



UNIVERSITY OF
CAMBRIDGE



DiRAC



Gonville & Caius College
Cambridge, UK, CB2 1TA
☎ +44 (0) 7718 622713
✉ wh260@cam.ac.uk
🌐 www.willhandley.co.uk

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.

- Internationally recognised research programme which has been awarded over **£3.8m** over the past 4 years.
- Interdisciplinary research with technology transfer to industry, government & start-ups.
- 2 years experience lecturing fourth year Cambridge General Relativity & Bayesian inference courses.
- 6 years experience (co-)supervising 17 PhD students & 3 postdocs.
- 128 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
- 2021–2023 **Turing Fellow**, *Alan Turing Institute*
- 2016–2020 **Research fellow**, *Gonville & Caius College*, University of Cambridge
Funded by Gonville & Caius College and an STFC IPS grant.
- Jul-Sep 2016 **Postdoctoral researcher**, *Prof. H. Peiris*, University College London
Searching for features in the primordial power spectrum.
- 2012–2016 **PhD Astrophysics**, *Prof. A. Lasenby & Prof. M. Hobson*, University of Cambridge
Kinetic initial conditions for inflation: Theory, observations & methods.
- 2011–2012 **Part III Dissertation**, *Prof. P. Alexander*, University of Cambridge
Investigating the origins of cosmic magnetism.
- Summer 2011 **Summer Research Student**, *Prof. M. Faulkes & Dr. J. Spencer*, Imperial College
Folded spectrum full configuration interaction quantum Monte Carlo.
- Summer 2011 **Summer Research Student**, *Dr. R. Blumenfeld*, University of Cambridge
Geometry and field equations of granular systems.
- 2010–2011 **Research Review**, *Prof. S. Gull*, University of Cambridge
Literature Survey of the Physics-Philosophy crossover field of measurement theory.
- Summer 2010 **iGEM Team Physicist**, *Dr. J. Haseloff*, University of Cambridge
E-glowli 2010 iGEM team (placed in final 6) <http://2010.igem.org/Team:Cambridge>

Grants won (£3.8m)

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

Awards & Prizes

Jul. 2022	Pacific Institute of Theoretical Physics visitor	<i>University of British Columbia</i>
Feb. 2020	George Southgate visiting Fellow	<i>University of Adelaide</i>
Jul. 2019	Guiseppe and Vanna Cocconi Prize (WMAP and Planck)	<i>EPS-HEPP Division</i>
Jun. 2018	Gruber Prize (Planck)	<i>Gruber Foundation</i>
Dec. 2013	Best presentation	<i>Cavendish grad. students conference</i>
Jun. 2012	Best theoretical part III project	<i>University of Cambridge</i>
	Physics prize	<i>Gonville & Caius College</i>
Summer 2011	Undergraduate Research Bursary	<i>Nuffield Foundation</i>
	UROP Studentship	<i>Imperial College</i>
Summer 2010	iGEM Studentship	<i>Wellcome Trust</i>
2009–12	Junior and Senior Scholarships	<i>Gonville & Caius College</i>

Current students & postdocs

willhandley.co.uk/students

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

Previous students & postdocs

PhD

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

MPhil

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

MSci

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

Summer students

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

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

Postdocs

- 2020 Jianghui Lui
 2018-19 Kamran Javid

Lecturing

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

Workshops

- 2023 **Monte Carlo Methods**, *For Cosmology and Particle Physics*, UNAM, Mexico
github.com/handley-lab/workshop-monte-carlo-methods
 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 *Tripes classes (20 hours), Supervising (580 hours)*
 2015-2016 Part IA Physics *Supervising (20 hours)*
 2013 Part II Theoretical Physics 1 & 2 *Demonstrating (8 hours)*
 2006–2012 Maths and Science Tuition *Individual coaching, key stage 1 – STEP*

Academic Talks

willhandley.co.uk/talks

† = remote

- 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[†]
- 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	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
Dec 2021 **High-resolution CMB bispectrum estimator**, *Wu Hyun Sohn*, PhD
Sep 2020 **Machine Learning Applied to Gaia and Other Survey Data: Applications Supporting a Polarisation Survey**, *Kyriakos Stylianiopoulos*, MPhil

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

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

Publications:

arxiv.org/a/handley_w_1

First Author Publications

- [1] **Will Handley** and Pablo Lemos. