PETER L. TAYLOR

https://pltaylor16.github.io./

Research Focus: Survey cosmology, especially weak lensing, galaxy clustering, statistical inference and machine learning. I am particularly active in DESI and Euclid.

EMPLOYMENT

CCAPP Fellow *2022 – Present*
Center for Cosmology and AstroParticle Physics
The Ohio State University
(5-year independent fellowship)

NASA Postdoctoral Program Fellow *2019 – 2022*
Jet Propulsion Laboratory
California Institute of Technology
(3-year independent fellowship)

EDUCATION

PhD, Astrophysics *2016 – 2019*
Mullard Space Science Laboratory
University College London
Thesis: *Cosmological Inference with Cosmic Shear*
Supervisors: Prof. Thomas Kitching OBE & Prof. Jason McEwen

MRes, Astrophysics *2015 – 2017*
Durham University
Thesis: *On the Shape of Dark Matter Halos in the Galaxy Cluster Abell 3827 and the Scattering Cross-Section of Dark Matter*
Supervisors: Prof. Richard Massey & Prof. Mathilde Jauzac

MMATH, Mathematics *2011 – 2015*
University of Oxford
Dissertation: *Kaluza-Klein Cosmologies*
Supervisor: Prof. Pedro Ferreira

PUBLICATION METRICS

40 Papers (**12** First Author, **4** Student First Author)
h-index: **17** (ADS)
Citations: $>$ **1700** (ADS)
Link to full list

FUNDING PROFILE

$950k as PI (or equivalent)
$1.7 million external funding as named co-I or PI
$2.3 million total funds as named co-I or PI when including internal JPL R&D grants

AWARDS

UCL Dean's Commendation Thesis Prize *2020*
Faculty of Mathematical and Physical Sciences

Alan Johnstone Award for Outstanding Graduate Research *2018*
Department of Space and Climate Physics, University College London

UK Science and Technologies Facilities Council Studentship *2016*
Up to 3.5 Years of Graduate Research Funding

SELECTED GRANTS

Science-PI *2021*
NASA Astrophysics Theory Program
Leveraging Weak Gravitational Lensing - Redshift Space Distortions Cross-correlations ($748k)

Co-I (1 of 5, PI E Huff) *2020*
JPL Internal Research and Technology Development Fund
Mass and Motion, Tension and Concordance:
What Are Tensions in Current Data Telling us About Dark Energy? ($220k)

Co-I (1 of 1, PI E Huff) *2020*
JPL Internal Topic Area Proposal
Next-Generation Weak Lensing with Hyperspectral Imaging Surveys ($400k)

Co-I (1 of 10, Science-I B Lee) *2020*
HST Cycle 28 Archival Study
Constraining the masses of galaxy overdensities at $z > 1$ in CANDELS and COSMOS through weak lensing in the NIR ($751k)

PI *2019*
NASA Postdoctoral Program Fellowship
A Next Generation Statistical Analysis for Next Generation Dark Energy Surveys ($\sim$ $200k)

TEACHING AND MENTORING

Guest Lecturer *10/24*
Astro 5682 – Intro to Cosmology
The Ohio State University

Project Supervisor *06/24 – Present*
Alexander Torres
Undergraduate at The Ohio State University

Project Supervisor *06/24 – 08/24*
Sophie Olsen
Undergraduate at The Ohio State University

Project Supervisor *06/23 – 09/24*
Matthew Craigie
PhD Student at University of Queensland
NPP Fellow at JPL (awarded)

Supervisor *06/22 – Present*
Erik Zaborowski
PhD Student at The Ohio State University
NSF Graduate Research Fellowship Program (GRFP) Honorable Mention
Ohio State Presidential Fellow
Department of Energy Graduate Student Research Award

Invited Lecturer *06/22*
Euclid Advanced School, Les Houches, France
1.5 hour Lecture on Likelihoods in Cosmology (Video Recording)

Primary Supervisor *06/21 – 06/22*
Sebastian Tsai
Project: *The Limits of k-cut* 3×2 *Point Statistics*
Caltech Summer Undergraduate Research Fellow
& Project Advisor for Senior Thesis at Yale
Now Business Analyst at McKinsey

