



# Will Handley

## Summary

[willhandley.co.uk/CV](http://willhandley.co.uk/CV)

Cosmologist and statistician whose research programme weaves theory, observation & inference:  
Nested sampling; Bayesian machine learning; cosmological model selection, parameter estimation & tension quantification; likelihood-free inference; early universe cosmology; CMB; 21cm; gravitational waves; exoplanets.

- Internationally recognised research programme which has been awarded over **£3.8m** over the past 4 years.
- Interdisciplinary research with technology transfer to industry, government & start-ups.
- 2 years experience lecturing fourth year Cambridge General Relativity & Bayesian inference courses.
- 7 years experience (co-)supervising 17 PhD students & 3 postdocs.
- 129 papers
- PhD begun in 2012

## Education

- 2012–2016 **University of Cambridge**, *PhD Astrophysics*, Prof. A. Lasenby & Prof. M. Hobson
- 2008–2012 **University of Cambridge**, *MSci, MA: Natural Sciences*, Gonville & Caius College
- 2001–2008 **Alleyn's School**, *A levels, GCSEs*, London

## Employment & Research

- Oct 2020– **Royal Society University Research Fellow**, *Cavendish Lab*, University of Cambridge  
Bayesian machine learning and tensions in cosmology
- May 2021– **Teaching Fellow**, *Gonville & Caius College*, University of Cambridge
- 2017– **Chief Technical Officer**, *PolyChord Ltd*, [polychord.co.uk](http://polychord.co.uk)
- 2021–2023 **Turing Fellow**, *Alan Turing Institute*
- 2016–2020 **Research fellow**, *Gonville & Caius College*, University of Cambridge  
Funded by Gonville & Caius College and an STFC IPS grant.
- Jul-Sep 2016 **Postdoctoral researcher**, *Prof. H. Peiris*, University College London  
Searching for features in the primordial power spectrum.
- 2012–2016 **PhD Astrophysics**, *Prof. A. Lasenby & Prof. M. Hobson*, University of Cambridge  
Kinetic initial conditions for inflation: Theory, observations & methods.
- 2011–2012 **Part III Dissertation**, *Prof. P. Alexander*, University of Cambridge  
Investigating the origins of cosmic magnetism.
- Summer 2011 **Summer Research Student**, *Prof. M. Faulkes & Dr. J. Spencer*, Imperial College  
Folded spectrum full configuration interaction quantum Monte Carlo.
- Summer 2011 **Summer Research Student**, *Dr. R. Blumenfeld*, University of Cambridge  
Geometry and field equations of granular systems.
- 2010–2011 **Research Review**, *Prof. S. Gull*, University of Cambridge  
Literature Survey of the Physics-Philosophy crossover field of measurement theory.
- Summer 2010 **iGEM Team Physicist**, *Dr. J. Haseloff*, University of Cambridge  
E-glowli 2010 iGEM team (placed in final 6) <http://2010.igem.org/Team:Cambridge>

## Grants won (£3.8m)

£1.3m	<b>ERC starting grant</b> ⇒ <b>UKRI frontier research</b> , <i>Resolving cosmological tensions with diverse data, novel theories and Bayesian machine learning</i> , Horizon Europe ERC STG 2021, invited for grant preparation, converted to UKRI frontier research guarantee Start date: October 2024 <a href="http://willhandley.co.uk/ERC.pdf">willhandley.co.uk/ERC.pdf</a>
£240k	<b>Royal Society Enhancement</b> , <i>Next generation nested sampling for cosmological inference</i>
£170k	<b>Royal Society Enhancement</b> , <i>Likelihood-free inference and Bayesian neural networks</i>
52MCPUh ≡ £520k	<b>DiRAC Resource Allocation Committee 15<sup>th</sup> call 2023</b> , <i>New frontiers in particle cosmology</i>
30MCPUh ≡ £300k	<b>DiRAC Resource Allocation Committee 13<sup>th</sup> call 2021</b> , <i>Next generation cosmological analysis with nested sampling</i>
£723k	<b>Royal Society URF 2020</b> , <i>Bayesian machine learning and tensions in cosmology</i>
2MCPUh ≡ £20k	<b>DiRAC directors discretionary award 2020</b> , <i>Bayesian model comparison of inflation and spatial curvature</i>
£225k	<b>STFC IPS 2019</b> , <i>PolyChord and Bayesian sparse facial recognition</i>
£42k	<b>STFC IAA 2018</b> , <i>PolyChord and Bayesian neural network facial recognition</i>
£25k	<b>STFC IAA 2016</b> , <i>Interfacing PolyChord 2.0</i>
£15k	<b>KICC Workshop 2023</b> , <i>GAMBIT at the KICC</i>
£15k	<b>KICC Workshop 2019</b> , <i>AstroHackWeek 2019</i>
\$6k	<b>George Southgate Visiting Fellowship 2020</b> , <i>GAMBIT visit</i>
£2k	<b>KICC visitors 2019</b> , <i>Likelihood free inference workshop</i>
£2k	<b>KICC visitors 2017</b> , <i>Class and MontePython workshop</i>
£1.8k	<b>Caius + Kavli</b> , <i>Summer 2019 student funding</i>
£1.5k	<b>King's + Kavli</b> , <i>Summer 2018 student funding</i>

