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Christopher C. Lovell

Curriculum Vitae

Appointments

October 2022– Present — **Dennis Sciama Postdoctoral Research Fellow**.
Institute of Cosmology and Gravitation, University of Portsmouth

April 2022 - July 2022 — **JSPS short-term postdoctoral research fellowship**.
ICRR, University of Tokyo, Japan

August 2019– October 2022 — **Postdoctoral Research Fellow**.
The School of Physics, Astronomy and Mathematics, University of Hertfordshire

May 2019– August 2019 — **Postdoctoral Research Fellow**.
Astronomy Centre, School of Mathematical and Physical Sciences, University of Sussex

2013–2015 — **Data Scientist**.
Bank of England, London

Education

September 2015– June 2019 — **Ph.D. Astronomy, Modelling Galaxy Formation and Evolution during the Epoch of Reionisation and Beyond**.
Astronomy Centre, School of Mathematical and Physical Sciences, University of Sussex
Advisors: Prof. Peter Thomas & Dr. Stephen Wilkins

2009–2013 — **MPhys Astrophysics**.
School of Physics and Astronomy, Cardiff University. *Advisors:* Prof. Peter Coles, Prof. Anthony Whitworth

Grants, Awards & Successful Proposals

January 2024 — **Royal Astronomical Society 2024 Winton Award**.
"Awarded for research by early career Post Doctoral researchers in a UK institution in astronomy or geophysics"

April 2023 — **CAMELS-EAGLE: extending the CAMELS suite to new astrophysical models and cosmic environments (PI: Chris Lovell)**.
Successful DiRAC 15th call proposal, granted 13.5 million CPU hours on COSMA.

April 2021 — **Co-I on JWST General Observer Cycle 1 proposal 1791 (PI: Justin Spilker)**.
"The Early Assembly History of the Most Massive Halo in the Reionization Era"

April 2022 — **JSPS short-term postdoctoral research fellowship**.
University of Tokyo, Japan, min. 1086000¥ (approx. £7700)

Summer 2013 — **Cardiff Undergraduate Research Opportunities Programme (CUROP)**.
School of Physics and Astronomy, Cardiff University. *Advisor:* Dr. Ian Harrison

Collaborations

2022 – — **Learning the Universe**.
Leading key projects in the synthetic observations, training set generation and accelerated forward modelling working groups.

2022 – **CAMELS collaboration**.
Leading the inclusion of the SWIFT-EAGLE model in the simulation suite.

2019 – **Euclid consortium**.
Member of the Galaxy and AGN evolution scientific working group.

Selected Conferences, Meetings, & Invited Talks

October 2023 **Department of Physics, Oxford University, UK**, *Invited talk*.

January 2023 **Kavli Institute, University of Cambridge, UK**, *Invited talk*.

January - April 2023 **KITP program, Building a Physical Understanding of Galaxy Evolution with Data-driven Astronomy**, *Tutorial, blackboard talk, presentation, invited*.

September '22, '23, March '23 **Learning the Universe Annual Meeting, Flatiron Institute, New York, US**, *Invited*.

May 2022 **Department of Astronomy, Kyoto University, Kyoto, Japan**, *Invited talk*.

March 2022 **Department of Astronomy, University of Toronto, Canada**, *Invited talk*.

February 2020 **The Center for Cosmology and Particle Physics, New York University, New York, US**, *Invited talk*.

March 2018 **Department of Astronomy and Astrophysics, University of California, Santa Cruz, US**, *Invited talk*.

Teaching, Communication & Outreach

2016–Present **Writing**.
I have written outreach articles on a number of subjects for a wide range of different audiences. Organisations included *Astrobites*, which provides accessible summaries of the latest research papers in Astronomy for an undergrauate audience; *Significance*, the magazine of the Royal Statistical Society and the American Statistical Association, where I contributed an article on the Search for ExtraTerrestrial Intelligence (SETI); The Conversation, where I have submitted articles for the general public on the latest Astronomy news

2017–Present **Webb UK**.
I have performed outreach at a number of events around the UK related to the James Webb Space Telescope, including festivals and talks for societies.

2017-Present **Outreach Talks**.
I have given a number of outreach talks to the public, school groups of various age groups and astronomy societies on my research, with a particular focus on explaining how and why we run simulations, such as Building A Universe In A Box, and How to Build a Universe

2017–Present **Student mentor**, *University of Sussex, University of Hertfordshire*.
I have mentored a number of PhD students working in the FLARES team for a number of years (Aswin Vijayan, Will Roper, Jussi Kuusisto, Louise Seeyave). I also co-organise our weekly group meetings. At Hertfordshire and Portsmouth I am mentoring and co-advising a number of masters and PhD students.

