

Leander F. Thiele

Contact lhthiele@princeton.edu, Department of Physics, Princeton University
leanderthiele.github.io,

Education	Princeton University, PhD Physics	2019 – present
------------------	------------------------------------------	----------------

- advisor: David N. Spergel
- graduate courses: QFT I, Extragalactic Astronomy, Cosmology, General Relativity, Condensed Matter

Perimeter Institute for Theoretical Physics, MSc 2018 – 2019

- advisor: Kendrick M. Smith
- thesis: *Capturing non-Gaussianity: Analytic model for the one-point probability distribution function of cosmological fields within the halo model*
- graduate courses: QFT I & II, Statistical Mechanics, Condensed Matter, Cosmology, General Relativity, Machine Learning

University of Oxford, Physics, BA First Class 2015 – 2018

- ranked top of the cohort (~ 130 students) in years 2 and 3

Publications G.A. Marques, J. Liu, M. Shirasaki, **L. Thiele**, D. Grandón, K.M. Huffenberger, S. Cheng, J. Harnois-Déraps, K. Osato, W.R. Coulton, *Cosmology from weak lensing peaks and minima with Subaru Hyper Suprime-Cam survey first-year data*, 2023, [arXiv:2308.10866 \[astro-ph.CO\]](#)

L. Thiele, E. Massara, A. Pisani, C. Hahn, D.N. Spergel, S. Ho, B. Wandelt, *Neutrino mass constraint from an Implicit Likelihood Analysis of BOSS voids*, 2023, arXiv:2307.07555 [astro-ph.CO]

L. Thiele, G.A. Marques, J. Liu, M. Shirasaki, *Cosmological constraints from HSC Y1 lensing convergence PDF*, 2023,
arXiv:2304.05928 [astro-ph.CO]

A.M. Delgado, D. Anglés-Alcázar, **L. Thiele**, M. Ntampaka, S. Pandey, K. Lehman, R.S. Somerville, S. Genel, F. Villaescusa-Navarro, *Predicting the impact of feedback on matter clustering with machine learning in CAMELS*, 2023, [arXiv:2301.02231](https://arxiv.org/abs/2301.02231) [astro-ph.GA]

D. Wadekar, **L. Thiele**, J.C. Hill, S. Pandey, F. Villaescusa-Navarro, D.N. Spergel, M. Cranmer, D. Nagai, D. Anglés-Alcázar, S. Ho, L. Hernquist, *The SZ flux-mass (Y-M) relation at low halo masses: improvements with symbolic regression and strong constraints on baryonic feedback*, 2022, MNRAS 522, 2, [arXiv:2209.02075 \[astro-ph.CO\]](#)

B.K.K. Lee, W. Coulton, **L. Thiele**, S. Ho, *An exploration of the properties of cluster profiles for the thermal and kinetic Sunyaev-Zel'dovich effects*, 2022, MNRAS 517, 420. [arXiv:2205.01710](https://arxiv.org/abs/2205.01710) [astro-ph.CO]

L. Thiele, M. Cranmer, W. Coulton, S. Ho, D.N. Spergel, *Predicting the Thermal Sunyaev-Zel'dovich Field using Modular and Equivariant Set-Based Neural Networks*, 2022, MLST 3, 035002, [arXiv:2203.00026 \[astro-ph.CO\]](#), poster presented at the Fourth Workshop on Machine Learning and the Physical Sciences (NeurIPS 2021)

L. Thiele, D. Wadekar, J.C. Hill, N. Battaglia, J. Chluba, F. Villaescusa-Navarro, L. Hernquist, M. Vogelsberger, D. Anglés-Alcázar, F. Marinacci, *Percent-level constraints on baryonic feedback with spectral distortion measurements*, 2022, Phys Rev D 105, 083505, [arXiv:2201.01663 \[astro-ph.CO\]](#)