## Awards & Prizes

Jul. 2022	Pacific Institute of Theoretical Physics visitor	<i>University of British Columbia</i>
Feb. 2020	George Southgate visiting Fellow	<i>University of Adelaide</i>
Jul. 2019	Guiseppe and Vanna Cocconi Prize (WMAP and Planck)	<i>EPS-HEPP Division</i>
Dec. 2013	Best presentation	<i>Cavendish grad. students conference</i>
Jun. 2012	Best theoretical part III project Physics prize	<i>University of Cambridge Gonville &amp; Caius College</i>
Summer 2011	Undergraduate Research Bursary UROP Studentship	<i>Nuffield Foundation Imperial College</i>
Summer 2010	iGEM Studentship	<i>Wellcome Trust</i>
2009–12	Junior and Senior Scholarships	<i>Gonville &amp; Caius College</i>

## Current students & postdocs

[willhandley.co.uk/students](http://willhandley.co.uk/students)

Postdoc	David Yallup	<i>2021-present</i>
PhD	Namu Kroupa	<i>2023-present</i>
	Metha Prathaban, Wei-Ning Deng, Sinah Legner	<i>2022-present</i>
	Adam Ormondroyd	<i>2021-present</i>
	George Carter, Kilian Scheutwinkel, Thomas Gessey-Jones	<i>2020-present</i>
Masters	Felicity Ibrahim, Sam Hewson, Patrick Lau, Nicolas Mediato Diaz, Tze Goh	<i>2023-present</i>

## Previous students & postdocs

### PhD

- Dec 2023 **Ian Roque**, *EXCALIBRATE: Calibration for astrophysical experimentation*  
co-supervised with Nima Razavi-Ghods
- Jun 2023 **Harry Bevins**, *A Machine Learning-enhanced Toolbox for Bayesian 21-cm Data Analysis and Constraints on the Astrophysics of the Early Universe*  
co-supervised with Eloy de Lera Acedo and Anastasia Fialkov
- Jul 2022 **Dominic Anstey**, *Data Analysis in Global 21cm Experiments: Physically Motivated Bayesian Modelling Techniques*  
co-supervised with Eloy de Lera Acedo
- Sep 2021 **Fruzsina Agocs**, *Primordial evolution of cosmological perturbations: Theory and computation*  
co-supervised with Mike Hobson & Anthony Lasenby
- Aug 2021 **Will Barker**, *Gauge Theories of Gravity*  
co-supervised with Mike Hobson & Anthony Lasenby
- Dec 2020 **Lukas Hergt**, *Constraining the kinetically dominated Universe*  
co-supervised with Mike Hobson & Anthony Lasenby
- Oct 2018 **Ed Higson**, *Bayesian Methods and machine Learning in Astrophysics*  
co-supervised final year with Mike Hobson & Anthony Lasenby
- Individual projects  
Thomas McAloon (2020-21), Isidro Gómez Vargas (2020), Ayngaran Thavenesan (2021-22)

