

# 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

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### 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

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### 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

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40 Papers (12 First Author, 4 Student First Author)  
h-index: 14 (ADS)  
Citations: > 1400 (ADS)  
[Link to full list](#)

## FUNDING PROFILE

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**\$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

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<b>UCL Dean's Commendation Thesis Prize</b> Faculty of Mathematical and Physical Sciences	<i>2020</i>
<b>Alan Johnstone Award for Outstanding Graduate Research</b> Department of Space and Climate Physics, University College London	<i>2018</i>
<b>UK Science and Technologies Facilities Council Studentship</b> Up to 3.5 Years of Graduate Research Funding	<i>2016</i>

## SELECTED GRANTS

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<b>Science-PI</b> <b>NASA Astrophysics Theory Program</b> <b>Leveraging Weak Gravitational Lensing - Redshift Space</b> <b>Distortions Cross-correlations (\$748k)</b>	<i>2021</i>
<b>Co-I</b> (1 of 5, PI E Huff) 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)	<i>2020</i>
<b>Co-I</b> (1 of 1, PI E Huff) JPL Internal Topic Area Proposal Next-Generation Weak Lensing with Hyperspectral Imaging Surveys (\$400k)	<i>2020</i>
<b>Co-I</b> (1 of 10, Science-I B Lee) 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)	<i>2020</i>
<b>PI</b> <b>NASA Postdoctoral Program Fellowship</b> <b>A Next Generation Statistical Analysis for Next Generation</b> <b>Dark Energy Surveys (~ \$200k)</b>	<i>2019</i>

## TEACHING AND MENTORING

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<b>Guest Lecturer</b> Astro 5682 – Intro to Cosmology The Ohio State University	<i>10/24</i>
<b>Project Supervisor</b> Alexander Torres Undergraduate at The Ohio State University	<i>06/24 – Present</i>
<b>Project Supervisor</b> Sophie Olsen Undergraduate at The Ohio State University	<i>06/24 – 08/24</i>
<b>Project Supervisor</b> Matthew Craigie PhD Student at University of Queensland NPP Fellow at JPL (awarded)	<i>06/23 – 09/24</i>

**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 (awarded)

**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  $3 \times 2$  Point Statistics*

Caltech Summer Undergraduate Research Fellow

&amp; 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**

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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 <sup>1</sup> (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 <sup>1</sup> (invited, remote)	08/20
Euclid US Talk Series (remote)	07/20
University of Manchester, Manchester, UK (invited)	08/19
Euclid Science Ground Segment, Euclid Conference, Helsinki, Finland	06/19

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<sup>1</sup>On behalf of the Euclid Consortium

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

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### 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

<b>Fellow, Royal Astronomical Society</b>	2017 – Present
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## OUTREACH & PUBLIC ENGAGEMENT

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<b>Lead Organizer</b>	07/19
The Universe in Virtual Reality	
Royal Society, London	

<b>Lead Organizer</b>	07/18
Mullard Space Science Laboratory Work Experience Week	
<i>Week long program for high school students from underrepresented backgrounds.</i>	
<b>Project Mentor</b>	07/18
Mullard Space Science Laboratory Work Experience Week	
<b>Outreach Talk</b>	04/18
Institute for the Arts, London	
<b>Project Mentor</b>	07/17
Mullard Space Science Laboratory Work Experience Week	
<b>Public Talk</b>	06/17
Westminster School, London	
<b>Public Demonstrator</b>	05/17
Mullard Space Science Laboratory 50th Anniversary Open Day	
<b>Gravitational Lensing Demonstrator</b>	05/17
Euclid Consortium School Science Day, London	
<b>Demonstrator</b>	03/16
Schools' Science Festival, Durham	
<b>Planetarium Demonstrator</b>	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.<sup>2</sup> **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.

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<sup>2</sup>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: Tunable 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.

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## 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- $\ell$  frontier under the reduced shear approximation with  $k$ -cut cosmic shear. *Phys. Rev. D*, 102(8):083535, 2020.

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## 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*)

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## 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. Fert  (...**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

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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 Ly $\alpha$  BAO analysis using synthetic datasets.
34. A. Brodzeller, (... **P. L. Taylor**). Damped Ly $\alpha$  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

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40. G. Canas-Herrera (... **P. L. Taylor**). Euclid preparation. TBD. Cosmology Likelihood for Observables in Euclid (CLOE): Inference and Forecasts.
41. V. Cardone (... **P. L. Taylor**). Euclid Preparation TBD. Cosmology Likelihood for Observables in Euclid (CLOE): Theoretical Recipe.
42. S. Joudaki (... **P. L. Taylor**). Euclid Preparation. TBD. Cosmology Likelihood for Observables in Euclid (CLOE): Code Implementation.
43. M. Martinelli (... **P. L. Taylor**). Euclid Preparation. TBD. Cosmology Likelihood for Observables in Euclid (CLOE): Validation and Performance.

## NON-REFEREED PAPERS

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