

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 (~ \$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 Sebastian Tsai Project: <i>The Limits of k-cut 3×2 Point Statistics</i> Caltech Summer Undergraduate Research Fellow & Project Advisor for Senior Thesis at Yale Now Business Analyst at Mckinsey	<i>06/21 - 06/22</i>
Primary Supervisor Leah Vazsonyi Project: <i>Constraining $f(R)$ Gravity with k-cut Cosmic Shear</i> Caltech Summer Undergraduate Research Fellow Now PhD student at UNC Chapel Hill	<i>06/20 - 10/21</i>
Project Supervisor Anurag Deshpande PhD student at University College London Now Machine Learning Scientist at Amazon	<i>6/20 - 12/20</i>

OUTREACH & PUBLIC ENGAGEMENT EVENTS

Lead Organizer The Universe in Virtual Reality Royal Society, London	<i>07/19</i>
Lead Organizer Mullard Space Science Laboratory Work Experience Week <i>Week long program for high school students from underrepresented backgrounds.</i>	<i>07/18</i>
Project Mentor Mullard Space Science Laboratory Work Experience Week	<i>07/18</i>
Outreach Talk Institute for the Arts, London	<i>04/18</i>
Project Mentor Mullard Space Science Laboratory Work Experience Week	<i>07/17</i>
Public Talk Westminster School, London	<i>06/17</i>
Public Demonstrator Mullard Space Science Laboratory 50th Anniversary Open Day	<i>05/17</i>
Gravitational Lensing Demonstrator Euclid Consortium School Science Day, London	<i>05/17</i>
Demonstrator Schools' Science Festival, Durham	<i>03/16</i>
Planetarium Demonstrator Celebrate Science Festival, Durham	<i>10/15</i>

PRESENTATIONS

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 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

¹On 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: Tune-able 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.

²Euclid Consortium Paper.

FIRST AUTHOR SUBMITTED

11. **Peter L. Taylor**, Matthew Craigie, Yuan-Sen Ting. Unsupervised Searches for Cosmological Parity-Violation: An Investigation with Convolutional Neural Networks. arXiv:2312.09287 (2023) (*Phys. Rev. D. Submitted*)

PAPERS BY STUDENTS

12. 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.
13. 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.

OTHER PUBLICATIONS

14. Kyle Finner (... **Peter L. Taylor 7/8**). Near-IR weak-lensing (NIRWL) measurements in the CANDELS fields I: point-spread function modeling and systematics. (2023) (*ApJ Accepted*)
15. 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.
16. 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.
17. 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.
18. 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.
19. 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.
20. 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.
21. 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.
22. 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.

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