Oliver H. E. Philcox MSci MA

Email: ohep2@cantab.ac.uk

Peyton Hall, 4 Ivy Lane, Princeton, NJ 08540, USA

Mob: +1 (857) 253-8764 (USA) ⋄ +44 7964 359967 (UK)

Website: oliverphilcox.github.io

EDUCATION

Department of Astrophysical Sciences, Princeton University, USA   *2019 - Present*
PhD Candidate, *Expected Graduation Year: 2022*

   Thesis: 'Large Scale Structure Cosmology from the Higher-Point Functions'

   Thesis Advisors: Prof. David N. Spergel & Prof. Matias Zaldarriaga

M.A. in Astrophysics (2020)

Center for Astrophysics | Harvard & Smithsonian, Cambridge, USA   *2018 - 2019*
Pre-Doctoral Student, *Herchel-Smith Scholar*

   Advisor: Prof. Daniel J. Eisenstein

Institute of Astronomy, University of Cambridge   *2017 - 2018*
MSci in Astrophysics

   Part III: 1$^{\text{st}}$ Class (Rank 1/28, 97%)

   Thesis: 'Detection and Removal of B-mode CMB Dust Foregrounds with Signatures of Statistical Anisotropy'
   Thesis Advisor: Dr. Blake D. Sherwin

   Institute of Astronomy Prize

Emmanuel College, University of Cambridge   *2014 - 2017*
BA (Hons) in Natural Sciences, *Senior Scholar*

   Parts IA, IB, II: 1$^{\text{st}}$ Class (Rank 1/20, 90%)

   Holgate Pollard Memorial Prize

LONG-TERM ACADEMIC VISITS

Institute for Advanced Study   Sep. 2020 - Present
Visiting Graduate Student with Prof. Matias Zaldarriaga   *Princeton, USA*

Max-Planck Institute for Astrophysics   Aug. - Sep. 2020
Visiting Graduate Student with Prof. Eiichiro Komatsu   *Munich, Germany*

Department of Applied Mathematics and Theoretical Physics   May - Jul. 2020
Visiting Graduate Student with Dr. Blake D. Sherwin   *Cambridge, UK*

Max-Planck-Institut für Astronomie   Jul. - Sep. 2017
Summer Intern with Dr. Jan Rybizki   *Heidelberg, Germany*

Center for Astrophysics | Harvard & Smithsonian   Jun. - Aug. 2016
Undergraduate Research Fellow with Dr. Ákos Bogdán   *Cambridge, USA*

PUBLICATION LIST

Major Author

1. Ivanov, M. M., **Philcox, O. H. E.**, Simonović, M., Zaldarriaga, M., Nishimichi, T., Takada, M. "Cosmological constraints without fingers of God", *submitted to JCAP* (arXiv).

2. **Philcox, O. H. E.**, Hou J., Slepian, Z. "A First Detection of the Connected 4-Point Correlation Function of Galaxies using the BOSS CMASS Sample", *submitted to Phys. Rev. D* (arXiv).

3. **Philcox, O. H. E.** "Cosmology Without Windows: Cubic Estimators for the Galaxy Bispectrum", *accepted by Phys. Rev. D* (arXiv).

4. **Philcox, O. H. E.**, Slepian Z. "Efficient Computation of N-Point Correlation Functions in D Dimensions", *submitted to PNAS* (arXiv).

5. **Philcox, O. H. E.**, Slepian, Z., Hou, J., Warner, C., Cahn, R. N., Eisenstein, D. J. "ENCORE: Estimating Galaxy N-point Correlation Functions in $\mathcal{O}(N_g^2)$ Time", *accepted by MNRAS* (arXiv).

6. **Philcox, O. H. E.**, Slepian, Z. "An Exact Integral-to-Sum Relation for Products of Bessel Functions", *accepted by Proc. Roy. Soc. A* (arXiv).

7. **Philcox, O. H. E.**, Goodman, J., Slepian Z. "Kepler's Goat Herd: An Exact Solution to Kepler's Equation for Elliptical Orbits", *MNRAS* **506**, $6111 - 6116$ (2021) (arXiv).