D. Wakekar, **L. Thiele**, F. Villaescusa-Navarro, J.C. Hill, D.N. Spergel, M. Cranmer, N. Battaglia, D. Anglés-Alcázar, L. Hernquist, S. Ho, *Augmenting astrophysical scaling relations with machine learning: application to reducing the SZ flux-mass scatter*, 2022, PNAS 120(12), [arXiv:2201.01305](#) [[astro-ph.CO](#)]

F. Villaescusa-Navarro, S. Genel, D. Anglés-Alcázar, L.A. Perez, P. Villanueva-Domingo, D. Wadekar, H. Shao, F.G. Mohammad, S. Hassan, E. Moser, E.T. Lau, L.F.M.P. Valle, A. Nicola, **L. Thiele**, Y. Jo, O.H.E. Philcox, B.D. Oppenheimer, M. Tillman, C. Hahn, N. Kaushal, A. Pisani, M. Gebhardt, A.M. Delgado, J. Caliendo, C. Kreisch, K.W.K. Wong, W.R. Coulton, M. Eickenberg, G. Paribelli, Y. Ni, U.P. Steinwandel, V. La Torre, R. Dave, N. Battaglia, D. Nagai, D.N. Spergel, L. Hernquist, B. Burkhart, D. Narayanan, B. Wandelt, R.S. Somerville, G.L. Bryan, M. Viel, Y. Li, V. Irsic, K. Kraljic, M. Vogelsberger, *The CAMELS project: public data release*, 2022, [arXiv:2201.01300](#) [[astro-ph.CO](#)]

B. Maffei, M.H. Abitbol, N. Aghanim, J. Aumont, E. Battistelli, J. Chluba, X. Coulon, P. De Bernardis, M. Douspis, J. Grain, S. Gervasoni, J.C. Hill, A. Kogut, S. Masi, T. Matsumara, C. O Sullivan, L. Pagano, G. Pisano, M. Remazeilles, A. Ritacco, A. Rotti, V. Sauvage, G. Savini, S.L. Stever, A. Tartari, **L. Thiele**, N. Trappe, *BISOU: a balloon project to measure the CMB spectral distortions*, 2021, 16th Marcel Grossmann Meeting, [arXiv:2111.00246](#) [[astro-ph.IM](#)]

F. Villaescusa-Navarro, S. Genel, D. Anglés-Alcázar, **L. Thiele**, R. Dave, D. Narayanan, A. Nicola, Y. Li, P. Villanueva-Domingo, B. Wandelt, D.N. Spergel, R.S. Somerville, J.M. Zorrilla Matilla, F.G. Mohammad, S. Hassan, H. Shao, D. Wadekar, M. Eickenberg, K.W.K. Wong, G. Contardo, Y. Jo, E. Moser, E.T. Lau, L.F.M.P. Valle, L.A. Perez, D. Nagai, N. Battaglia, M. Vogelsberger, *The CAMELS Multifield Dataset: Learning the Universe's Fundamental Parameters with Artificial Intelligence*, 2021, *Astrophys J Suppl Ser* 259, 61, [arXiv:2109.10915](#) [[cs.LG](#)]

F. Villaescusa-Navarro, S. Genel, D. Anglés-Alcázar, D.N. Spergel, Y. Li, B. Wandelt, **L. Thiele**, A. Nicola, J.M. Zorrilla Matilla, H. Shao, S. Hassan, D. Narayanan, R. Dave, M. Vogelsberger, *Robust marginalization of baryonic effects for cosmological inference at the field level*, 2021, [arXiv:2109.10360](#) [[astro-ph.CO](#)]

F. Villaescusa-Navarro, D. Anglés-Alcázar, S. Genel, D.N. Spergel, Y. Li, B. Wandelt, A. Nicola, **L. Thiele**, S. Hassan, J.M. Zorrilla Matilla, D. Narayanan, R. Dave, M. Vogelsberger, *Multifield Cosmology with Artificial Intelligence*, 2021, [arXiv:2109.09747](#) [[astro-ph.CO](#)]