2016–Present **Associate Tutor / Lecturer**, *University of Sussex, University of Hertfordshire*.
As a tutor at Sussex I performed marking and workshop supervision for a first year introductory Python course. At Hertfordshire I have hosted lectures and exercise classes for both bachelors and masters level data science courses, as well as an introductory Python course

2021 **Certified Software Carpentries Instructor**, *The Carpentries*.
The Carpentries Instructors are volunteers who teach foundational computational and data skills to researchers.

Technical Skills

Programming Languages **Python, R, C, C++, Intel MPI, OpenMP, Javascript, Git, HTML, LaTeX, bash**.

Software & Packages **Pyro, Tensorflow, Keras, sbi, Scikit-learn, D3, HDF5**.

Publications.
10 first author publications since 2018, 50 co-authored publications since 2016. h-index $=$ 19 (according to ADS). An up to date list of my publications, along with (mostly accurate) citation metrics, is available at ADS or Google Scholar.

Refereed Publications

First-Author

2023 **First Light And Reionisation Epoch Simulations (FLARES) - VIII. The Emergence of Passive Galaxies at $z > 5$.**
Christopher C. Lovell, Will Roper, Aswin P. Vijayan & others,
MNRAS, 525, 4, 5520 arXiv:2211.07540

2023 **A Hierarchy of Normalizing Flows for Modelling the Galaxy–Halo Relationship**.
Christopher C. Lovell, Sultan Hassan, Daniel Anglés-Alcázar & others,
Accepted to ICML 2023, arXiv:2307.06967

2023 **Extreme Value Statistics of the Halo and Stellar Mass Distributions at High Redshift: are JWST Results in Tension with ΛCDM?**.
Christopher C. Lovell, Ian Harrison, Yuichi Harikane, Sandro Tacchella, Stephen M. Wilkins,
MNRAS, 518, 2, 2511 arXiv:2208.10479

2022 **An orientation bias in observations of submillimetre galaxies**.
C. C. Lovell, J. E. Geach, R. Davé & others,
MNRAS, 515, 3, 3644 arXiv:2106.11588

2022 **A machine learning approach to mapping baryons onto dark matter halos using the EAGLE and C-EAGLE simulations**.
Christopher C. Lovell, Stephen M. Wilkins, Peter A. Thomas, Matthieu Schaller, Carlton M. Baugh, Giulio Fabbian, Yannick Bahé,
MNRAS, 509, 4, 5046, arXiv:2106.04980

2021 **Reproducing sub-millimetre galaxy number counts with cosmological hydrodynamic simulations**.
Christopher C. Lovell, James E. Geach, Romeel Davé, Desika Narayanan, Qi Li,
MNRAS, 502, 1, 772, arXiv:2006.15156

2021 **First Light And Reionization Epoch Simulations (FLARES) – I. Environmental dependence of high-redshift galaxy evolution** .
Christopher C. Lovell, Aswin P Vijayan, Peter A Thomas & others,
MNRAS, 500, 2, 2127, arXiv:2004.07283

2021 **Sengi: a small, fast, interactive viewer for spectral outputs from stellar population synthesis models**.
Christopher C. Lovell
Astronomy & Computing, 34, arXiv:1911.12713

2019 **Learning the Relationship between Galaxies Spectra and their Star Formation Histories**.
Christopher C. Lovell, Viviana Acquaviva, Stephen M. Wilkins, Peter A. Thomas
MNRAS, 490, 4, 5503, arXiv:1903.10457

2018 **Characterising and Identifying Galaxy Protoclusters**.
Christopher C. Lovell, Peter A. Thomas, Stephen M. Wilkins
MNRAS 474, 4, 4612, arXiv:1710.02148

Co-Authored

2024 **First Light And Reionisation Epoch Simulations (FLARES) XIV: The Balmer/4000Å Breaks of Distant Galaxies** .
Stephen M. Wilkins, Christopher C. Lovell, Dimitrios Irodotou & others
MNRAS, 527, 3 arXiv:2305.18175

2024 **iMaNGA: mock MaNGA galaxies based on IllustrisTNG and MaStar SSPs. – III. Stellar metallicity drivers in MaNGA and TNG50**.
Lorenza Nanni, Justus Neumann & others including Christopher C. Lovell
MNRAS, 527, 3 arXiv:2309.14257

2023 **JWST constraints on the UV luminosity density at cosmic dawn: implications for 21-cm cosmology**.
Sultan Hassan, Christopher C. Lovell & others
ApJL, 958, 1 arXiv:2305.02703

2023 **Robust field-level likelihood-free inference with galaxies**.
Natalí S. M. de Santi, Francisco Villaescusa-Navarro & others including Christopher C. Lovell
ApJ, 952, 1, 69 arXiv:2302.14101

