David Yallup

Kavli Institute for Cosmology, University of Cambridge
david.yallup@gmail.com • yallup.github.io • dyallup
yallup • ORCiD: 0000-0003-4716-5817 Google Scholar: david.yallup

Research Themes: ***Probabilistic Machine Learning, Explainable AI, Scientific applications of Machine Learning***

Appointments

Kavli Institute for Cosmology, University of Cambridge
Postdoctoral Research Associate *2021-*
- Cosmology, High Energy Physics, Gravitational Wave Physics.
- Accelerated Inference procedures for next generation experiments.
- Simulation Based inference, advanced MCMC algorithms, and interfacing generative AI with scientific inference problems.

Corpus Christi College, University of Cambridge
Research Associate *2022-*
Associate member of college research community

Polychord Ltd.
Research Scientist *2021-*
Partnered with a Cambridge spin out startup data science consultancy.

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 4 MSc projects, ∼ 20 hours each

Recent Conferences and Invited Talks (2024-)

NeurIPS - FPI Workshop
Sand Diego *2025*
Particle Monte Carlo methods for Lattice Field Theory

CamGW: Cambridge Gravitational Wave network
KICC, University of Cambridge *2025*
Towards real time Gravitational Wave inference

Future of SED Fitting
KICC, University of Cambridge *2025*
GPU Accelerated Sampling methods

ICLR - FPI Workshop
Singapore *2025*
Nested Slice Sampling

Gravitational Wave Analysis in the Era of Machine Learning
Royal Astronomical Society *2025*
GPU Accelerated Sampling methods

BayesAI Workshop
Lancaster University *2024*
Neural network advances in Nested Sampling

EU AI for Fundamental Physics Conference
Amsterdam *2024*
Diffusion Meets Nested Sampling

Cavendish Astrophysics Seminar
University of Cambridge *2024*
Diffusion Models for accelerated inference.

Astrophysics ML Seminar
University of Cambridge *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.*