Mr. Christian Kirkham, FRAS

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http://astrochristian.github.io/

Education

2022 – Present **Ph.D., University of Cambridge** Physics
Thesis title: *Foreground Modelling using Bayesian Techniques for 21-cm Cosmology*.

2018 – 2022 **MPhys., Durham University** Physics with Astronomy.
Awarded first class degree with honours.

Employment History

Oct 2024 – Mar 2025 **Demonstrator for Part IA Scientific Computing Module** Department of Physics, University of Cambridge

Oct 2023 – Jun 2024 **Supervisor for Part II Stellar Dynamics and Structure of Galaxies Module** Institute of Astronomy, University of Cambridge

Jan 2023 – Mar 2023 **Demonstrator for Part IB Introduction to Computing Module** Department of Physics, University of Cambridge

Oct 2022 – Mar 2023 **Demonstrator for Part IA Scientific Computing Module** Department of Physics, University of Cambridge

Sep 2021 **"Developing a Remote Operation Mode for the TARA Radio Telescope"** Centre for Extragalactic Astronomy, Durham University

Research Publications

- G. V. C. Allen, S. Pegwal, D. I. L. de Villiers, and **The REACH Collaboration**, *In Situ Receiver Circuit Modelling and Inference for High Precision 21 cm Radio Astronomy*, in prep.
  - *REACH collaboration member.*
- M. Bucher, **C. J. Kirkham**, E. de Lera Acedo, D. I. L. de Villiers, and S. Pegwal, *Global 21-cm Measurement Calibration Methodology*, in prep.
  - *Generated simulated receiver data and applied the calibration equations to the mock dataset to allow for effective comparison of the methods.*
- **C. J. Kirkham**, W. J. Handley, J. Zhu, K. Artuc, I. L. V. Roque et al., *Accounting for Noise and Singularities in Bayesian Calibration Methods for Global 21-cm Cosmology Experiments*, Nov. 2025. MNRAS, 543, 4312. doi:10.1093/mnras/staf1715
- S. A. K. Leeney, H. T. J. Bevins, E. de Lera Acedo, W. J. Handley, **C. J. Kirkham** et al., *Radiometer Calibration using Machine Learning*, Oct. 2025. Sci Rep, 15, 34335 (2025). doi:10.1038/s41598-025-16732-9
  - *Provided helpful discussion and advice to the lead author.*
- **C. J. Kirkham**, D. J. Anstey, and E. de Lera Acedo, *Capturing System Drift with Time Series Calibration for Global 21-cm Cosmology Experiments*, Sep. 2025. doi: 10.48550/arXiv.2509.13010. arXiv: 2509.13010 [astro-ph].
- **C. J. Kirkham**, D. J. Anstey, and E. de Lera Acedo, *A Bayesian Method to Mitigate the Effects of Unmodelled Time-Varying Systematics for 21-cm Cosmology Experiments*, Jan. 2024. MNRAS, 527, 8305. doi:10.1093/mnras/stad3725

Skills

Research	21-cm Radio Cosmology, Bayesian statistics, Microwave engineering, Nested sampling, Gaussian processes, Time-series analysis
Languages	Strong reading, writing and speaking competencies in English
Coding	Python, LaTeX, Git, UNIX, HPC
Web Dev	HTML, CSS, JavaScript
Misc.	Teaching, LaTeX typesetting and publishing.

Talks

Conference and Workshop Talks

- Nov 2025 — **"Capturing System Drift with Time Series Calibration for REACH"** REACH Annual Meeting, University of Cambridge, Cambridge, UK
- **"An Overview of REACH Calibration"** REACH Annual Meeting, University of Cambridge, Cambridge, UK
- Sep 2025 — **"An Overview of Methods for REACH Calibration"** Global 21-cm Workshop, California Institute of Technology, Pasadena, USA
- Jul 2025 — **"Modelling Drifts in Receiver Calibrations for Global 21-cm Cosmology Experiments"** Radio Cosmology and Science with the 21-cm Signal, University of Cambridge, Cambridge, UK
- Apr 2025 — **"Accounting for Noise and Singularities in Bayesian Calibration Methods for Global 21-cm Cosmology Experiments"** Friday Lunchtime Astronomy Talk, Durham University, Durham, UK
- Feb 2025 — **"Accounting for Noise and Singularities in Bayesian Calibration Methods for Global 21-cm Cosmology Experiments"** Hills Coffee Talk, University of Cambridge, Cambridge, UK
- Sep 2024 — **"An Overview of Bayesian Noise Wave Methods for Calibration of REACH"** REACH Annual Meeting, Mahabaleshwar, India
- May 2024 — **"Gaussian Processes for Systematic Mitigation"** URSI AT-RASC, Gran Canaria, Spain
- Feb 2024 — **"Gaussian Processes for Mitigating Systematics in Global 21-cm Cosmology Experiments"** Institute of Astronomy Wednesday Seminar, University of Cambridge, Cambridge, UK
- **"Gaussian Processes for Mitigating Systematics"** Science with the 21-cm line, Kavli Science Focus Meeting, University of Cambridge, Cambridge, UK
- Sep 2023 — **"A Bayesian Method to Mitigate the Effects of Unmodelled Time-Varying Systematics for 21-cm Cosmology Experiments"** REACH Annual Meeting, University of Malta, Valetta, Malta

Poster Presentations

- Oct 2024 — **"A Marginalised Bayesian Noise Wave Calibration Method for Global 21-cm Cosmology Experiments"** Global 21-cm Workshop, Raman Research Institute, Bengaluru, India
- Mar 2024 — **"A Bayesian Method to Mitigate the Effects of Unmodelled Time-Varying Systematics for 21-cm Cosmology Experiments"** Cosmology in the Alps, Les Diablerets, Switzerland

Awards

2025 **College Senior Scholarship**, Fitzwilliam College, Cambridge
2024 **College Senior Scholarship**, Fitzwilliam College, Cambridge
2019 **Physics Award for Outstanding Achievement**, Durham University

References

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