Dr. Matthew Price

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GitHub: github.com/CosmoMatt
Website: https://cosmomatt.github.io

Education

University College London (Mullard Space Science Laboratory) — London, UK
PhD in Cosmology and Astrostatistics — 2017 –2021

- ▷ Advisors: Prof. Jason D. McEwen & Prof. Thomas D. Kitching
- ▷ Thesis: "Bayesian Variational Regularisation for Dark Matter Reconstruction with Uncertainty Quantification"

University of Cambridge (Institute of Astronomy) — Cambridge, UK
MSci. in Astrophysics (Tripos part III), Grade: 2:1 — 2016-2017

- ▷ Advisors: Dr. James R. Fergusson & Prof. Anthony D. Challinor
- ▷ Thesis: "Improving CMB Power Spectrum Estimation via Machine Learning"

University of Cambridge (Fitzwilliam College) — Cambridge, UK
BA in Natural Sciences (Physical), Grade: 2:1 — 2013-2016

Professional History

Research Fellow in Artificial Intelligence and Imaging (University College London)	2021–present
LSST Dark Energy Science Collaboration full member	2017–present
Research Internship (Kagenova, Surrey)	2019–2021
Postgraduate Research Student (University College London)	2017–2021
Postgraduate Masters Student (Institute of Astronomy, University of Cambridge)	2016–2017

Grants & Funding

"`SAX`: Accelerated and differentiable Spherical transforms in `JAX`" — Principle Investigator, £10k
UCL-ARC, Open Source Software Sustainability Funding Call — 2022–present

"Learned Exascale Computational Imaging (LEXCI)" — Named Researcher, £1.2m
Engineering and Physical Sciences Research Council (EPSRC) — 2021–present

Scholarships & Awards

Michael Penston Thesis Prize (Royal Astronomical Society, Runner up, £50)	2022
UCL Faculty of Mathematical and Physical Sciences Postgraduate Research Prize (UCL, £250)	2021
Rencontres de Moriond Travel Grant (€665)	2022
Alan Johnston Award for Outstanding Scientific Achievement (MSSL, University College London, £250)	2021
Innovation Mini-Fellowship (University College London, Data intensive science, £8,350)	2019
STFC Postgraduate Studentship (MSSL, University College London)	2017–2021
Clough Scholarship for Academic Excellence (Fitzwilliam College, University of Cambridge, £350)	2014

Academic Talks

"Imaging the Invisible" — 17th Nov. 2021
Invited talk for the Alan Johnston Award for Outstanding Scientific Achievement — Virtual

"Hierarchical Bayesian inference on the celestial sphere" — 21st Apr. 2020
Invited Kilo-Degree Survey internal presentation — Virtual

"Sparse Bayesian mass-mapping with uncertainty quantification" — 28th Nov. 2018
Invited LSST Dark Energy Science Collaboration internal presentation — Virtual

Conferences & Workshops

56th Rencontres de Moriond — 23rd–30th Jan. 2022
Declined (COVID-19) — La Thuile, Aosta Valley, Italy

Statistical Challenges in Modern Astronomy VII — 7th–10th Jun. 2021
Two virtual poster presentations — Virtual

27th EUSIPCO — 2nd–6th Sept. 2019
Conference proceedings & poster presentation — A Coruna, Spain

BASP Frontiers 2019 — 3rd–8th Feb. 2019
Conference proceedings & poster presentation — Villars-sur-Ollon, Switzerland

The Imperial Centre for Inference and Cosmology (ICIC) — 3rd–6th Sept. 2018
Data analysis workshop — London, UK

COSMO21 — 22nd–25th May 2018
Poster presentation & conference workshops — Valencia, Spain

STFC Summer School — 28th Aug.–1st Sept. 2017
Doctoral student introductory workshop — Jodrell Bank Centre for Astrophysics, UK

Academic Articles

Highest impact factor: 11.38 (ICLR 2021)
7 first author papers + 6 other papers = 13 academic articles
Google scholar profile: https://tinyurl.com/y6rec3s6
arXiv profile: https://arxiv.org/a/price_m_1

[1] J. Ocampo, **M. A. Price**, and J. D. McEwen, "Scalable and equivariant spherical cnns by discrete-continuous (disco) convolutions", in *Submitted to International Conference on Learning Representations (ICLR)*, Sep. 2022.