Primary Supervisor *06/20 – 10/21*
Leah Vazsonyi
Project: *Constraining f(R) Gravity with k-cut Cosmic Shear*
Caltech Summer Undergraduate Research Fellow
Now PhD student at UNC Chapel Hill

Project Supervisor *6/20 – 12/20*
Anurag Deshpande
PhD student at University College London
Now Machine Learning Scientist at Amazon

TALKS

MSSL, University College London (invited, scheduled)	04/25
University of Edinburgh	03/25
University of Manchester	03/25
Ohio University (invited)	02/25
University of Texas, San Antonio (invited)	02/25
Euclid GC SWG Meeting, Garching, Germany (invited, remote)	01/25
Euclid US Seminar Series (invited, remote)	01/25
University of Chicago (invited)	10/24
University of North Carolina, Chapel Hill	09/24
Duke University	09/24
Key Project 7 Workshop, DESI Conference, Marseille, France (invited, remote)	07/24
Euclid Conference, Rome, Italy	06/24
Cosmology from Home (selected, remote)	06/24

University of Michigan (invited)	06/24
University of Cincinnati (invited)	02/24
Parity Violations from Home 2023 (selected talk, remote, Video Recording)	10/23
CosmoPalooza[1] (invited, remote, Video Recording)	10/23
CCAPP Symposium, The Ohio State University (internal)	09/23
Lensing on Different Scales Workshop, Chicago (selected talk)	07/23
DESI Meeting, Durham, UK (flash talk)	07/23
Euclid Meeting, Copenhagen (flash talk, selected, remote)	06/23
Statistical Challenges in Modern Astronomy, State College (flash talk)	06/23
Euclid Early Career Talk Series (flash talk, remote)	*10/22*
CCAPP Symposium, The Ohio State University (internal)	*09/22*
University of Turin, Italy (invited, remote)	*05/22*
University of Waterloo, Canada (invited, remote)	*02/22*
Stanford University (invited, remote)	*01/22*
Queen Mary University of London (invited, remote)	*11/21*
Duke University (invited, remote)	*10/21*
ICG, University of Portsmouth (invited, remote)	*10/21*
University of California, Santa Cruz (remote)	*10/21*
Lawrence Berkeley National Lab (remote)	*10/21*
IPAC, California Institute of Technology (invited, remote)	*10/21*
University of Geneva (invited, remote)	*10/21*
USM/LMU, Munich (invited, remote)	*09/21*
Postdoc Lab-wide Seminar Series, Jet Propulsion Laboratory (remote)	*08/21*
University of Oxford (invited, remote)	*07/21*
University of Arizona (invited, remote)	*03/21*
Stanford University (remote)	*12/20*
Euclid Inter-Science Task Force (IST) Nonlinear Talk Series (invited, remote)	*12/20*
University of Minnesota (invited, remote)	*10/20*
External Synergies for Rubin Community Science Workshop[1] (invited, remote)	*08/20*
Euclid US Talk Series (remote)	*07/20*
University of Manchester, Manchester, UK (invited)	*08/19*

[1] On behalf of the Euclid Consortium

Euclid Science Ground Segment, Euclid Conference, Helsinki, Finland *06/19*

Euclid UK Meeting, University of Oxford, Oxford, UK (selected talk) *12/18*

Euclid Weak Lensing and Galaxy Clustering Meeting, Milan, Italy *12/18*

Alan Johnstone Prize Talk, University College London (internal) *11/18*

Euclid France Weak Lensing Atelier, IAP, Paris, France (invited) *10/18*

Jet Propulsion Laboratory, California Institute of Technology *08/18*

MSSL, University College London (internal) *03/18*

ICC/CEA, Durham University (internal) *06/16*

PROFESSIONAL ACTIVITIES

Collaboration Membership
Euclid Consortium, Roman Cosmology Science Investigation Team,
Dark Energy Survey, Dark Energy Spectroscopic Instrument,
& Rubin Dark Energy Science Collaboration

Euclid Consortium

Member, Diversity Committee	*2020 – 2023*
Co-Lead, Weak Lensing Forward Modelling Work Package	*2019 – 2023*
Consultant, Likelihood Inter-Science Task-force	*2019 – 2024*
Science Organizing Committee, Les Houches Advanced School	*2022*
Internal Referee for Euclid Publications	*2023 – Present*
Flagship Paper Authorship Rights for >1 Year of Infrastructure Work	*2023 - Present*