### MPhil

- Sep 2023 **Danielle Dineen**, *Cosmological Matching Conditions for Primordial Perturbations*
- Jan 2023 **Allahyar Sahibzada**, *Machine Learning and Nested Sampling: in the context of data intensive science and cosmology*
- Nov 2022 **Sam Leeney**, *Data science in early universe Cosmology: a novel Bayesian RFI mitigation approach using numerical sampling techniques*  
co-supervised with Eloy de Lera Acedo
- Aug 2020 **Emma Shen**, *Ionospheric Effects in the Global 21-cm Experiment*  
co-supervised with Eloy de Lera Acedo & Anastasia Fialkov
- Aug 2019 **Ian Roque**, *Bayesian Techniques for the Calibration of 21 cm Global Experiments*  
co-supervised with Nima Razavi-Ghods
- Aug 2018 **Panagiotis Mavrogiannis**, *Wheeler–Feynman absorber theory of radiation: Establishing the cosmological electrodynamic arrow of time*  
co-supervised with Anthony Lasenby

### MSci

- 2023 Zixiao Hu, Cole Meldorf, Sankalan Bhattacharyyan, Toby Lovick
- 2022 Yoann Launay, Oliver Normand, Xy Wang, Carola Zanoletti
- 2021 Yi Jer Loh, Metha Prathaban
- 2020 Thomas Gessey-Jones, Aleks Petrosyan
- 2019 Deaglan Bartlet, Jamie Bamber, Ian Roque
- 2018 Ward Haddadin, Jessica Rigley
- 2017 Fruzsina Agocs, Robert Knighton, Stephen Pickman, Daniel Manela

### Summer students

- 2023 Zixiao Hu, Toby Lovick, Namu Kroupa
- 2022 Mary Letey, Beichen Xu, Artyom Baryshnikov
- 2021 Zak Shumaylov, Mattia Varrone

2019 Denis Werth, Maxime Jabarian, Liam Lau  
 2018 Elizabeth Guest, Ward Haddadin, Shu-Fan Chen

## Postdocs

2020 Jianghui Lui  
 2018-19 Kamran Javid

## Lecturing

2021-2023 Part III Physics: Relativistic Astrophysics & Cosmology *MSci 24 lecture course*  
 2017-2021 Bayesian Statistics *Graduate 2 lecture course*

## Workshops

2023 **Monte Carlo Methods**, *For Cosmology and Particle Physics*, UNAM, Mexico  
[github.com/handley-lab/workshop-monte-carlo-methods](https://github.com/handley-lab/workshop-monte-carlo-methods)  
 2022 **ICCS**, *Training Machine Learning models*, Cambridge, UK  
[github.com/handley-lab/2022-cambridge-iccs](https://github.com/handley-lab/2022-cambridge-iccs)  
 2018 **CosmoTools**, *Introduction to Statistics*, Aachen, Germany  
[indico.cern.ch/e/CosmoTools2018](https://indico.cern.ch/e/CosmoTools2018)  
 2017 **CosmoTools**, *Cosmological statistics & sampling*, IFT Madrid, Spain  
[workshops.ift.uam-csic.es/cosmotools2017](https://workshops.ift.uam-csic.es/cosmotools2017)

## Small group teaching

2020–present Part III Physics: Relativistic Astrophysics and Cosmology *Supervising (24 hours)*  
 2013–present Part II Physics: General relativity *Supervising (156 hours)*  
 2023–present Part II Physics: Statistical Mechanics *Supervising (28 hours)*  
 2012–2017 Part IA Mathematics for NatSci *Tripes classes (20 hours), Supervising (580 hours)*  
 2015-2016 Part IA Physics *Supervising (20 hours)*  
 2013 Part II Theoretical Physics 1 & 2 *Demonstrating (8 hours)*  
 2006–2012 Maths and Science Tuition *Individual coaching, key stage 1 – STEP*

## Academic Talks

[willhandley.co.uk/talks](https://willhandley.co.uk/talks)