L. Thiele, Y. Guan, J.C. Hill, A. Kosowsky, D.N. Spergel, *Can small-scale baryon inhomogeneities resolve the Hubble tension? An investigation with ACT DR4*, 2021, *Phys Rev D* 104, 063535, [arXiv:2105.03003](#) [[astro-ph.CO](#)]

L. Thiele, J.C. Hill, K.M. Smith, *Accurate Analytic Model for the Weak Lensing Convergence One-Point Probability Distribution Function and its Auto-Covariance*, 2020, *Phys Rev D* 102, 123545, [arXiv:2009.06547](#) [[astro-ph.CO](#)]

L. Thiele, F. Villaescusa-Navarro, D.N. Spergel, D. Nelson, A. Pillepich, *Teaching neural networks to generate Fast Sunyaev Zel'dovich Maps*, 2020, *ApJ* 902, 129, [arXiv:2007.07267](#) [[astro-ph.CO](#)]

R. Cayuso, O.J.C. Dias, F. Gray, D. Kubizňák, A. Margalit, J.E. Santos, R.G. Souza, **L. Thiele**, *Massive vector fields in Kerr–Newman and Kerr–Sen black hole spacetimes*, 2020, *JHEP* 159, [arXiv:1912.08224](#) [[hep-th](#)]

L. Thiele, C.A.J. Duncan, D. Alonso, *Disentangling magnification in combined shear clustering analyses*, 2020,
MNRAS 491, 1746, [arXiv:1907.13205](#) [astro-ph.CO]

R. Cayuso, F. Gray, D. Kubizňák, A. Margalit, R.G. Souza, **L. Thiele**, *Principal Tensor Strikes Again: Separability of Vector Equations with Torsion*, 2019,
Phys Lett B 795, 650, [arXiv:1906.10072](#) [hep-th]

L. Thiele, J.C. Hill, K.M. Smith, *Accurate analytic model for the thermal Sunyaev-Zel'dovich one-point probability distribution function*, 2019,
Phys Rev D 99, 103511, [arXiv:1812.05584](#) [astro-ph.CO]

F. Dinc, M. Medvidovic, **L. Thiele**, *Effective Geometry Monte Carlo: A Fast and Reliable Simulation Framework for Molecular Communication*, 2019,
IEEE Access 7, 28635

F. Dinc, **L. Thiele**, B. C. Akdeniz, *The effective geometry Monte Carlo algorithm: applications to molecular communication*, 2019,
Phys Lett A 383, 2594, [arXiv:1809.06438](#) [cs.ET]

Academic Honors

Kusaka Memorial Prize in Physics (Princeton, 2022, \$3k)
Member of the German Academic Scholarship Foundation (2015 – 2019, \$40k)
Perimeter Scholars International Award (Perimeter, 2018, \$34k)
Scott Prize for best performance in the 3rd year (Oxford, 2018, \$500)
Winton Capital Prize for best performance in the 2nd year (Oxford, 2017, \$300)
BP Scholarship (Oxford, 2017, \$2.6k)
Rokos Award for summer research project (Oxford, 2016, \$1k)

Professional Service

reviewer for ApJ, MNRAS, NeurIPS

Talks

5/20 CCA Cosmo x ML
5/20 Princeton/IAS cosmo lunch
5/20 Perimeter Institute
9/20 German Astronomical Society
10/20 MPA Garching
8/21 CMB-S4 meeting
8/21 Learn the Universe @ CCA
1/22 Cosmology Talks
1/22 AAS 239
3/22 IAS astro coffee
9/22 UCL Physics & Astronomy
2/23 Princeton gravity group
3/23 IPMU
4/23 Nagoya
9/23 Cosmo Madrid
9/23 Institut d'Astrophysique Spatiale Orsay
9/23 IPMU CD3 seminar