

Oliver H. E. Philcox MSci MA

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EDUCATION

Department of Astrophysical Sciences, Princeton University, USA

2019 - Present

PhD Candidate

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: 1st Class (Rank 1/28, 97%)

Courses: Cosmology (97%), Advanced Cosmology (91%), General Relativity (92%)

Quantum Field Theory (84%), Stellar Structure and Evolution (95%)

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

Institute of Astronomy Prize

Emmanuel College, University of Cambridge

2014 - 2017

BA (Hons) in Natural Sciences, *Senior Scholar*

Part II: 1st Class (Rank 1/20, 90%)

Part IB: 1st Class (Rank 9/578)

Part IA: 1st Class (Rank 6/626)

Holgate Pollard Memorial Prize for Part II Examination Results, 2017

College & Rowley Mainhood Prizes for Achievement, 2015-8

ADDITIONAL RESEARCH EXPERIENCE

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 (Virtual) 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

PUBLICATIONS

Major Author

1. **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", *submitted to Phys. Rev. D* (arXiv).
2. **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", *submitted to Phys. Rev. Lett.* (arXiv).
3. **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).
4. **Philcox, O. H. E.** "A Faster Fourier Transform? Computing Small-Scale Power Spectra and Bispectra for Cosmological Simulations in $\mathcal{O}(N^2)$ Time", *submitted to MNRAS* (arXiv).
5. **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).
6. **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).
7. **Philcox, O. H. E.**, Rybizki, J. "Inferring Galactic Parameters from Chemical Abundances: A Multi-Star Approach", *ApJ* **887**, 9 (2019) (arXiv).
8. **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).
9. **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).
10. **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).
11. **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).
12. **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

13. 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", *submitted to ApJ* (arXiv).
14. 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).
15. Chudaykin, A., Ivanov, M. M., **Philcox, O. H. E.**, Simonović, M. "CLASS-PT: non-linear perturbation theory extension of the Boltzmann code CLASS", *accepted by Phys. Rev. D* (arXiv).

SELECTED TALKS

Oct. 2020	DESI Galaxy & Quasar Clustering Working Group (Virtual) <i>Compressing Cosmological Observables via Subspace Projections</i>
Oct. 2020	Center for Astrophysics Harvard & Smithsonian (Eisenstein Group) <i>Modeling and Interpreting Marked Power Spectra of Matter and Halos</i>
Sep. 2020	UK Cosmology Meeting (Virtual) <i>What's Next for the Effective Field Theory of Large Scale Structure?</i>
Sep. 2020	Institute for Advanced Study (Cosmology Group, Virtual) <i>Data Compression via Subspace Projections & H_0 Without the Sound Horizon</i>
Aug. 2020	Cosmology from Home (Virtual Conference) <i>Measuring H_0 from Galaxy Surveys: With and Without the Sound Horizon</i>
Aug. 2020	American Statistical Association (Joint Statistical Meeting, invited talk) <i>Inferring Galactic Parameters from Stellar Chemical Abundances</i>
Jun. 2020	Perimeter Institute for Theoretical Physics (Cosmology Colloquium) <i>What's Next for the Effective Field Theory of Large Scale Structure?</i>
May 2020	Berkeley Center for Cosmological Physics (Journal Club) <i>The Effective Halo Model: Accurate Models for the Power Spectrum and Cluster Counts</i>
Apr. 2020	NYU / CCA (Cosmology X Data Science Group) <i>The Effective Halo Model: Accurate Models for the Power Spectrum and Cluster Counts</i>
Mar. 2020	Institute for Advanced Study (Cosmology Group) <i>Constraining Cosmology from Galaxy Surveys: Combining Full Shape and BAO Analyses</i>
Dec. 2019	Princeton University (Gravity Group) <i>Detection and Removal of CMB B-mode Dust via Statistical Anisotropy</i>
Nov. 2019	JINA-CEE Nuclear Astrophysics Seminar <i>Inferring the Milky Way Stellar Initial Mass Function using Chemical Evolution Modelling</i>
Jul. 2019	Center for Astrophysics Harvard & Smithsonian (Eisenstein Group) <i>Computing Clustering Statistics and Covariances in Configuration Space</i>
Apr. 2019	Center for Astrophysics Harvard & Smithsonian (Joint Cosmology Group) <i>Detection and Removal of CMB B-mode Dust via Statistical Anisotropy</i>
Sep. 2017	Max-Planck-Institut für Astronomie (Rix Group) <i>Creating Objective Scores for Nucleosynthetic Yield Tables</i>
Sep. 2017	Heidelberg Institute for Theoretical Studies (Springel Group) <i>Choosing Nucleosynthetic Yield Tables for Hydrodynamical Simulations</i>

PROFESSIONAL ACTIVITIES

Referee	Monthly Notices of the Royal Astronomical Society (2020–)
Coadvisor	<i>Jess Boyland</i> Simons-NSBP Undergraduate Scholars Program (2020)

MISCELLANEOUS

Computing Languages	Python, C++, Bash
Codes Developed	EffectiveHalos, HIPSTER, RascalC, CLASS-PT, ChempyMulti, HADES
Teaching	5 years of online tutoring in Physics and Astronomy at high-school to graduate level TEFL Qualification in English teaching with 2 months experience in China
Languages	English (Native), Spanish (Conversational), Mandarin (Basic)
Other	DipABRSM in Music Performance (Distinction)

REFEREES

References available on request