

David Yallup

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Researcher specialising in big data, Bayesian statistics and computational modelling. Passionate about cutting edge machine learning and software development for research.

Areas of Specialization

- Modelling** Computational modelling of complex systems; Monte Carlo event generators for particle physics and Markov Chain Monte Carlo.
- Engineering** Over 5 years experience open source software development and design in Python and C++.
- Statistics** Statistical inference on big data sets; frequentist hypothesis tests and Bayesian inference.
- ML and AI** Usage of advanced machine learning techniques. *PyTorch*, *scipy*, *scikit-learn* etc.
- Collaboration** Experience of open source development in small and large teams. *Git*, *Mercurial*, *JIRA* etc.
- Deployment** Containerization (*Docker*) of applications. Execution of code on HPC clusters and Google Cloud. Management of Linux environments.

Appointments and Associations

- 2021-Ongoing **Postdoctoral Research Associate**, *Kavli Institute for Cosmology*, University of Cambridge, Cambridge.
Developing Bayesian statistical techniques from Cosmological problems and applying them to the field of modern Machine Learning. Using Bayesian Neural Networks to develop techniques for computer vision driven by principled Bayesian inference.
- 2019-2020 **Postdoctoral Research Associate**, *High Energy Physics group*, UCL, London.
Developing software tools for cutting edge research.
 - Teaching and supervision of 6 final year MSci projects.
 - Investigation of machine learning techniques and advanced correlated likelihood treatment in theoretical LHC simulations.
- 2015-2019 **Doctoral candidate**, *High Energy Physics group*, UCL, London.
Recipient of UCL HEP postgraduate prize for outstanding postgraduate research.
Specialising in novel calculations and methods at the interface of experiment and theory at the LHC (Large Hadron Collider).
 - Led design and development of open source LHC theoretical model surveying tool *CONTUR*.
 - Analyst of big data in group measuring observables sensitive to dark matter production at the LHC, one paper published and another pending.
 - Contributing author as a member of the ATLAS experimental collaboration. Key contributions as an expert in theoretical modelling and event visualisation. ATLAS Herwig generator expert.
 - Core member of the MCnet theory collaboration, involved with network meeting organisation as a student representative. Awarded numerous travel grants to speak at international conferences and give software tutorials at schools.
- 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 using Herwig.
- 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.
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.

Invited conference talks

- 2019 **Les Houches Physics at TeV Colliders**, *Chamonix*, France.
- 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] J. M. Butterworth, D. Grellscheid, M. Krämer, B. Sarrazin, and D. Yallup, JHEP 03, 078 (2017), arXiv:1606.05296.
- [2] S. Amrith, J. Butterworth, F. Deppisch, W. Liu, and D. Yallup, JHEP 05, 154 (2019), arXiv:1811.11452.
- [3] 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*, 2018, arXiv:1803.10379.
- [4] 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*, 2020, arXiv:2002.12220.
- [5] ATLAS collaboration, M. Aaboud *et al.*, Eur. Phys. J. C 77, 765 (2017), arXiv:1707.03263.
- [6] 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.