8. Slepian, Z., **Philcox, O. H. E.** "A Uniform Spherical Goat (Problem): Explicit Solution for Homologous Collapse's Radial Evolution in Time" (arXiv).

9. **Philcox, O. H. E.**, Slepian, Z. "Beyond Yamamoto: Anisotropic Power Spectra and Correlation Functions with Pairwise Lines-of-Sight", *Phys. Rev. D* **103**, 123509 (2021) (arXiv).

10. **Philcox, O. H. E.** "Cosmology Without Windows: Quadratic Estimators for the Galaxy Power Spectrum", *Phys. Rev. D* **103**, 103504 (2021) (arXiv).

11. **Philcox, O. H. E.**, Aviles, A., Massara, E. "Modeling the Marked Spectra of Matter and Biased Tracers in Real and Redshift Space", *JCAP* 03 038 (2021) (arXiv).

12. **Philcox, O. H. E.**, Ivanov, M. M., Simonović, M., Zaldarriaga, M., Schmittfull, M. "Fewer Mocks and Less Noise: Reducing the Dimensionality of Cosmological Observables with Subspace Projections", *Phys. Rev. D* **103**, 043508 (2021) (arXiv).

13. **Philcox, O. H. E.**, Sherwin, B. D., Farren, G. S., Baxter, E. J. "Determining the Hubble Constant without the Sound Horizon: Measurements from Galaxy Surveys", *Phys. Rev. D* **103**, 023538 (2021) (arXiv).

14. **Philcox, O. H. E.**, Massara, E., Spergel, D. N. "What does the Marked Power Spectrum Measure? Insights from Perturbation Theory", *Phys. Rev. D* **102**, 043516 (2020) (arXiv).

15. **Philcox, O. H. E.** "A Faster Fourier Transform? Computing Small-Scale Power Spectra and Bispectra for Cosmological Simulations in $\mathcal{O}(N^2)$ Time", *MNRAS* **501**, $4004 - 4034$ (2021) (arXiv).

16. **Philcox, O. H. E.**, Spergel, D. N., Villaescusa-Navarro, F. "The Effective Halo Model: Creating a Physical and Accurate Model of the Matter Power Spectrum and Cluster Counts", *Phys. Rev. D* **101**, 123520 (2020) (arXiv).

17. **Philcox, O. H. E.**, Ivanov, M. M., Simonović, M., Zaldarriaga, M. "Combining Full-Shape and BAO Analyses of Galaxy Power Spectra: A 1.6% CMB-Independent Constraint on H_0", *JCAP* 05 032 (2020) (arXiv).

18. **Philcox, O. H. E.**, Rybizki, J. "Inferring Galactic Parameters from Chemical Abundances: A Multi-Star Approach", *ApJ* **887**, 9 (2019) (arXiv).

19. **Philcox, O. H. E.**, Eisenstein, D. J., "Computing the Small-Scale Galaxy Power Spectrum and Bispectrum in Configuration-Space", *MNRAS* **492** $1214 - 1242$ (2019) (arXiv).

20. **Philcox, O. H. E.**, Eisenstein, D. J., "Estimating Covariance Matrices for Two- and Three-Point Correlation Function Moments in Arbitrary Survey Geometries", *MNRAS* **490**, $5931 - 5951$ (2019) (arXiv).

21. **Philcox, O. H. E.**, Eisenstein, D. J., O'Connell, R., Wiegand, A., "RASCALC: A Jackknife Approach to Estimating Single and Multi-Tracer Galaxy Covariance Matrices", *MNRAS* **491**, $3290 - 3317$ (2019) (arXiv).

22. **Philcox, O. H. E.**, Sherwin, B. D., van Engelen, A., "Detection and Removal of B-mode Dust Foregrounds with Signatures of Statistical Anisotropy", *MNRAS* **479**, $5577 - 5595$ (2018) (arXiv).

