# PETER L. TAYLOR

https://pltaylor16.github.io./

## 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 & 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

## PROFESSIONAL ACTIVITIES

**Consortium 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 - Present*
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**
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*

**Organizer**

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

## 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

## 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

**Supervisor** *06/22 - Present*
Erik Zaborowski
PhD Student at The Ohio State University
NSF Graduate Research Fellowship Program (GRFP) Honorable Mention

**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
& 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

## OUTREACH & PUBLIC ENGAGEMENT EVENTS

**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

## PRESENTATIONS

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| Parity Violations from Home 2023 (selected talk, remote) | 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 Metting, 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* |
| Euclid Science Ground Segment, Euclid Conference, Helsinki, Finland | *06/19* |

[1] 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*

## FIRST AUTHOR PUBLICATIONS

1. **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.

2. **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.

3.[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.

4. **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.

5. **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.

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

7. **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.

8. **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.

9. **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.

10. **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.

[2]Euclid Consortium Paper.

## PAPERS BY STUDENTS

11. 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.

12. 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.

## OTHER PUBLICATIONS

13. Near-IR weak-lensing (NIRWL) measurements in the CANDELS fields I: point-spread function modeling and systematics. Kyle Finner (2023) (... **Peter L. Taylor 7/8**) (*ApJ Accepted*)

14. 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.

15. 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.

16. 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.

17. 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.

18. 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.

19. 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.

20. 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.

21. 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

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