022) 020, [arXiv:2112.05155](#) [[astro-ph](#)]
- [13] D. Baumann, W.-M. Chen, C. Duaso Pueyo, A. Joyce, H. Lee, and G. L. Pimentel, “Linking the Singularities of Cosmological Correlators,” *JHEP* 09 (2022) 010, [arXiv:2106.05294](#) [[hep-th](#)]
- [12] S.-F. Chen, H. Lee, and C. Dvorkin, “Precise and Accurate Cosmology with CMB×LSS Power Spectra and Bispectra,” *JCAP* 05 (2021) 030, [arXiv:2103.01229](#) [[astro-ph.CO](#)]
- [11] D. Baumann, C. Duaso Pueyo, A. Joyce, H. Lee, and G. L. Pimentel, “The Cosmological Bootstrap: Spinning Correlators from Symmetries and Factorization,” *SciPost Phys.* 11 (2021) 071, [arXiv:2005.04234](#) [[hep-th](#)]
- [10] H. Lee and C. Dvorkin, “Cosmological Angular Trispectra and Non-Gaussian Covariance,” *JCAP* 05 (2020) 044, [arXiv:2001.00584](#) [[astro-ph.CO](#)]
- [9] A. Moradinezhad Dizgah, H. Lee, M. Schmittfull, and C. Dvorkin, “Capturing Non-Gaussianity of the Large-Scale Structure with Weighted Skew-Spectra,” *JCAP* 04 (2020) 011, [arXiv:1911.05763](#) [[astro-ph.CO](#)]
- [8] D. Baumann, C. Duaso Pueyo, A. Joyce, H. Lee, and G. L. Pimentel, “The Cosmological Bootstrap: Weight-Shifting Operators and Scalar Seeds,” *JHEP* 12 (2020) 204, [arXiv:1910.14051](#) [[hep-th](#)]
- [7] N. Arkani-Hamed, D. Baumann, H. Lee, and G. L. Pimentel, “The Cosmological Bootstrap: Inflationary Correlators from Symmetries and Singularities,” *JHEP* 04 (2020) 105, [arXiv:1811.00024](#) [[hep-th](#)]
- [6] A. Moradinezhad Dizgah, H. Lee, J. Muñoz, and C. Dvorkin, “Galaxy Bispectrum from Massive Spinning Particles,” *JCAP* 05 (2018) 013, [arXiv:1801.07265](#) [[astro-ph.CO](#)]
- [5] D. Baumann, G. Goon, H. Lee, and G. L. Pimentel, “Partially Massless Fields During Inflation,” *JHEP* 04 (2018) 140, [arXiv:1712.06624](#) [[hep-th](#)]
- [4] H. Lee, D. Baumann, and G. L. Pimentel, “Non-Gaussianity as a Particle Detector,” *JHEP* 12 (2016) 040, [arXiv:1607.03735](#) [[hep-th](#)]
- [3] D. Baumann, H. Lee, and G. L. Pimentel, “High-Scale Inflation and the Tensor Tilt,” *JHEP* 01 (2016) 101, [arXiv:1507.07250](#) [[hep-th](#)]
- [2] D. Baumann, D. Green, H. Lee, and R. A. Porto, “Signs of Analyticity in Single-Field Inflation,” *Phys. Rev. D* 93 (2016) 023523, [arXiv:1502.07304](#) [[hep-th](#)]
- [1] H. Lee, S.-C. Su, and D. Baumann, “The Superhorizon Test of Future B-mode Experiments,” *JCAP* 02 (2015) 036, [arXiv:1408.6709](#) [[astro-ph.CO](#)]

