



# 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 **£4m** over the past 5 years.
- Interdisciplinary research with technology transfer to industry, government & start-ups.
- 2 years experience lecturing fourth year Cambridge General Relativity & Bayesian inference courses.
- 8 years experience (co-)supervising 25 Masters students, 20 PhD students & 3 postdocs.
- 130 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>

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## Grants won (£4m)

### Cosmology

- £1.3m **ERC starting grant** ⇒ **UKRI frontier research**, *Resolving cosmological tensions with diverse data, novel theories and Bayesian machine learning*, Horizon Europe ERC STG 2021, invited for grant preparation, converted to UKRI frontier research guarantee  
Start date: October 2024 [willhandley.co.uk/ERC.pdf](http://willhandley.co.uk/ERC.pdf)
- £240k **Royal Society Enhancement**, *Next generation nested sampling for cosmological inference*
- £170k **Royal Society Enhancement**, *Likelihood-free inference and Bayesian neural networks*
- 52MCPUH **DiRAC Resource Allocation Committee 15<sup>th</sup> call 2023**,  
≡ £520k *New frontiers in particle cosmology*
- 30MCPUH **DiRAC Resource Allocation Committee 13<sup>th</sup> call 2021**,  
≡ £300k *Next generation cosmological analysis with nested sampling*
- £723k **Royal Society URF 2020**, *Bayesian machine learning and tensions in cosmology*
- 2MCPUH **DiRAC directors discretionary award 2020**,  
≡ £20k *Bayesian model comparison of inflation and spatial curvature*
- £15k **KICC Workshop 2023**, *GAMBIT at the KICC*
- £15k **KICC Workshop 2019**, *AstroHackWeek 2019*
- \$6k **George Southgate Visiting Fellowship 2020**, *GAMBIT visit*
- £2k **KICC visitors 2019**, *Likelihood free inference workshop*
- £2k **KICC visitors 2017**, *Class and MontePython workshop*

### PolyChord

- £100k **DASA GAN 2023**, *Optimal dynamic manoeuvring & adaptation of communications networks driven by the MIDAS information-advantage mathematical framework*, PCLtd
- £25k **DSTL CEME 2023**, *MIDAS: Maximum information data acquisition strategies*, PCLtd
- £100k **DSTL CEME 2022**, *Further optimisation of sensor location*, PCLtd & QML
- £60k **DSTL CEME 2021**, *Optimisation of sensor location*, PCLtd & QML
- £10k **DSTL CEME 2020**, *Optimising a search route for constrained network discovery*
- £50k **Amadeus Seed capital**, *PolyChord for protein folding*, PCLtd
- £225k **STFC IPS 2019**, *PolyChord and Bayesian sparse facial recognition*
- £42k **STFC IAA 2018**, *PolyChord and Bayesian neural network facial recognition*
- £25k **STFC IAA 2016**, *Interfacing PolyChord 2.0*

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## Awards & Prizes

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

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

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Previous students & postdocs

## PhD

Dec 2023	<b>Ian Roque</b> , <i>EXCALIBRATE: Calibration for astrophysical experimentation</i> co-supervised with Nima Razavi-Ghods
Jun 2023	<b>Harry Bevens</b> , <i>A Machine Learning-enhanced Toolbox for Bayesian 21-cm Data Analysis and Constraints on the Astrophysics of the Early Universe</i> co-supervised with Eloy de Lera Acedo and Anastasia Fialkov
Jul 2022	<b>Dominic Anstey</b> , <i>Data Analysis in Global 21cm Experiments: Physically Motivated Bayesian Modelling Techniques</i> co-supervised with Eloy de Lera Acedo
Sep 2021	<b>Fruzsina Agocs</b> , <i>Primordial evolution of cosmological perturbations: Theory and computation</i> co-supervised with Mike Hobson & Anthony Lasenby
Aug 2021	<b>Will Barker</b> , <i>Gauge Theories of Gravity</i> co-supervised with Mike Hobson & Anthony Lasenby
Dec 2020	<b>Lukas Hergt</b> , <i>Constraining the kinetically dominated Universe</i> co-supervised with Mike Hobson & Anthony Lasenby
Oct 2018	<b>Ed Higson</b> , <i>Bayesian Methods and machine Learning in Astrophysics</i> 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	<b>Danielle Dineen</b> , <i>Cosmological Matching Conditions for Primordial Perturbations</i>
Jan 2023	<b>Allahyar Sahibzada</b> , <i>Machine Learning and Nested Sampling: in the context of data intensive science and cosmology</i>
Nov 2022	<b>Sam Leeney</b> , <i>Data science in early universe Cosmology: a novel Bayesian RFI mitigation approach using numerical sampling techniques</i> co-supervised with Eloy de Lera Acedo
Aug 2020	<b>Emma Shen</b> , <i>Ionospheric Effects in the Global 21-cm Experiment</i> co-supervised with Eloy de Lera Acedo & Anastasia Fialkov
Aug 2019	<b>Ian Roque</b> , <i>Bayesian Techniques for the Calibration of 21 cm Global Experiments</i> co-supervised with Nima Razavi-Ghods
Aug 2018	<b>Panagiotis Mavrogiannis</b> , <i>Wheeler–Feynman absorber theory of radiation: Establishing the cosmological electrodynamic arrow of time</i> 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 | <i>MSci 24 lecture course</i>    |
| 2017-2021 | Bayesian Statistics                                     | <i>Graduate 2 lecture course</i> |