† = remote

Mar. 2023 **Nested sampling: powering next-generation inference and machine learning tools for cosmology, particle physics and beyond**, *Gatsby computational unit*, UCL, UK  
 Feb. 2024 **Sampling techniques in high-dimensional parameter spaces with ScannerBit 2.0**, *ORIGINS data science cluster*, Munich, Germany  
 Jan. 2024 **Next-generation inference tools for cosmology and beyond**, Oxford, UK  
 Jan. 2024 **Simulation Based Inference: theory, sampling & model comparison**, *RAS*, London, UK  
 Dec. 2023 **Nested sampling: powering next-generation inference and machine learning tools for cosmology, particle physics and beyond**, *UNAM*, Mexico City, Mexico  
 Nov. 2023 **Bayesian OODA loops with MIDAS: Augmented decision making in a complex future electromagnetic environment**, *OFEME 2023*, Nottingham, UK  
 Oct. 2023 **unimpeded: Universal model comparison and parameter estimation distributed over every dataset**, *Oscar Klein Center*, Stockholm, Sweden  
 Oct. 2023 **Nested sampling: powering next-generation inference and machine learning tools for cosmology, particle physics and beyond**, *Manchester*, UK  
 Sep. 2023 **Nested sampling tools**, *REACH AGM*, Malta

- Sep. 2023 **Nested sampling: powering next-generation inference and machine learning tools for cosmology, particle physics and beyond** , *UCL*, UK
- Aug. 2023 **Nested sampling: powering next-generation inference and machine learning tools for cosmology, particle physics and beyond** , *KCL*, UK
- Jul. 2023 **The scaling frontier of nested sampling: Summary talk**, *MaxEnt*, Munich, Germany
- Jun. 2023 **Gradients and Nested Sampling: the present state of the art**, *MIAPbP*, Munich, Germany
- Mar. 2023 **Nested Sampling: A multi-purpose numerical tool for science and machine learning**, *ETH Zurich*, Switzerland
- Jan. 2023 **High dimensional nested sampling**, *Simulation based inference with swyft*, Amsterdam, Netherlands
- Jan. 2023 **What is the benefit of adversarial systems?**, *Mathematical Challenges in the Electromagnetic Environment*, London, UK
- Dec. 2022 **Theory, observation & cosmological inference**, *KICC christmas*, Cambridge, UK
- Sep. 2022 **Next generation cosmological analysis with nested sampling**, *KICC Symposium*, Cambridge, UK
- Sep. 2022 **Next generation cosmological analysis with nested sampling**, *Corfu2022: Tensions in Cosmology*, Corfu, Greece
- Aug. 2022 **Dark matter, cosmology and likelihood-free Inference**, *GAMBIT XIV*, Kelowna, Canada
- Jul. 2022 **Nested Sampling: An efficient and robust Bayesian inference tool for particle physics and cosmology** , *TRIUMF & UBC*, Vancouver, Canada
- Jul. 2022 **Frontiers of Nested Sampling**, *MaxEnt 2022*, Paris, France
- Apr. 2022 **Nested Sampling and Likelihood-free inference**, *Likelihood-free in Paris*, Paris, France
- Apr. 2022 **Statistical methods in Cosmology**, *Obs. and Theor. 21-cm Cosmology*, Cambridge, UK
- Jan. 2022 **PolyChord: Next generation nested sampling**, *UK Atomic Energy Authority*, UK<sup>†</sup>
- Nov. 2021 **Review on Statistical Tools and Samplers**, *TOOLS 2021*, IP2I, Lyon, France<sup>†</sup>
- Jul. 2021 **Success Story 2 — Optimum Sensor Placement**, *Mathematical Challenges in the Electromagnetic Environment*, Isaac Newton Institute, Cambridge, UK
- Jul. 2021 **Success Story 1 — Detecting Illicit Mesh Networks**, *Mathematical Challenges in the Electromagnetic Environment*, Isaac Newton Institute, Cambridge, UK
- Mar. 2021 **PolyChord: Novel Bayesian Machine Learning**, *Cambridge Data Science Fair*, UK<sup>†</sup>
- Feb. 2021 **Bayesian methods for quantifying global parameter tensions between cosmological datasets**, *Tehran meeting on cosmology at the crossroads*, Tehran, Iran<sup>†</sup>
- Jan. 2021 **Bayesian information fusion**, *Mathematical Challenges in the Electromagnetic Environment*, Isaac Newton Institute, Cambridge, UK<sup>†</sup>
- Oct. 2020 **Nested Sampling: an efficient and robust Bayesian inference tool for 21cm cosmology**, *3rd Global 21-cm Workshop*, Cambridge, UK<sup>†</sup>
- Sep. 2020 **Nested Sampling for optimising sensor location**, *Mathematical Challenges in the Electromagnetic Environment*, Isaac Newton Institute, Cambridge, UK<sup>†</sup>
- Feb. 2020 **Nested Sampling: an efficient and robust Bayesian inference tool for physics and machine learning**, *Physics Colloquium*, Adelaide, Australia
- Jan. 2020 **Nested Sampling: an efficient and robust Bayesian inference tool for astrophysics and cosmology**, Oxford, UK
- Jan. 2020 **PolyChord: next generation nested sampling**, *Mathematical Challenges in the Electromagnetic Environment*, Isaac Newton Institute, Cambridge, UK
- Dec. 2019 **Quantised primordial power spectra**, *Texas 2019*, Portsmouth, UK