2023 **A Universal Equation to Predict Ω_m from Halo and Galaxy Catalogues**.
Helen Shao, Natalí S. M. de Santi, Francisco Villaescusa-Navarro & others including Christopher C. Lovell
ApJ, 956, 2, 149 arXiv:2302.14591

2023 **ALMACAL XI: Over-densities as signposts to proto-clusters? A cautionary tale**.
Jianhang Chen, R. J. Ivison & others including Christopher C. Lovell
A&A, 675, L10, 8 arXiv:2306.17313

2023 **First Light And Reionisation Epoch Simulations (FLARES) XIII: the Lyman-continuum emission of high-redshift galaxies**.
Louise T. C. Seeyave, Stephen M. Wilkins, Jussi K. Kuusisto, Christopher C. Lovell & others
MNRAS, 525, 2, 2422 arXiv:2305.18174

2024 **First Light And Reionisation Epoch Simulations (FLARES) XII: The consequences of star-dust geometry on galaxies in the EoR** .
Aswin P. Vijayan, Peter A. Thomas, Christopher C. Lovell & others
MNRAS, 527, 3, 7337 arXiv:2303.04177

2023 **First Light And Reionisation Epoch Simulations (FLARES) XI: [OIII] emitting galaxies at $5 < z < 10$.**
Stephen M. Wilkins, Christopher C. Lovell, Aswin P. Vijayan & others
MNRAS, 522, 3, 4014 arXiv:2301.13038

2023 **First Light And Reionisation Epoch Simulations (FLARES) X: Environmental Galaxy Bias and Survey Variance at High Redshift**.
Peter A. Thomas, Christopher C. Lovell, Maxwell G. A. Maltz & others
MNRAS, 524, 1, 43 arXiv:2301.09510

2023 **FLARES IX: The Physical Mechanisms Driving Compact Galaxy Formation and Evolution**.
William J. Roper, Christopher C. Lovell, Aswin P. Vijayan & others
MNRAS, 526, 4 arXiv:2301.05228

2023 **First Light And Reionisation Epoch Simulations (FLARES) V: The redshift frontier**.
Stephen M. Wilkins, Aswin P. Vijayan, Christopher C. Lovell & others
MNRAS, 519, 2, 3118 arXiv:2204.09431

2023 **Mapping Circumgalactic Medium Observations to Theory Using Machine Learning** .
Sarah Appleby, Romeel Davé & others including Christopher C. Lovell
MNRAS, 525, 1, 1167 arXiv:2301.02001

2023 **Unveiling the main sequence of galaxies at z $\geqslant$ 5 with the James Webb Space Telescope: predictions from simulations**.
Jordan C. J. D'Silva, Claudia D. P. Lagos, & others including Christopher C. Lovell
MNRAS, 518, 1, 456 arXiv:2208.06180

2023 **First Light And Reionisation Epoch Simulations (FLARES) VII: The Star Formation and Metal Enrichment Histories of Galaxies in the early Universe**.
Stephen M. Wilkins, Aswin P. Vijayan, Christopher C. Lovell & others
MNRAS, 518, 3, 3935 arXiv:2208.00976

2022 **Seeing sharper and deeper: JWST's first glimpse of the photometric and spectroscopic properties of galaxies in the epoch of reionisation**.
James A. A. Trussler, Nathan J. Adams & others including Christopher C. Lovell
MNRAS 523 3 3423 arXiv:2207.14265

2022 **MIGHTEE: Deep 1.4 GHz Source Counts and the Sky Temperature Contribution of Star Forming Galaxies and Active Galactic Nuclei**.
C. L. Hale, I. H. Whittam, M. J. Jarvis & others including Christopher C. Lovell
MNRAS, 520, 2, 2668 arXiv:2211.05741

2022 **First Light And Reionisation Epoch Simulations (FLARES) VI: The colour evolution of galaxies z = 5 - 15**.
Stephen M. Wilkins, Aswin P. Vijayan, Christopher C. Lovell & others
MNRAS, 517, 3, 3227 arXiv:2207.10920

2022 **First Light And Reionisation Epoch Simulations (FLARES) - IV. The size evolution of galaxies at $z \geqslant 5$.**
William J. Roper, Christopher C. Lovell, Aswin P. Vijayan & others
MNRAS, 514, 2, 1921 arXiv:2203.12627

2022 **First Light And Reionisation Epoch Simulations (FLARES) III: The properties of massive dusty galaxies at cosmic dawn**.
Aswin P. Vijayan, Stephen M. Wilkins, Christopher C. Lovell & others
MNRAS, 511, 4, 4999 arXiv:2108.00830

