

Will Handley

Summary

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.*

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 2024– **Associate Professor**, *Institute of Astronomy*, University of Cambridge
- Oct 2020– **Royal Society University Research Fellow**, *IoA*, University of Cambridge
Bayesian machine learning and tensions in cosmology (Cavendish Lab 2020–2024)
- May 2021– **Teaching Fellow**, *Gonville & Caius College*, University of Cambridge
- 2017– **Chief Technical Officer**, *PolyChord Ltd*, 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 (£4.3m)

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
- £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 15th call 2023**,
≡ £520k *New frontiers in particle cosmology*
- 30MCPUH **DiRAC Resource Allocation Committee 13th 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

- £260k **MSCA DTN 2023**, *GLITTER: Gnss-r sateLIITe earTh obsERvation*, PC Ltd et al
- £100k **DASA GAN 2023**, *Optimal dynamic manoeuvring & adaptation of communications networks driven by the MIDAS information-advantage mathematical framework*, PC Ltd
- £25k **DSTL CEME 2023**, *MIDAS: Maximum information data acquisition strategies*, PC Ltd
- £100k **DSTL CEME 2022**, *Further optimisation of sensor location*, PC Ltd & QML
- £60k **DSTL CEME 2021**, *Optimisation of sensor location*, PC Ltd & QML
- £10k **DSTL CEME 2020**, *Optimising a search route for constrained network discovery*
- £50k **Amadeus Seed capital**, *PolyChord for protein folding*, PC Ltd
- £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*

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	University of Cambridge
	Physics prize	Gonville & Caius College
Summer 2011	Undergraduate Research Bursary	Nuffield Foundation
	UROP Studentship	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	2020-present

Previous students & postdocs

PhD

Mar 2024	Thomas Gessey-Jones , <i>Probing the First Stars with the 21-cm Signal: Theory, Methods, and Forecasts</i> co-supervised with Eloy de Lera Acedo & Anastasia Fialkov
Dec 2023	Ian Roque , <i>EXCALIBRATE: Calibration for astrophysical experimentation</i> co-supervised with Nima Razavi-Ghods
Jun 2023	Harry Bevins , <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	Dominic Anstey , <i>Data Analysis in Global 21cm Experiments: Physically Motivated Bayesian Modelling Techniques</i> co-supervised with Eloy de Lera Acedo
Sep 2021	Fruzsina Agocs , <i>Primordial evolution of cosmological perturbations: Theory and computation</i> co-supervised with Mike Hobson & Anthony Lasenby
Aug 2021	Will Barker , <i>Gauge Theories of Gravity</i> co-supervised with Mike Hobson & Anthony Lasenby
Dec 2020	Lukas Hergt , <i>Constraining the kinetically dominated Universe</i> co-supervised with Mike Hobson & Anthony Lasenby
Oct 2018	Ed Higson , <i>Bayesian Methods and machine Learning in Astrophysics</i> co-supervised final year with Mike Hobson & Anthony Lasenby
Individual projects	Thomas McAloone (2020-21), Isidro Gómez Vargas (2020), Ayngaran Thavenesan (2021-22)

MPhil

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

MSci

2024	Nicolas Mediato Diaz, Samuel Hewson, Felicity Ibrahim, Patrick Lau, Tze Goh
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- 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

- 2024 Charlotte Priestley
- 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

- 2024 Thomas Gessey-Jones
- 2020 Jianghui Lui
- 2018-19 Kamran Javid

Lecturing

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|-----------|---|----------------------------------|
| 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
- 2022 **ICCS**, *Training Machine Learning models*, Cambridge, UK
github.com/handley-lab/2022-cambridge-iccs
- 2018 **CosmoTools**, *Introduction to Statistics*, Aachen, Germany
indico.cern.ch/e/CosmoTools2018
- 2017 **CosmoTools**, *Cosmological statistics & sampling*, IFT Madrid, Spain
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

† = remote

- Sep. 2024 **PolySwyft: a sequential simulation-based nested sampler**, *Global 21cm conference*, Raman Research Institute, Bangalore, India

