



UNIVERSITY OF
CAMBRIDGE



DiRAC



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August 29, 2024

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 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
- 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

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|-------------|----------------------------------------------------|-------------------------------------|
| 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

- 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	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 **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

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|------------|----------------------------------------------------------------------------------------------------------------------------|
| PolyChord | Sole author and maintainer: github.com/PolyChord/PolyChordLite |
| anesthetic | Principle author and maintainer: github.com/handley-lab/anesthetic |
| lsbi | Principle author and maintainer: github.com/handley-lab/lsbi |
| unimpeded | Principle author and maintainer: github.com/handley-lab/unimpeded |
| fgivenx | Sole author and maintainer: github.com/handley-lab/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 Founded start-up company PolyChord Ltd. to bring Bayesian methods & tools from cosmology to Machine Learning & Biotech industries: 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/
- 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
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] 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.
- [2] Metha Prathaban and **Will Handley**. Costless correction of chain based nested sampling parameter estimation in gravitational wave data and beyond. *MNRAS*, August 2024.
- [3] 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.
- [4] 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.
- [5] 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.
- [6] 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.
- [7] Zixiao Hu, Artem Baryshnikov, and **William Handley**. AEONS: approximating the end of nested sampling. *MNRAS*, 532(4):4035–4049, August 2024.
- [8] 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.
- [9] T. Gessey-Jones and **W. J. Handley**. Fully Bayesian forecasts with evidence networks. *PRD*, 109(12):123541, June 2024.
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