### 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

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

### 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	GAMBIT
2020–present	Leader of data analysis team	REACH
2021–present	Center for data-driven discovery (C2D3) steering committee	University of Cambridge
2022–present	KICC Scientific Strategy Committee	KICC
2022–present	KICC Visitor and Lecturer committee	KICC
2018–present	Science Research Fellowships committee	Gonville & Caius college
2018–present	Investments committee	Gonville & Caius college
2016–present	Undergraduate Admissions	Gonville & Caius college
2020–present	Wine Committee (WSET3)	Gonville & Caius college
2019–2022	Gonville & Caius College Council	Gonville & Caius college
2021–2023	CDT in data intensive science executive committee	University of Cambridge
2018–2020	Education and research committee	Gonville & Caius college
2017–2022	Organiser of weekly group seminars	Cavendish astrophysics group

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

## 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

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## Collaborations

2018–present	REACH	<a href="https://astro.phy.cam.ac.uk/research/research-projects/reach">astro.phy.cam.ac.uk/research/research-projects/reach</a>
2018–present	GAMBIT	<a href="https://gambit.hepforge.org">gambit.hepforge.org</a>
2018–2020	DarkMachines	<a href="https://darkmachines.org">darkmachines.org</a>
2017–2018	Terra Hunter Experiment	<a href="https://terra hunting.org">terra hunting.org</a>
2016–2017	CORE	<a href="https://core-mission.org">core-mission.org</a>
2015–2016	AMI	<a href="https://astro.phy.cam.ac.uk/research/research-projects/AMI">astro.phy.cam.ac.uk/research/research-projects/AMI</a>
2015–2019	Planck	<a href="https://cosmos.esa.int/web/planck">cosmos.esa.int/web/planck</a>

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## Software

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

PolyChord	Sole author and maintainer: <a href="https://github.com/PolyChord/PolyChordLite">github.com/PolyChord/PolyChordLite</a>
anesthetic	Principle author and maintainer: <a href="https://github.com/handley-lab/anesthetic">github.com/handley-lab/anesthetic</a>
lsbi	Principle author and maintainer: <a href="https://github.com/handley-lab/lsbi">github.com/handley-lab/lsbi</a>
unimpeded	Principle author and maintainer: <a href="https://github.com/handley-lab/unimpeded">github.com/handley-lab/unimpeded</a>
fgivenx	Sole author and maintainer: <a href="https://github.com/handley-lab/fgivenx">github.com/handley-lab/fgivenx</a>
pyBAMBI	Team maintainer: <a href="https://github.com/DarkMachines/pyBAMBI">github.com/DarkMachines/pyBAMBI</a>
MultiNest	Maintainer: <a href="https://github.com/farhanferoz/MultiNest">github.com/farhanferoz/MultiNest</a>
primordial	Sole author and maintainer: <a href="https://github.com/williamjameshandley/primordial">github.com/williamjameshandley/primordial</a>
ModeCode	Maintainer: <a href="https://modecode.org">modecode.org</a>
Open source	scipy: Weighted kernel density estimation in <code>scipy.stats.gaussian_kde</code> matplotlib: Vertical slider in <code>matplotlib.widgets.Slider</code>

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## Interaction with industry

PolyChord	Founded start-up company PolyChord Ltd. to bring Bayesian methods & tools from cosmology to Machine Learning & Biotech industries: <a href="https://polychord.co.uk">polychord.co.uk</a>
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

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## 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/](https://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](https://kicc.cam.ac.uk/aboutus/kicc-annual-reports)
- 2019 **KICC annual report**, *Compromise-free Bayesian cosmology & AstroHack week*

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## Computer skills

Programming	MPI parallelisation, C++, FORTRAN, Mathematica, Maple, Python
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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)

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## References

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Prof. Hiranya Peiris, +44 (0)203 5495831, h.peiris@ucl.ac.uk

Prof. Julien Lesgourgues, +49 241 80 25724, lesgourg@physik.rwth-aachen.de

- [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] T. Gessey-Jones, S. Pochinda, H. T. J. Bevins, A. Fialkov, **W. J. Handley**, E. de Lera Acedo, S. Singh, and R. Barkana. On the constraints on superconducting cosmic strings from 21-cm cosmology. *MNRAS*, 529(1):519–536, March 2024.
- [4] 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.
- [5] David Yallup and **Will Handley**. Hunting for bumps in the margins. *Journal of Instrumentation*, 18(5):P05014, May 2023.
- [6] 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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