WHITE PAPER CONTRIBUTION	[2] G. L. Pimentel, B. Wallisch, W. L. K. Wu et al. (incl. H. Lee), “Inflation: Theory and Observations,” arXiv:2203.08128 [astro-ph.CO]	
	[1] P. D. Meerburg, D. Green et al. (incl. H. Lee), “Primordial Non-Gaussianity,” arXiv:1903.04409 [astro-ph.CO]	
INVITED TALKS	Physics colloquium, Villanova University, US	02/2025
	“Loop-the-Loop,” online workshop, MITP, DE	11/2024
	“Amplitudes Meet Cosmology,” Simons Symposium, Vidago Palace, PT	09/2024
	Amplitudes & Correlators seminar (online), Durham University, IR	06/2024
	“Amplitudes 2024,” conference, IAS, US	06/2024
	“IBS Workshop on Cosmological Collider,” workshop, IBS, KR	06/2024
	HEP theory seminar, KAIST, KR	05/2024
	Particle physics seminar, KIAS, KR	05/2024
	Physics theory seminar, Boston University, US	04/2024
	“Quantum Universe,” workshop, University of Chicago, US	03/2024
	Physics & Astronomy colloquium, Tufts University, US	02/2024
	HEP seminar, University of Pennsylvania, US	01/2024
	Astrophysics talk, University of Chicago, US	12/2023
	Particle physics seminar, MIT, US	11/2023
	Amplitudes talk, Northwestern University, US	11/2023
	“Correlators in Cortona,” workshop, Cortona, IT	09/2023
	“From Amplitudes to Gravitational Waves,” conference, Nordita, SE	07/2023
	Particle physics seminar, National Taiwan University, TW	05/2023
	Particle physics seminar, Seoul National University, KR	05/2023
	Particle physics seminar (online), University of Tsinghua, CH	04/2023
	Particle physics seminar, University of Chicago, US	01/2023
	Astrophysics talk, University of Chicago, US	12/2022
	“Features of a Quantum de Sitter Universe,” Corfu Summer Institute, GR	09/2022
	Cosmology seminar (online), Universidad de Chile, CL	12/2021
	HEP seminar (online), UC San Diego, US	11/2021
	Cosmology seminar (online), IAS/Princeton University, US	05/2021
	KICP lunch talk (online), University of Chicago, US	03/2021
	HEP seminar, Seoul National University, KR	11/2020
	Cosmology seminar (online), University of Cambridge, UK	11/2020
	“Cosmological Correlators,” online workshop (plenary)	09/2020
	“Inflationary Imprints in Large Scale Structure,” workshop, Lorentz Center, NL	06/2020

HET seminar, Harvard University, US	02/2020
Physics seminar, University of Canterbury, NZ	01/2020
Particle physics seminar, Perimeter Institute, CA	11/2019
HET seminar, Harvard University, US	11/2019
HEP seminar, University of Pennsylvania, US	11/2019
“From Scattering to Expansion,” workshop, Northwestern University, US	10/2019
HEP Seminar, Texas A&M University, US	04/2019
“In Pursuit of New Particles and Paradigms,” conference, Aspen, US	03/2019
SITP theory colloquium, Stanford University, US	03/2019
HET seminar, Columbia University, US	11/2018
HET seminar, Harvard University, US	11/2018
“KIAS Workshop on Particle Physics and Cosmology,” workshop, KIAS, KR	11/2018
HEP seminar, University of Massachusetts Lowell, US	10/2018
Particle physics seminar, HKUST, HK	04/2018
Particle physics seminar, Case Western Reserve University, US	04/2018
Astrophysics talk, IAS, US	11/2017
HET seminar, Harvard University, US	09/2017
ITC journal club, Harvard University, US	09/2017
Particle physics seminar, KIAS, KR	08/2017
Particle physics seminar, Seoul National University, KR	08/2017
Cosmology seminar, Sungkyunkwan University, KR	08/2017
Particle physics seminar, IBS, KR	08/2017
HEP seminar, ICTP, IT	06/2017
Cosmology seminar, University of Cambridge, UK	10/2016

TEACHING

Lecturer, Principles of Physics II: Electromagnetism and Radiation (PHYS 0151), University of Pennsylvania, Spring 2025

Invited lecturer, Cosmological Bootstrap (3 review lectures), KIAS, Summer 2023

Guest lecturer, Introduction to Astrophysics (ASTR133), University of Chicago, Winter 2022

Guest lecturer, Cosmology (ASTR310), University of Chicago, Winter 2022

Guest lecturer, Cosmology (Physics 212), Harvard University, Spring 2019

Invited lecturer, Cosmological Correlators (3 review lectures), KIAS, Fall 2018

MENTORING

Dhayaa Anbajagane (PhD at University of Chicago)

Xinkang Wang (PhD at University of Chicago)

Shu-Fan Chen (PhD at Harvard University)