- Nov. 2019 **Nested Sampling: an efficient and robust Bayesian inference tool for Machine Learning and Data Science**, *CDT talk*, Cambridge, UK
- Aug. 2019 **Curvature tension: evidence for a closed universe(?)**, ICG Portsmouth, UK
- Jul. 2019 **Quantifying cosmological tensions**, University College London, UK
- Jun. 2019 **Likelihood free inference**, *GAMBIT X*, Germany
- Mar. 2019 **Compromise-free Bayesian sparse reconstruction**, *LFI workshop*, Flatiron institute, US
- Dec. 2018 **Inflation, curvature and kinetic dominance**, *Future uses of Planck data*, ESAC, Spain
- Nov. 2018 **BAMBI Resurrection: Blind Accelerated Multimodal Bayesian Inference**, *Dark Machines*, Worldwide<sup>†</sup>
- Nov. 2018 **Nested Sampling: an efficient and robust Bayesian inference tool for cosmology and particle physics**, *Dark Machines*, Worldwide<sup>†</sup>
- Oct. 2018 **Bayesian Statistics**, *Third Asterics-Obelics workshop*, Cambridge, UK
- May. 2018 **Planck, inflation and the future of inflationary constraints**, *Consistency of Cosmological Datasets*, Cambridge, UK
- May. 2018 **MaxEnt priors with derived parameters in a specified distribution**, Cambridge, UK
- May. 2018 **Nested Sampling: an efficient and robust Bayesian inference tool for astrophysics and cosmology**, ICIC, UK
- April. 2018 **Introduction to statistics**, *CosmoTools 18*, RWTH Aachen, Germany
- Jan. 2018 **Advances in Nested Sampling & astrophysical application**, Cambridge, UK
- Aug. 2017 **PolyChord 2.0: Fast inference & nested sampling**, *Cosmo17*, Paris, France
- Jun. 2017 **Modern Bayesian Inference: Theory and Practice**, RWTH Aachen, Germany
- Mar. 2017 **Parameter estimation and Model comparison**, *CosmoTools 17*, Madrid, Spain
- Feb. 2017 **PolyChord 2.0: Advances in Nested Sampling & astrophysical application**, Flatiron institute, US
- Sep. 2016 **PolyChord 2.0 & the future of nested sampling**, University College London, UK
- May. 2016 **PolyChord 2.0 & the future of nested sampling**, University of Sussex, UK
- Mar. 2016 **PolyChord & the future of nested sampling**, Edinburgh, UK
- Dec. 2015 **PolyChord: next generation nested sampling**, *MPA Bayes Forum*, Munich, Germany
- Feb. 2015 **PolyChord: next generation nested sampling**, University of Sussex, UK
- Dec. 2013 **Kinetic dominance in the pre-inflationary universe**, Cavendish grad. conference

## Selected Outreach

Over the course of my career I have given 19 public outreach talks including:

- May 2015 **Intro. to Astronomy: Beyond the Milky Way**, *IoA Public Talk*, Cambridge
- May 2015 **To infinity and beyond: Dark Energy**, *Pint of Science*, Cambridge Brewhouse
- Feb 2014 **The Physics of Juggling**, *CCPE*, Cavendish Laboratory
- Jan 2014 **The first 3 yocto-pico seconds**, *Three minute wonder*, Cavendish Laboratory

## Institutional responsibilities

2020–present	Convener of CosmoBit	<i>GAMBIT</i>
2020–present	Leader of data analysis team	<i>REACH</i>
2021–present	Center for data-driven discovery (C2D3) steering committee	<i>University of Cambridge</i>
2022–present	KICC Scientific Strategy Committee	<i>KICC</i>
2022–present	KICC Visitor and Lecturer committee	<i>KICC</i>
2018–present	Science Research Fellowships committee	<i>Gonville &amp; Caius college</i>