23. **Philcox, O. H. E.**, Rybizki, J., Gutcke, T., "On the Optimal Choice of Nucleosynthetic Yields, Initial Mass Function, and Number of SNe Ia for Chemical Evolution Modeling ", *ApJ* **861**, 40 (2018) (arXiv).

Contributing Author

24. Hou, J., Cahn, R. N., **Philcox, O. H. E.**, Slepian, Z., "Analytic Gaussian Covariance Matrices for Galaxy N-Point Correlation Functions", *submitted to MNRAS* (arXiv).

25. Schmittfull, M., Simonović, M., Ivanov, M. M, **Philcox, O. H. E.**, Zaldarriaga, M. "Modeling Galaxies in Redshift Space at the Field Level", *JCAP* 05 059 (2021) (arXiv).

26. Villaescusa-Navarro, F., Anglés-Alcázar, D., Genel, S., *et al.* (inc. **Philcox, O. H. E.**) "The CAMELS project: Cosmology and Astrophysics with MachinE Learning Simulations", *ApJ*, **915**, 1 (2018) (arXiv).

27. Wang, Y., Zhao, G-B., Zhao, C., **Philcox, O. H. E.**, *et al.* "The clustering of the SDSS-IV extended Baryon Oscillation Spectroscopic Survey DR16 luminous red galaxy and emission line galaxy samples: cosmic distance and structure growth measurements using multiple tracers in configuration space", *MNRAS* **498**, $3470 - 3483$ (2020) (arXiv).

28. Chudaykin, A., Ivanov, M. M., **Philcox, O. H. E.**, Simonović, M., "CLASS-PT: non-linear perturbation theory extension of the Boltzmann code CLASS", *Phys. Rev. D*, **102**, 063533 (2020) (arXiv).

SELECTED TALKS

2021	University of Pennsylvania, *Astronomy & Astrophysics Seminar*
	Berkeley Center for Cosmological Physics, *Cosmology Seminar*
	Stanford University, *Theory Colloquium*
	Columbia University, *Theory Seminar* (Virtual)
	Cosmology from Home Conference (Virtual)
	Princeton University, *Gravity Group* (Virtual)
	Southampton University, H_0 *Workshop* (Virtual, Invited Talk)
	University of Geneva, *Cosmology & Particle Physics Group* (Virtual)
2020	DESI, *Galaxy & Quasar Clustering Working Group* (Virtual)
	Center for Astrophysics | Harvard & Smithsonian, *Eisenstein Group* (Virtual)
	UK Cosmology Meeting (Virtual)
	Institute for Advanced Study, *Joint Cosmology Group* (Virtual)
	Cosmology from Home Conference (Virtual)
	American Statistical Association, *Joint Statistical Meeting* (Virtual, Invited Talk)
	Perimeter Institute for Theoretical Physics, *Cosmology Colloquium* (Virtual)
	Berkeley Center for Cosmological Physics, *Journal Club* (Virtual)
	Center for Computational Astrophysics, *Cosmology X Data Science Group* (Virtual)
2019	Princeton University, *Gravity Group*
	JINA-CEE, *Nuclear Astrophysics Seminar* (Virtual)
	Center for Astrophysics | Harvard & Smithsonian, *Joint Cosmology Group*
2017	Max-Planck-Institut für Astronomie, *Rix Group*
	Heidelberg Institute for Theoretical Studies, *Springel Group*

PROFESSIONAL ACTIVITIES

Referee	MNRAS $(2020-)$, JCAP $(2020-)$, MPLA $(2021-)$	
Coadvisor	*Jess Boyland*	Simons-NSBP Undergraduate Scholars Program $(2020-2021)$
	James Sunseri	University of Florida REU Program (2021)

MISCELLANEOUS

Computing Languages	PYTHON, C++, CUDA, MATHEMATICA, JULIA
Codes Developed	ENCORE, NPCFs.jl, EFFECTIVEHALOS, CLASS-PT, HIPSTER, RASCALC
Teaching	6 years of online tutoring (high-school to Masters level)
	Teaching assistant for Princeton introductory astronomy class (AST203)
	TEFL qualification in English teaching