DESI

In-person Observing	*2024*
Internal Referee for DESI Publications	*2024 - Present*
Mentorship Program	*2022 – Present*

Refereeing and Reviewing

Subject-matter Expert Reviewer in NASA Proposal Peer Review	*2021, 2022*
Astronomy and Astrophysics	*2019 – Present*
Monthly Notices of the Royal Astronomical Society	*2020 – Present*
Journal of Cosmology and Astroparticle Physics	*2021 – Present*
The Open Journal of Astrophysics	*2024 – Present*
The Astrophysical Journal	*2025 – Present*

Organizer

CCAPP Seminar Series	*2023 – 2024*
NASA JPL Dark Sector Meetings	*2020 – 2022*
Mullard Space Science Laboratory Cosmology Journal Club	*2017 – 2018*

Fellow, Royal Astronomical Society *2017 – Present*

OUTREACH & PUBLIC ENGAGEMENT

Lead Organizer *07/19*
The Universe in Virtual Reality
Royal Society, London

Lead Organizer *07/18*
Mullard Space Science Laboratory Work Experience Week
Week long program for high school students from underrepresented backgrounds.

Project Mentor *07/18*
Mullard Space Science Laboratory Work Experience Week

Outreach Talk *04/18*
Institute for the Arts, London

Project Mentor *07/17*
Mullard Space Science Laboratory Work Experience Week

Public Talk *06/17*
Westminster School, London

Public Demonstrator *05/17*
Mullard Space Science Laboratory 50th Anniversary Open Day

Gravitational Lensing Demonstrator *05/17*
Euclid Consortium School Science Day, London

Demonstrator *03/16*
Schools' Science Festival, Durham

Planetarium Demonstrator *10/15*
Celebrate Science Festival, Durham

FIRST AUTHOR PUBLICATIONS

1. **Peter L. Taylor**, Andrei Cuceu et al. `CombineHarvesterFlow`: Joint Probe Analysis Made Easy with Normalizing Flows. *The Open Journal of Astrophysics*, 10.33232/001c.124495, 2024.

2. **Peter L. Taylor**, Matthew Craigie, Yuan-Sen Ting. Unsupervised Searches for Cosmological Parity-Violation: An Investigation with Convolutional Neural Networks. *Phys. Rev. D*, 109:083518, 2024.

3. **Peter L. Taylor** and Katarina Markovič. Covariance of photometric and spectroscopic two-point statistics: Implications for cosmological parameter inference. *Phys. Rev. D*, 106(6):063536, 2022.

4. **Peter L. Taylor**, Katarina Markovič, Alksitis Portsidou and Eric Huff. Redshift space distortions: Unmixing radial scales in projection. *Phys. Rev. D*, 105(8):084007, 2022.

5.[2] **Peter L. Taylor** et. al. [94 co-authors]. Euclid: forecasts for k-cut 3x2 point statistics. *The Open Journal of Astrophysics*, 10.21105/astro.2012.04672, 2021.

6. **Peter L. Taylor**, Francis Bernardeau, Eric Huff. x-cut Cosmic Shear: Optimally Removing Sensitivity to Baryonic and Nonlinear Physics with an Application to the Dark Energy Survey Year 1 Shear Data. *Phys. Rev. D*, 103(4):043531, 2021.

7. **Peter L. Taylor**, Thomas D. Kitching, Justing Alsing, Benjamin D. Wandelt, Stephen M. Feeney, and Jason D. McEwen. Cosmic Shear: Inference from Forward Models. *Phys. Rev. D*, 100:023519, 2019.

[2]Euclid Consortium Paper.

8. **Peter L. Taylor**, Thomas D. Kitching, and Jason D. McEwen. Nonparametric cosmology with cosmic shear. *Phys. Rev. D*, 99:043532, 2019.

9. **Peter L. Taylor**, Francis Bernardeau, and Thomas D. Kitching. k-cut cosmic shear: Tuneable power spectrum sensitivity to test gravity. *Phys. Rev. D*, 98(8):083514, 2018.