2018–present	Investments committee	<i>Gonville &amp; Caius college</i>
2016–present	Undergraduate Admissions	<i>Gonville &amp; Caius college</i>
2020–present	Wine Committee (WSET3)	<i>Gonville &amp; Caius college</i>
2019–2022	Gonville & Caius College Council	<i>Gonville &amp; Caius college</i>
2021–2023	CDT in data intensive science executive committee	<i>University of Cambridge</i>
2018–2020	Education and research committee	<i>Gonville &amp; Caius college</i>
2017–2022	Organiser of weekly group seminars	<i>Cavendish astrophysics group</i>

## Examination

2021–2023	<b>Exam setting</b> , <i>Relativistic Astrophysics and Cosmology</i> , Part III Physics
2020–2022	<b>Masters exam checking</b> , <i>Astrostatistics</i> , Part III Maths

## PhD

Dec 2023	<b>Lester Sandles</b> , <i>Star-forming Galaxies and Quenched Systems throughout Cosmic Time</i>
Dec 2021	<b>Wu Hyun Sohn</b> , <i>High-resolution CMB bispectrum estimator</i>

## MPhil

Sep 2020	<b>Kyriakos Stylianiopoulos</b> , <i>Machine Learning Applied to Gaia and Other Survey Data: Applications Supporting a Polarisation Survey</i>
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## Organisation of scientific meetings

2023	GAMBIT at the KICC	<i>KICC</i>
2023	Frontiers of nested sampling	<i>Munich</i>
2023	Simulation based inference workshop (delayed from 2019)	<i>KICC</i>
2020	Scientific organising committee member of 3 <sup>rd</sup> Global 21-cm Workshop	<i>KICC</i>
2019	Local organising committee member of KICC 10 <sup>th</sup> anniversary symposium	<i>KICC</i>
2019	Helped secure funding and organised AstroHack week 2019	<i>KICC</i>
2018	Secured funding for and organised CLASS+MontePython software workshop	<i>KICC</i>

## Peer review

Performed 78 reviews for journals including Physical Review D and Physical Review Letters;

<https://www.webofscience.com/wos/author/record/S-9134-2018>

PRD (34), MNRAS (7), JCAP (8), PRL (8), JOSS (2), APJ (2), EPJC (1), PLB (6), RASTI (2) Entropy (4), Astronomy & Computing (2), Physics of the Dark Universe (2)

Review for fellowship awards:

2022	C2D3 Early Career Researcher Seed Fund
2022	ABTA UK Doctoral Research Award
2022	Blavatnik fellowship
2021–	Gonville & Caius Junior Research Fellowships

## Collaborations

2018–present	REACH	<i>astro.phy.cam.ac.uk/research/research-projects/reach</i>
2018–present	GAMBIT	<i>gambit.hepforge.org</i>
2018–2020	DarkMachines	<i>darkmachines.org</i>
2017–2018	Terra Hunter Experiment	<i>terrahunting.org</i>
2016–2017	CORE	<i>core-mission.org</i>
2015–2016	AMI	<i>astro.phy.cam.ac.uk/research/research-projects/AMI</i>

## Software

[willhandley.co.uk/software](http://willhandley.co.uk/software)

- PolyChord Sole author and maintainer: [github.com/PolyChord/PolyChordLite](https://github.com/PolyChord/PolyChordLite)
- anesthetic Principle author and maintainer: [github.com/handley-lab/anesthetic](https://github.com/handley-lab/anesthetic)
- lsbi Principle author and maintainer: [github.com/handley-lab/lsbi](https://github.com/handley-lab/lsbi)
- unimpeded Principle author and maintainer: [github.com/handley-lab/unimpeded](https://github.com/handley-lab/unimpeded)
- fgivenx Sole author and maintainer: [github.com/handley-lab/fgivenx](https://github.com/handley-lab/fgivenx)
- pyBAMBI Team maintainer: [github.com/DarkMachines/pyBAMBI](https://github.com/DarkMachines/pyBAMBI)
- MultiNest Maintainer: [github.com/farhanferoz/MultiNest](https://github.com/farhanferoz/MultiNest)
- primordial Sole author and maintainer: [github.com/williamjameshandley/primordial](https://github.com/williamjameshandley/primordial)
- ModeCode Maintainer: [modecode.org](https://modecode.org)
- Open source
  - scipy: Weighted kernel density estimation in `scipy.stats.gaussian_kde`
  - matplotlib: Vertical slider in `matplotlib.widgets.Slider`