- Sep. 2023 **lsbi: linear simulation based inference**, *PhyStat: Statistics meets ML*, Imperial college London, UK
- Aug. 2023 **Nested sampling: powering next-generation inference and machine learning tools for astrophysics, cosmology, particle physics and beyond**, *University of Sydney*, Sydney, Australia
- Aug. 2023 **Sampling methods for high energy physics & particle astrophysics**, *XVIth Quark Confinement and the Hadron Spectrum*, Cairns, Australia
- Aug. 2023 **Nested sampling: powering next-generation inference and machine learning tools for astrophysics, cosmology, particle physics and beyond**, *University of Queensland*, Brisbane, Australia
- Jul. 2023 **Nested sampling: powering next-generation inference and machine learning tools for astrophysics, cosmology, particle physics and beyond**, *RWTH*, Aachen, Germany
- Jul. 2023 **PolySwyft: a sequential simulation-based nested sampler**, *Cosmoverse*, Krakow, Poland
- Jul. 2023 **The scaling frontier of nested sampling**, *Maxent 2024*, Ghent, Belgium
- Jun. 2023 **Resonant or asymmetric: The status of sub-GeV dark matter** **Sub-GeV dark matter**, *Dark Matter in Astrophysical Laboratories*, Cambridge, UK
- May. 2023 **Next generation astrophysical inference across the interdisciplinary frontier**, *UCL job talk*, UCL, UK[†]
- May. 2023 **PolySwyft: a sequential simulation-based nested sampler**, *PHYSTAT SBI*, Munich, Germany
- May. 2023 **Next generation astrophysical inference across the interdisciplinary frontier**, *IoA job talk*, Cambridge, UK
- 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 **Nested sampling: powering the next-generation of Bayesian inference tools for cosmology, particle physics and beyond**, *Cavendish job talk*, Cambridge, UK
- 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[†]
- Nov. 2021 **Review on Statistical Tools and Samplers**, *TOOLS 2021*, IP2I, Lyon, France[†]
- 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[†]
- Feb. 2021 **Bayesian methods for quantifying global parameter tensions between cosmological datasets**, *Tehran meeting on cosmology at the crossroads*, Tehran, Iran[†]
- Jan. 2021 **Bayesian information fusion**, *Mathematical Challenges in the Electromagnetic Environment*, Isaac Newton Institute, Cambridge, UK[†]
- Oct. 2020 **Nested Sampling: an efficient and robust Bayesian inference tool for 21cm cosmology**, *3rd Global 21-cm Workshop*, Cambridge, UK[†]
- Sep. 2020 **Nested Sampling for optimising sensor location**, *Mathematical Challenges in the Electromagnetic Environment*, Isaac Newton Institute, Cambridge, UK[†]
- 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[†]
- Nov. 2018 **Nested Sampling: an efficient and robust Bayesian inference tool for cosmology and particle physics**, *Dark Machines*, Worldwide[†]
- 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>
2020–2024	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 & Caius college</i>
2018–present	Investments committee	<i>Gonville & Caius college</i>
2016–present	Undergraduate Admissions	<i>Gonville & Caius college</i>
2020–present	Wine Committee (WSET3)	<i>Gonville & Caius college</i>
2019–2022	Gonville & Caius College Council	<i>Gonville & 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 & Caius college</i>
2017–2022	Organiser of weekly group seminars	<i>Cavendish astrophysics group</i>

Examination

- 2024– **Senior Examiner**, *Astrophysics*, Part II
- 2024– **CATAM coordinator**, *Astrophysics*, Part II
- 2021–2023 **Exam setting**, *Relativistic Astrophysics and Cosmology*, Part III Physics
- 2020–2022 **Masters exam checking**, *Astrostatistics*, Part III Maths

PhD

- May 2024 **Stefan Heimersheim**, *Constraining reionization: Evidence from 21 cm limits and predictions for fast radio bursts*
- Dec 2023 **Lester Sandles**, *Star-forming Galaxies and Quenched Systems throughout Cosmic Time*
- Dec 2021 **Wu Hyun Sohn**, *High-resolution CMB bispectrum estimator*

MPhil

- Sep 2020 **Kyriakos Stylianiopoulos**, *Machine Learning Applied to Gaia and Other Survey Data: Applications Supporting a Polarisation Survey*

Organisation of scientific meetings

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| 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 rd Global 21-cm Workshop | KICC |
| 2019 | Local organising committee member of KICC 10 th 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