10. **Peter L. Taylor**, Thomas D. Kitching, Jason D. McEwen, and Thomas Tram. Testing the cosmic shear spatially-flat universe approximation with generalized lensing and shear spectra. *Phys. Rev. D*, 98(2):023522, 2018.

11. **Peter L. Taylor**, Thomas D. Kitching, and Jason D. McEwen. Preparing for the cosmic shear data flood: Optimal data extraction and simulation requirements for stage iv dark energy experiments. *Phys. Rev. D*, 98:043532, 2018.

12. **Peter Taylor**, Richard Massey, Mathilde Jauzac, Frederic Courbin, David Harvey, Remy Joseph, and Andrew Robertson. A test for skewed distributions of dark matter, and a possible detection in galaxy cluster abell 3827. *Monthly Notices of the Royal Astronomical Society*, 468(4):50045013, 2017.

PAPERS BY STUDENTS

13. Leah Vazsonyi, **Peter L. Taylor**, Georgios Valogiannis, Nesar S. Ramachandra, Agnès Ferté, and Jason Rhodes. Constraining $f(R)$ Gravity with a k-cut Cosmic Shear Analysis of the Hyper Suprime-Cam First-Year Data. *Phys. Rev. D.*, 104(8):083527, 2021.

14. A. Deshpande, **P. L. Taylor**, and T. Kitching. Accessing the high-ℓ frontier under the reduced shear approximation with k-cut cosmic shear. *Phys. Rev. D*, 102(8):083535, 2020.

PAPERS BY STUDENTS (SUBMITTED)

15. E. Zaborowski, **P. Taylor** et. al. A Sound Horizon-Free Measurement of H_0 in DESI. arXiv:2411.16677 (2024). (*JCAP submitted*)

16. Matthew Craigie, **Peter L. Taylor**, Yuan-Sen Ting, Carolina Cuesta-Lazaro, Rossana Ruggeri and Tamara M Davis. Unsupervised Searches for Cosmological Parity Violation: Improving Detection Power with the Neural Field Scattering Transform. arXiv:2405.13083 (2024). (*PRD submitted*)

OTHER PUBLICATIONS

17. A.G. Adame, (**... P. Taylor**). DESI 2024 VI: Cosmological Constraints from the Measurements of Baryon Acoustic Oscillations. Journal of Cosmology and Astroparticle Physics 2025(02), 021.

18. R. Calderon, (**... P. Taylor**). DESI 2024: Reconstructing Dark Energy using Crossing Statistics with DESI DR1 BAO data. *Journal of Cosmology and Astroparticle Physics* 2024.10 (2024): 048.

19. Euclid Collaboration: (**... P. L. Taylor**). Euclid. I. Overview of the Euclid Mission. *A &A special issue 'Euclid on Sky'.* (2024).

20. Kyle Finner (... **Peter L. Taylor 7/8**). Near-IR weak-lensing (NIRWL) measurements in the CANDELS fields I: point-spread function modeling and systematics. *The Astrophysical Journal* 958.1 (2023): 33.

21. A. Ferté (...**Peter L. Taylor 5/6**) et. al. Categorizing models using self-organizing maps: An application to modified gravity theories probed by cosmic shear. *The Open Journal of Astrophysics*, 10.21105/astro.2110.13171, 2023.

22. T. D. Kitching, A. C. Deshpande and **P. L. Taylor**. Spatially varying additive biases in cosmic shear data. *The Open Journal of Astrophysics*, 10.21105/astro.2010.07749, 2021.

23. T. D. Kitching, A. C. Deshpande, and **P. L. Taylor**. Mitigating biases in cosmic shear power spectra amplitude inference. *The Open Journal of Astrophysics*, 10.21105/astro.2110.01275, 2021.

24. A. Deshpande, T. Kitching, V. Cardone, **P. L. Taylor**, S. Casas, S. Camera, C. Carbone, M. Kilbinger, V. Pettorino, Z. Sakr, et al. Euclid: The reduced shear approximation and magnification bias for stage iv cosmic shear experiments. *Astronomy and Astrophysics*, 636, 2020.

25. Thomas D. Kitching, **Peter L. Taylor**, Peter Capak, Daniel Masters, and Henk Hoekstra. Rainbow cosmic shear: Optimization of tomographic bins. *Phys. Rev. D*, 99(6):063536, 2019.

