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November 21, 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 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 ≡ £520k **DiRAC Resource Allocation Committee 15th call 2023**, *New frontiers in particle cosmology*

30MCPUh ≡ £300k **DiRAC Resource Allocation Committee 13th call 2021**, *Next generation cosmological analysis with nested sampling*

£723k **Royal Society URF 2020**, *Bayesian machine learning and tensions in cosmology*

2MCPUh ≡ £20k **DiRAC directors discretionary award 2020**, *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 sateLlITe 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*

Current students & postdocs

handley-lab.co.uk/group

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**, *Probing the First Stars with the 21-cm Signal: Theory, Methods, and Forecasts*
co-supervised with Eloy de Lera Acedo & Anastasia Fialkov

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 McAloone (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

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

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

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

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

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 — *Tripos 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 † = 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

2024–present	CASU steering committee	*Institute of Astronomy*
2024–present	Teaching committee	*Institute of Astronomy*
2024–present	CPAC committee	*University of Cambridge*
2020–present	Convener of CosmoBit	*GAMBIT*
2020–2024	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

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

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 3rd Global 21-cm Workshop	*KICC*
2019	Local organising committee member of KICC 10th 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

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/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 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, LaTeX, Ti*k*Z, 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

Publications: arxiv.org/a/handley_w_1

ui.adsabs.harvard.edu/search/q=orcid%3A0000-0002-5866-0445

[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.

[10] T. Gessey-Jones and **W. J. Handley**. Fully Bayesian forecasts with evidence networks. *PRD*, 109(12):123541, June 2024.

[11] D. D. Dineen and **W. J. Handley**. Analytic approximations for the primordial power spectrum with Israel junction conditions. *PRD*, 109(8):083513, April 2024.

[12] Wei-Ning Deng and **Will Handley**. Predicting spatial curvature Ω_K in globally CPT-symmetric universes. *arXiv*, 2407.18225, July 2024.

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