David Yallup

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Postdoctoral researcher based in the cosmology group at the University of Cambridge. My work focus on Bayesian Machine Learning and *explainable AI*, with applications ranging from industrial challenges to fundamental science at both the biggest and smallest known scales in Physics.

Appointments

2021-Ongoing **Postdoctoral Research Associate**, *Kavli Institute for Cosmology*, University of Cambridge, Cambridge.
- Primary project in developing novel Bayesian Neural Network methodologies, targeting explainable AI.
- Leading multiple interdisciplinary projects in fundamental science; mixing expertise in Machine Learning, Particle physics and Cosmology.
- Initially funded through an STFC Industry Partnership Scheme, working with a Cambridge Astrophysics spinout company on developing next generation AI tools for industrial challenges.

2019-2020 **Postdoctoral Research Associate**, *High Energy Physics group*, UCL, London.
Developing Machine Learning tools for inference over theoretical models at the high energy frontier. Assisting supervision of six masters students using software I had written.

2015-2019 **Doctoral candidate**, *High Energy Physics group*, UCL, London.
PhD student working on the ATLAS experiment and with the MCnet collaboration for collider physics theory. Leading development of tools for simulating collider physics and analysing big data from the experiments for dark matter signals.

Associations

2021 **Associate Researcher**, *PolyChord Ltd*.
Partnered with a Cambridge spin out startup data science consultancy, aiding development of novel Bayesian techniques for a wide array of industrial challenges.

2021 **Affiliated Data Scientist**, *Turing Institute*, London.
Selected participant in Data Study group, parterned with Odin Vision investigating explainable AI for cancer diagnosis.

2015-2019 **MCnet Collaboration**.
Student representative for the international multi-institue theory collaboration, involved with network meeting organisation.

2015-2019 **ATLAS experiment**.
Contributing author on the ATLAS experimental collaboration. Key contributions as an expert in theoretical modelling and event visualisation. ATLAS Herwig generator expert.

2017 **Visiting Researcher**, *ATLAS Experiment*, CERN, Geneva.
STFC funding visiting researcher at CERN for 9 months to contribute to the ATLAS experimental project.

2016 **Visiting Researcher**, *ITP*, KIT, Karlsruhe.
Recipient of a Marie Curie ESR grant visiting Germany for 4 months for a project on new MC techniques for particle physics simulations.

2013-2014 **Business Consultant**, *Simcorp Ltd.*, London.
Implementation and support consultant for investment technology platform. Portfolio management software for the Investment industry.

Education

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

2014–2015 **MSc Particles, Strings and Cosmology**, *Durham University*, Durham.

2009–2013 **MSci Natural Sciences, Maths and Physics**, *Durham University*, Durham.

Grants

2017 **Marie Curie short term Early Stage Researcher grant**, $\sim £30k$.
Fully funded Marie Curie visiting position at KIT for 5 months.

2015-2019 **MCnet mobility allowance**, *Totalling* $\sim £5k$.
Awarded numerous travel grants for international conferences under MCnet Marie Curie network.

Invited conference talks

2022 **Likelihood Free in Paris**, *L'École Normale Supérieure*, Paris, France.

2021 **Learn the Universe - LFI for Cosmology**, *Flatiron Institute*, NY, USA.

2019 **Les Houches Physics at TeV Colliders**, *Chamonix*, France.
One of only 5 invited junior attendees

2019 **ATLAS Exotics workshop**, *Naples*, Italy.

2019 **Rencontres de Moriond - EW Interactions and Unified Theories**, *La Thuile*, Italy.

2019 **Young Experimentalist and Theorists Institute**, *Durham*, UK.

2018 **Institute of Physics annual meeting**, *Bristol*, UK.

2018 **MC4BSM**, *Durham*, UK.

2017 **Alpine LHC Summit**, *Innsbruck*, Austria.

Schools

2018 **CERN-Fermilab Hadron Collider Physics summer school**, *Fermilab*, USA.

2017 **MCnet summer school on Monte Carlo event generators for LHC physics**, *Lund University*, Sweden.

2016 **STFC High Energy Physics summer school**, *Lancaster University*, UK.

Teaching

2019 Original author and technical support for Rivet and Contur tutorial given at two MCnet PhD summer schools. Delivery via Docker and binder.

2019 Young Experiment and Theorist Institute school tutor on Rivet and Contur. Over 50 attendees.

2015-2019 Assisted supervision of yearly intake of MSci and MSc thesis projects under Prof Butterworth. Including jointly supervising an MSc project in scientific computing.

2018-2019 ATLAS UK meeting tutor on the Rivet package and Monte Carlo methods for particle physics. Over 30 students attending.

2016 First year physics lab demonstrator, UCL Physics.

Notable publications ⋆

[1] 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].

[2] D.S.G. team, *Data study group final report: Odin vision*, Nov., 2021. 10.5281/zenodo.5729340.

[3] J.M. Butterworth, D. Grellscheid, M. Krämer, B. Sarrazin and D. Yallup, *Constraining new physics with collider measurements of Standard Model signatures*, *JHEP* **03** (2017) 078 [1606.05296].

[4] S. Amrith, J. Butterworth, F. Deppisch, W. Liu and D. Yallup, *LHC Constraints on a $B-L$ Gauge Model using Contur*, *JHEP* **05** (2019) 154 [1811.11452].

[5] 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].

[6] G. Brooijmans et al., *Les Houches 2019 Physics at TeV Colliders: New Physics Working Group Report*, in *11th Les Houches Workshop on Physics at TeV Colliders: PhysTeV Les Houches*, 2, 2020 [2002.12220].

[7] ATLAS COLLABORATION collaboration, *Measurement of detector-corrected observables sensitive to the anomalous production of events with jets and large missing transverse momentum in pp collisions at $\sqrt{\mathbf{s}} = \mathbf{13}$ TeV using the ATLAS detector*, *Eur. Phys. J. C* **77** (2017) 765 [1707.03263].

[8] D. Yallup, *BSM Constraints from Standard Model measurements with Contur*, in *54th Rencontres de Moriond on Electroweak Interactions and Unified Theories*, pp. 357–360, 2019.

⋆ *As an ATLAS collaboration author I am a collaborator on over 280 papers, only external small authorlist papers, or ATLAS papers to which I have made a significant contribution are listed here. HEP results are generally presented alphabetically, inclusion here represents a first author level contribution.*