26. Alessio Spurio Mancini, **Peter L. Taylor**, R Reischke, T. Kitching, V. Pettorino, B. M. Schafer, B. Zieser, and P. M. Merkel. 3d cosmic shear: Numerical challenges, 3d lensing random fields generation, and minkowski functionals for cosmological inference. *Phys. Rev. D*, 98(10):103507, 2018.

27. Richard Massey, David Harvey, Jori Liesenborgs, Johan Richard, Stuart Stach, Mark Swinbank, **Peter Taylor** et al. Dark matter dynamics in abell 3827: new data consistent with standard cold dark matter. *Monthly Notices of the Royal Astronomical Society*, 477(1):669677, 2018.

28. M. Jauzac, D. Eckert, J. Schwinn , D. Harvey , C. M. Baugh, A. Robertson, S. Bose, R. Massey (**... Peter Taylor 23/24**) et al. The Extraordinary Amount of Substructure in the Hubble Frontier Fields Cluster Abell 2744, *Monthly Notices of the Royal Astronomical Society*, 463(4), 3876-3893, 2016.

SUBMITTED PAPERS

39. DESI Collaboration (**... P. L. Taylor**). Data Release 1 of the Dark Energy Spectroscopic Instrument.

30. DESI Collaboration (**... P. L. Taylor**). DESI DR2 results I: Measurements of Baryon Acoustic Oscillations and Cosmological Constraints.

31. DESI Collaboration (**... P. L. Taylor**). DESI DR2 results II: Baryon Acoustic Oscillations from the Lyman Alpha Forest.

32. U. Andrade, (**... P. L. Taylor**). Validation of the DESI DR2 BAO measurements from Galaxies and Quasars.

33. R. Casas, (**... P. L. Taylor**). Validation of the DESI DR2 Lya BAO analysis using synthetic datasets.

34. A. Brodzeller, (**... P. L. Taylor**). Damped Lya Systems in DESI DR1 and DR2 with the DLA Toolkit.

35. K. Lodha, (**... P. L. Taylor**). Analysis of extended Dark Energy models using DESI DR2 BAO measurements.

36. W. Elbers, (**... P. L. Taylor**). Constraints on Neutrino Physics using DESI DR2 BAO measurements.

37. M. Tsedrik, (**... P. L. Taylor 10/11**). Interacting dark energy constraints from the full-shape analyses of BOSS DR12 and DES Year 3 measurements. arXiv:2502.03390 (2025). (*MNRAS submitted*)

38. A.G. Adame, (**... P. Taylor**). DESI 2024 VII: Cosmological Constraints from the Full-Shape Modeling of Clustering Measurements. arXiv:2411.12022 (2024). (*JCAP submitted*)

39. Sankarshana Srinivasan, Daniel B Thomas and **Peter L. Taylor**. Cosmological gravity on all scales IV: 3x2pt Fisher forecasts for pixelised phenomenological modified gravity. arXiv:2409.06569 (2024). (*JCAP accepted.*)

PAPERS IN COLLABORATION WIDE REVIEW

40. C. Garcia-Quintero (**... P.L. Taylor**). Cosmological implications of DESI DR2 BAO measurements in light of the latest ACT DR6 CMB data.

41. G. Canas-Herrera (**... P. L. Taylor**). Euclid preparation. TBD. Cosmology Likelihood for Observables in Euclid (CLOE): Inference and Forecasts.

42. V. Cardone (**... P. L. Taylor**). Euclid Preparation TBD. Cosmology Likelihood for Observables in Euclid (CLOE): Theoretical Recipe.

43. S. Joudaki (**... P. L. Taylor**). Euclid Preparation. TBD. Cosmology Likelihood for Observables in Euclid (CLOE): Code Implementation.

44. M. Martinelli (**... P. L. Taylor**). Euclid Preparation. TBD. Cosmology Likelihood for Observables in Euclid (CLOE): Validation and Performance.

NON-REFEREED PAPERS

45. T.D. Kitching, N. Tessore, **P.L. Taylor**. Spatial propagation of weak lensing shear response corrections. arXiv:2302.14656 (2023).