Oliver H. E. Philcox MSci MA

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POSITIONS & EDUCATION

Simons Society of Fellows, New York, USA *Sep. 2022 - 2025*
Junior Fellow, *Host: Columbia University*

Mentors: Prof. Lam Hui & Prof. J. Colin Hill

Department of Astrophysical Sciences, Princeton University, USA *2019 - Present*
PhD Candidate, *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, UK *2017 - 2018*
MSci in Astrophysics

Part III: 1st 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

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

Parts IA, IB, II: 1st Class (Rank 1/20, 90%)

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. Cabass, G., Ivanov, M. M., **Philcox, O. H. E.**, Simonović, M., Zaldarriaga, M. "Constraints on Single-Field Inflation from the BOSS Galaxy Survey", *submitted to Phys. Rev. Lett.* (arXiv).
2. Farren, G. S., **Philcox, O. H. E.**, Sherwin, B. D. "Determining the Hubble Constant without the Sound Horizon: Perspectives with Future Galaxy Surveys", *submitted to Phys. Rev. D* (arXiv).
3. **Philcox, O. H. E.**, Ivanov, M. M. "The BOSS DR12 Full-Shape Cosmology: ΛCDM Constraints from the Large-Scale Galaxy Power Spectrum and Bispectrum Monopole", *accepted by Phys. Rev. D* (arXiv).
4. Ivanov, M. M., **Philcox, O. H. E.**, Nishimichi, T., Simonović, M., Takada, M., Zaldarriaga, M. "Precision analysis of the redshift-space galaxy bispectrum", *submitted to Phys. Rev. D* (arXiv).
5. 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).
6. **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).
7. **Philcox, O. H. E.** "Cosmology Without Windows: Cubic Estimators for the Galaxy Bispectrum", *Phys. Rev. D* **104**, 123529 (2021) (arXiv).
8. **Philcox, O. H. E.**, Slepian Z. "Efficient Computation of N-Point Correlation Functions in D Dimensions", *accepted by PNAS* (arXiv).
9. **Philcox, O. H. E.**, Slepian, Z., Hou, J., Warner, C., Cahn, R. N., Eisenstein, D. J. "ENCORE: Estimating Galaxy N-point Correlation Functions in $\mathcal{O}(N_{\rm g}^2)$ Time", *MNRAS* **509**, 2457 – 2481 (2022) (arXiv).
10. **Philcox, O. H. E.**, Slepian, Z. "An Exact Integral-to-Sum Relation for Products of Bessel Functions", *Proc. Roy. Soc. A* **477**, 2253 (2021) (arXiv).
11. **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).
12. Slepian, Z., **Philcox, O. H. E.** "A Uniform Spherical Goat (Problem): Explicit Solution for Homologous Collapse's Radial Evolution in Time" (arXiv).
13. **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).
14. **Philcox, O. H. E.** "Cosmology Without Windows: Quadratic Estimators for the Galaxy Power Spectrum", *Phys. Rev. D* **103**, 103504 (2021) (arXiv).
15. **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).
16. **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).
17. **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).
18. **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).
19. **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).
20. **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).
21. **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).

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

23. **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).

24. **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).

25. **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).

26. **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).

27. **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

28. Villaescusa-Navarro, F., Anglés-Alcázar, D., Genel, S., *et al.* (inc. **Philcox, O. H. E.**) "The CAMELS project: public data release", *submitted to ApJ* (arXiv).

29. 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).

30. 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).

31. 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).

32. 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).

33. 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

2022	Simons Modern Inflationary Cosmology Group (Virtual)
2021	Max Planck Institute for Astrophysics, *Seminar* (Virtual) Perimeter Institute, *Cosmology & Gravitation Seminar* (Virtual) University of Cambridge, *Cosmology Lunch Seminar* (Virtual) Harvard University, *Cosmology Seminar* LBNL, *Physics Division Seminar* (Virtual) Jet Propulsion Laboratory, *Dark Sector Group* (Virtual) Pennsylvania State University, *Quantum Gravity Seminar* Johns Hopkins University, *Astronomy Colloquium* 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*

AWARDS & PRIZES

2022	NHFP Einstein Fellowship, *declined* LBL Chamberlain Fellowship, *declined* Cambridge Kavli Fellowship, *declined*
2018	Herchel-Smith Scholarship, *Cambridge* → *Harvard* Institute of Astronomy Prize, *Cambridge*
2017	Holgate Pollard Memorial Prize, *Cambridge*

PROFESSIONAL ACTIVITIES

Referee	MNRAS (2020−), JCAP (2020−), MPLA (2021−), Phys. Rev. D (2022−)	
Coadvisor	*Jess Boyland*	Simons-NSBP Undergraduate Scholars Program (2020−2021)
	James Sunseri	University of Florida REU Program (2021)

MISCELLANEOUS

Computing Languages	Python, C++, Julia , Cuda, Mathematica
Codes Developed	Encore, NPCFs.jl, Class-PT, Boss-Without-Windows, EffectiveHalos, Hipster, RascalC
Teaching	6 years of online tutoring (high-school to Masters level) Teaching assistant for Princeton introductory astronomy class (AST203)