## Interaction with industry

- PolyChord Founded start-up company PolyChord Ltd. to bring Bayesian methods & tools from cosmology to Machine Learning & Biotech industries: [polychord.co.uk](http://polychord.co.uk)
- Shell Work with department postdocs in the department applying nested sampling to geophysics
- DSTL Consult for government defence research using Bayesian inference
- CMAM Consult for finance spin-out on Bayesian algorithmic trading
- AnyVision Worked collaboratively as part of STFC grant to apply Bayesian sparse reconstruction to facial recognition

## In the media

- 2022 **Cavendish Laboratory News**, *What can astrophysical data-intensive science do beyond the Universe?*, PolyChord, the next generation optimisation technology  
<https://www.phy.cam.ac.uk/news/what-can-astrophysical-data-intensive-science-do-beyond-universe-polychord-next-generation>
- 2022 **BBC Radio 4**, *The Third Degree*, Astrophysics Don  
 “Students vs Dons” BBC radio quiz aired July 2022
- 2020 **Quanta Magazine**, *Modified gravity in cosmology led by Will Barker*  
[quantamagazine.org/why-is-the-universe-expanding-so-fast-20200427/](http://quantamagazine.org/why-is-the-universe-expanding-so-fast-20200427/)
- 2022 **KICC annual report**, *Bringing astrostatistics back to Earth*  
[kicc.cam.ac.uk/aboutus/kicc-annual-reports](http://kicc.cam.ac.uk/aboutus/kicc-annual-reports)
- 2019 **KICC annual report**, *Compromise-free Bayesian cosmology & AstroHack week*

## Computer skills

- Programming MPI parallelisation, C++, FORTRAN, Mathematica, Maple, Python
- Computing Unix, Bash, zsh, vim, git, svn, L<sup>A</sup>T<sub>E</sub>X, TikZ, VMs, CI
- OS Arch Linux & HPC supercomputing (Experienced), Windows & OSX (Familiar)

## References

- Prof. Anthony Lasenby, +44 (0)1223 337293/4, [a.n.lasenby@mrao.cam.ac.uk](mailto:a.n.lasenby@mrao.cam.ac.uk),
- Prof. Mike Hobson, +44 (0)1223 339992, [mph@mrao.cam.ac.uk](mailto:mph@mrao.cam.ac.uk)
- Prof. Ofer Lahav, +44 (0)203 5495813, [o.lahav@ucl.ac.uk](mailto:o.lahav@ucl.ac.uk)
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- [1] Michael Pagano, Peter Sims, Adrian Liu, Dominic Anstey, **Will Handley**, and Eloy de Lera Acedo. A general Bayesian framework to account for foreground map errors in global 21-cm experiments. *MNRAS*, 527(3):5649–5667, January 2024.
- [2] Namu Kroupa, David Yallup, **Will Handley**, and Michael Hobson. Kernel-, mean-, and noise-marginalized Gaussian processes for exoplanet transits and  $H_0$  inference. *MNRAS*, 528(2):1232–1248, February 2024.
- [3] Harry T. J. Bevins, Stefan Heimersheim, Irene Abril-Cabezas, Anastasia Fialkov, Eloy de Lera Acedo, **William Handley**, Saurabh Singh, and Rennan Barkana. Joint analysis constraints on the physics of the first galaxies with low-frequency radio astronomy data. *MNRAS*, 527(1):813–827, January 2024.
- [4] David Yallup and **Will Handley**. Hunting for bumps in the margins. *Journal of Instrumentation*, 18(5):P05014, May 2023.
- [5] Margret Westerkamp, Jakob Roth, Philipp Frank, **Will Handley**, and Torsten Enßlin. Inferring Evidence from Nested Sampling Data via Information Field Theory. *arXiv*, 2312.11907, December 2023.
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