

David Yallup

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Research Themes: MCMC · Nested Sampling · GPU-Accelerated Inference · Generative AI for Science

Appointments

Kavli Institute for Cosmology, University of Cambridge

Postdoctoral Research Associate 2021-
Member of Handley research group
○ Developing GPU-accelerated inference for next-generation cosmology, gravitational wave, and particle physics experiments.
○ Building simulation-based inference and advanced MCMC tools in JAX/BlackJAX.
○ Bayesian statistics for scientific inference problems.

Corpus Christi College, University of Cambridge

Research Associate 2022-

Polychord Ltd.

Research Scientist 2021-
Cambridge spin-out applying Bayesian methods to industrial problems including:
○ Molecular structure prediction, battery design optimization, sensor placement.

Education

UCL

PhD. Particle Physics 2015–2019
Thesis titled, “*Constraining new physics with fiducial LHC measurements.*” supervised by Prof J. Butterworth.
Recipient of UCL HEP postgraduate prize.

Durham University

MSc Particles, Strings and Cosmology 2014–2015

Durham University

MSci Natural Sciences, Maths and Physics 2009–2013

Grants

Google Cloud for Researchers

\$5k *Google Compute Engine GPU credits.* 2025

Kavli Foundation

£3k *to host Cosmological inference in High dimension workshop.* 2024

Marie Curie Early Career Researcher

£30k *for academic secondment and travel grant.* 2016–2019

Teaching

University of Cambridge

Institute of Astronomy (Maths)

Part II Statistical Physics

2025

4 groups of 2 students, ~ 40 hours

University of Cambridge

Natural sciences tripos (Physics)

Part II Relativity

2022

4 groups of 3 students, ~ 40 hours

University of Cambridge

Natural sciences tripos (Physics)

Part III Projects

2021–

Primary Supervisor for 5 MSc projects, ~ 20 hours contact each

Recent Conferences and Invited Talks (2024-)

NeurIPS - FPI Workshop		
<i>San Diego</i>		2025
Particle Monte Carlo methods for Lattice Field Theory		
CamGW: Cambridge Gravitational Wave network		
<i>KICC, University of Cambridge</i>		2025
Towards real time Gravitational Wave inference		
Future of SED Fitting		
<i>KICC, University of Cambridge</i>		2025
GPU Accelerated Sampling methods		
ICLR - FPI Workshop		
<i>Singapore</i>		2025
Nested Slice Sampling		
Gravitational Wave Analysis in the Era of Machine Learning		
<i>Royal Astronomical Society</i>		2025
GPU Accelerated Sampling methods		
BayesAI Workshop		
<i>Lancaster University</i>		2024
Neural network advances in Nested Sampling		
EU AI for Fundamental Physics Conference		
<i>Amsterdam</i>		2024
Diffusion Meets Nested Sampling		
Cavendish Astrophysics Seminar		
<i>University of Cambridge</i>		2024
Diffusion Models for accelerated inference.		
Astrophysics ML Seminar		
<i>University of Cambridge</i>		2024
Simulation Based Inference		

Notable publications *

- [1] **Yallup, David**, *Particle Monte Carlo methods for Lattice Field Theory*, in *39th Annual Conference on Neural Information Processing Systems: Includes Machine Learning and the Physical Sciences (ML4PS)*, 11, 2025 [[2511.15196](#)].
- [2] D.D.Y. Ong, **Yallup, David** and W. Handley, *A Bayesian Perspective on Evidence for Evolving Dark Energy*, [2511.10631](#).
- [3] **Yallup, David**, M. Prathaban, J. Alvey and W. Handley, *Parallel Nested Slice Sampling for Gravitational Wave Parameter Estimation*, in *2nd European AI for Fundamental Physics Conference*, 9, 2025 [[2509.24949](#)].
- [4] A.N. Ormondroyd, W.J. Handley, M.P. Hobson, A.N. Lasenby and **Yallup, David**, *Dynamic or Systematic? Bayesian model selection between dark energy and supernova biases*, [2509.13220](#).
- [5] T. Lovick, **Yallup, David**, D. Piras, A. Spurio Mancini and W. Handley, *High-Dimensional Bayesian Model Comparison in Cosmology with GPU-accelerated Nested Sampling and Neural Emulators*, [2509.13307](#).
- [6] M. Prathaban, **Yallup, David**, J. Alvey, M. Yang, W. Templeton and W. Handley, *Gravitational-wave inference at GPU speed: A bilby-like nested sampling kernel within blackjax-ns*, [2509.04336](#).
- [7] **Yallup, David**, N. Kroupa and W. Handley, *Nested slice sampling*, in *The Thirteenth International Conference on Learning Representations: Frontiers in Probabilistic Inference Workshop*, 2025, <https://openreview.net/forum?id=ekbkMSuPo4>.
- [8] N. Kroupa, **Yallup, David**, W. Handley and M. Hobson, *Kernel-, mean-, and noise-marginalized Gaussian processes for exoplanet transits and H0 inference*, *Mon. Not. Roy. Astron. Soc.* **528** (2024) 1232 [[2311.04153](#)].

- [9] **Yallup, David** and W. Handley, *Hunting for bumps in the margins*, *JINST* **18** (2023) P05014 [[2211.10391](#)].
- [10] **Yallup, David**, W. Handley, M. Hobson, A. Lasenby and P. Lemos, *Split personalities in Bayesian Neural Networks: the case for full marginalisation*, [2205.11151](#).
- [11] **Yallup, David**, Janßen, Timo, Schumann, Steffen and Handley, Will, *Exploring phase space with nested sampling*, *Eur. Phys. J. C* **82** (2022) 678.
- [12] P. Lemos, M. Cranmer, M. Abidi, C. Hahn, M. Eickenberg, E. Massara et al., *Robust Simulation-Based Inference in Cosmology with Bayesian Neural Networks*, in *39th International Conference on Machine Learning Conference*, 7, 2022 [[2207.08435](#)].
- [13] A. Buckley et al., *Testing new physics models with global comparisons to collider measurements: the Contur toolkit*, *SciPost Phys. Core* **4** (2021) 013 [[2102.04377](#)].
- [14] S. Amrith, J. Butterworth, F. Deppisch, W. Liu and **Yallup, David**, *LHC Constraints on a $B - L$ Gauge Model using Contur*, *JHEP* **05** (2019) 154 [[1811.11452](#)].
- [15] G. Brooijmans et al., *Les Houches 2017: Physics at TeV Colliders New Physics Working Group Report*, in *10th Les Houches Workshop on Physics at TeV Colliders*, 3, 2018 [[1803.10379](#)].
- [16] J.M. Butterworth, D. Grellscheid, M. Krämer, B. Sarrazin and **Yallup, David**, *Constraining new physics with collider measurements of Standard Model signatures*, *JHEP* **03** (2017) 078 [[1606.05296](#)].

* As an ATLAS collaboration author I was an author on over 280 collaboration papers, only external small authorlist papers are listed here.