2022 **Chaotic and Clumpy Galaxy Formation in an Extremely Massive Reionization-era Halo**.
Justin S. Spilker, Christopher C. Hayward & others including Christopher C. Lovell
ApJ Letters, 929, 1, 3 arXiv:2203.14972

2022 **The BPT Diagram in Cosmological Galaxy Formation Simulations: Understanding the Physics Driving Offsets at High-Redshift**.
Prerak Garg, Desika Narayanan & others including Christopher C. Lovell
ApJ, 926, 1, 80 arXiv:2201.03564

2021 **Cosmic Evolution of the H2 Mass Density and the Epoch of Molecular Gas**.
T. K. Garratt, K. E. K. Coppin, J. E. Geach, O. Almaini, W. G. Hartley, D. T. Maltby, C. J. Simpson, A. Wilkinson, C. J. Conselice, M. Franco, R. J. Ivison, M. P. Koprowski, C. C. Lovell, A. Pope, D. Scott, P. van der Werf
ApJ, 912, 1, 62, 14 arXiv:2103.08613

2021 **First Light And Reionisation Epoch Simulations (FLARES) II: The Photometric Properties of High-Redshift Galaxies** .
Aswin P. Vijayan, Christopher C. Lovell, Stephen M. Wilkins & others
MNRAS, 501, 3, 3289 arXiv:2011.10584

2020 **The emergence of passive galaxies in the early Universe**.
P. Santini & others including Christopher C. Lovell
A&A, 652, A30, 20 arXiv:2011.10584

2020 **Powderday: Dust Radiative Transfer for Galaxy Simulations**.
Desika Narayanan & others including Christopher C. Lovell
ApJSS, 252, 1, 12, 18, arXiv:2006.10757

2020 **Debunking Generalization Error or: How I Learned to Stop Worrying and Love My Training Set**.
Viviana Acquaviva, Christopher C. Lovell & Emille Ishida
Accepted for 2020 NeurIPS workshop "Machine Learning and the Physical Sciences", arXiv:2008.06057

2019 **Nebular-line emission during the Epoch of Reionization**.
Stephen M. Wilkins, Christopher C. Lovell, Ciaran Fairhurst & others
MNRAS, 493, 4, 6079 arXiv:1904.07504

2019 **Recalibrating the cosmic star formation history**.
Stephen M. Wilkins, Christopher C. Lovell & Elizabeth Stanway
MNRAS, 490, 4, 5359 arXiv:1910.05220

2017 **Dust-obscured star-forming galaxies in the early universe**.
Stephen M. Wilkins & others including Christopher C. Lovell
MNRAS, 473, 4, 5363, arXiv:1710.01976

2017 **The properties of the first galaxies in the BLUETIDES simulation**.
Stephen M. Wilkins & others including Christopher C. Lovell
MNRAS, 469, 3, 2517 arXiv:1704.00954

2016 **The photometric properties of galaxies in the early universe**.
Stephen M. Wilkins & others including Christopher C. Lovell
MNRAS, 460, 3, 3170, arXiv:1605.05044

Submitted

2023 **Cosmic Evolution Early Release Science (CEERS) survey: The colour evolution of galaxies in the distant Universe** .
Stephen M. Wilkins, Jack C. Turner & others including Christopher C. Lovell
Submitted to MNRAS arXiv:2311.08065

2023 **Field-level simulation-based inference with galaxy catalogs: the impact of systematic effects**.
Natalí S. M. de Santi, Francisco Villaescusa-Navarro & others including Christopher C. Lovell
Submitted to ApJ arXiv:2310.15234

2023 **Star formation efficiency across large-scale galactic environments**.
Laya Ghodsi, Allison Man, Darko Donevski & others including Christopher C. Lovell
Submitted to MNRAS arXiv:2309.01277

2023 **Unveiling the distant Universe: Characterizing $z \geqslant 9$ Galaxies in the first epoch of COSMOS-Web**.
Maximilien Franco, Hollis B. Akins & others including Christopher C. Lovell
Submitted to ApJ arXiv:2308.00751

2023 **Cosmological baryon spread and impact on matter clustering in CAMELS**.
Matthew Gebhardt, Daniel Anglés-Alcázar & others including Christopher C. Lovell
Submitted to MNRAS arXiv:2307.11832

2023 **Outshining by Recent Star Formation Prevents the Accurate Measurement of High-z Galaxy Stellar Masses** .
Desika Narayanan, Sidney Lower & others including Christopher C. Lovell
Accepted to ApJ arXiv:2306.10118

2023 **Efficient NIRCam Selection of Quiescent Galaxies at $3 < z < 6$ in CEERS**.
Arianna S. Long, Jacqueline Antwi-Danso, Erini L. Lambrides, Christopher C. Lovell & others
Submitted to ApJ arXiv:2305.04662

References

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