Collaborations

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|--------------|-------------------------|---|
| 2018–present | REACH | astro.phy.cam.ac.uk/research/research-projects/reach |
| 2018–present | GAMBIT | gambit.hepforge.org |
| 2018–2020 | DarkMachines | darkmachines.org |
| 2017–2018 | Terra Hunter Experiment | terrahunting.org |
| 2016–2017 | CORE | core-mission.org |
| 2015–2016 | AMI | astro.phy.cam.ac.uk/research/research-projects/AMI |
| 2015–2019 | Planck | cosmos.esa.int/web/planck |

Software

willhandley.co.uk/software

- PolyChord Sole author and maintainer: github.com/PolyChord/PolyChordLite

anesthetic Principle author and maintainer: github.com/handleylab/anesthetic
 lsbi Principle author and maintainer: github.com/handleylab/lsbi
 unimpeded Principle author and maintainer: github.com/handleylab/unimpeded
 fgivenx Sole author and maintainer: github.com/handleylab/fgivenx
 pyBAMBI Team maintainer: github.com/DarkMachines/pyBAMBI
 MultiNest Maintainer: github.com/farhanferoz/MultiNest
 primordial Sole author and maintainer: github.com/williamjameshandley/primordial
 ModeCode Maintainer: 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 2017–: Founded start-up company PolyChord Ltd. to bring Bayesian methods & tools from cosmology to Machine Learning & Biotech industries: polychord.co.uk
 CMAM 2017–2023: Consulted for finance spin-out on Bayesian algorithmic trading
 Shell 2016: Worked with department postdocs in the department applying nested sampling to geophysics
 AnyVision 2019–2020: Worked collaboratively as part of STFC grant to apply Bayesian sparse reconstruction to facial recognition

Interaction with Government

2020– DSTL: Consult for government defence research using Bayesian inference
 2024 Workshop participant in national security resilience in the future electromagnetic environment

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/
 2022 **KICC annual report**, *Bringing astrostatistics back to Earth*
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^AT_EX, TikZ, VMs, CI, LLMs (Claude, Gemini, GPT)
 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,
 Prof. Mike Hobson, +44 (0)1223 339992, mph@mrao.cam.ac.uk
 Prof. Ofer Lahav, +44 (0)203 5495813, o.lahav@ucl.ac.uk
 Prof. Alan Heavens, +44 (0)207 5942930, a.heavens@imperial.ac.uk

Prof. Hiranya Peiris, +44 (0)203 5495831, h.peiris@ucl.ac.uk
Prof. Julien Lesgourgues, +49 241 80 25724, lesgourg@physik.rwth-aachen.de
Prof. Ben Wandelt, wandelt@iap.fr

- [1] Margret Westerkamp, Jakob Roth, Philipp Frank, **Will Handley**, and Torsten Enßlin. Towards a Field Based Bayesian Evidence Inference from Nested Sampling Data. *arXiv*, 2408.09889, August 2024.
- [2] Anchal Saxena, P. Daniel Meerburg, Christoph Weniger, Eloy de Lera Acedo, and **Will Handley**. Simulation-Based Inference of the sky-averaged 21-cm signal from CD-EoR with REACH. *arXiv*, 2403.14618, March 2024.
- [3] Metha Prathaban and **Will Handley**. Costless correction of chain based nested sampling parameter estimation in gravitational wave data and beyond. *MNRAS*, 533(2):1839–1851, September 2024.
- [4] 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.
- [5] M. I. Letey, Z. Shumaylov, F. J. Agocs, **W. J. Handley**, M. P. Hobson, and A. N. Lasenby. Quantum initial conditions for curved inflating universes. *PRD*, 109(12):123502, June 2024.
- [6] Pablo Lemos, Nikolay Malkin, **Will Handley**, Yoshua Bengio, Yashar Hezaveh, and Laurence Perreault-Levasseur. Improving gradient-guided nested sampling for posterior inference. In Ruslan Salakhutdinov, Zico Kolter, Katherine Heller, Adrian Weller, Nuria Oliver, Jonathan Scarlett, and Felix Berkenkamp, editors, *Proceedings of the 41st International Conference on Machine Learning*, volume 235 of *Proceedings of Machine Learning Research*, pages 27230–27253. PMLR, 21–27 Jul 2024.
- [7] 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.
- [8] Zixiao Hu, Artem Baryshnikov, and **William Handley**. AEONS: approximating the end of nested sampling. *MNRAS*, 532(4):4035–4049, August 2024.
- [9] 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.
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