[2] A. S. Mancini, M. Docherty, **M. A. Price**, and J. McEwen, "Bayesian model comparison for simulation-based inference", *Submitted to RASTI*, 2022. arXiv: 2207.04037 [astro-ph.CO].

[3] C. G. R. Wallis, **M. A. Price**, J. D. McEwen, T. D. Kitching, B. Leistedt, and A. Plouviez, "Mapping dark matter on the celestial sphere with weak gravitational lensing", *Mon. Not. Roy. Astron. Soc., in press*, vol. 509, no. 3, pp. 4480–4497, Nov. 2021. arXiv: 1703.09233 [astro-ph.CO].

[4] J. D. McEwen, C. G. R. Wallis, **M. A. Price**, and M. M. Docherty, "Machine learning assisted bayesian model comparison: Learnt harmonic mean estimator", *Statistics & Computing, submitted*, Dec. 2021. eprint: arXiv:2111.12720.

[5] **M. A. Price** and J. D. McEwen, "Bayesian variational regularization on the ball", *IEEE Sig. Proc. Let., submitted*, May 2021. eprint: arXiv:2105.05518.

[6] **M. A. Price**, J. D. McEwen, X. Cai, T. D. Kitching, C. G. R. Wallis, and LSST Dark Energy Science Collaboration, "Sparse Bayesian mass mapping with uncertainties: hypothesis testing of structure", *Mon. Not. Roy. Astron. Soc., in press*, vol. 506, no. 3, pp. 3678–3690, Jul. 2021. arXiv: 1812.04014 [astro-ph.CO].

[7] **M. A. Price**, L. Pratley, and J. D. McEwen, "Sparse image reconstruction on the sphere: A general approach with uncertainty quantification", *IEEE Trans. Image Proc., submitted*, May 2021. eprint: arXiv:2105.04935.

[8] **M. A. Price**, J. D. McEwen, L. Pratley, and T. D. Kitching, "Sparse Bayesian mass-mapping with uncertainties: Full sky observations on the celestial sphere", *Mon. Not. Roy. Astron. Soc., in press*, vol. 500, no. 4, pp. 5436–5452, Jan. 2021. arXiv: 2004.07855 [astro-ph.CO].

[9] O. J. Cobb, C. G. R. Wallis, A. N. Mavor-Parker, A. Marignier, **M. A. Price**, M. d'Avezac, and J. D. McEwen, "Efficient generalized spherical cnns", in *International Conference on Learning Representations (ICLR)*, Feb. 2021.

[10] J. D. McEwen and **M. A. Price**, "Scale-discretised ridgelet transform on the sphere", in *27th European Signal Processing Conference (EUSIPCO)*, 2019. eprint: arXiv:1510.01595.

[11] **M. A. Price**, X. Cai, J. D. McEwen, M. Pereyra, T. D. Kitching, and LSST Dark Energy Science Collaboration, "Sparse Bayesian mass mapping with uncertainties: local credible intervals", *Mon. Not. Roy. Astron. Soc., in press*, vol. 492, no. 1, pp. 394–404, Dec. 2019. arXiv: 1812.04017 [astro-ph.CO].

[12] **M. A. Price**, J. D. McEwen, X. Cai, T. D. Kitching, C. G. R. Wallis, and M. Pereyra, "Sparse bayesian mass-mapping with uncertainties", in *Biomedical and Astronomical Signal Processing Frontiers (BASP)*, Feb. 2019, p. 34.

[13] **M. A. Price**, J. D. McEwen, X. Cai, T. D. Kitching, and LSST Dark Energy Science Collaboration, "Sparse Bayesian mass mapping with uncertainties: peak statistics and feature locations", *Mon. Not. Roy. Astron. Soc., in press*, vol. 489, no. 3, pp. 3236–3250, Dec. 2019. arXiv: 1812.04018 [astro-ph.CO].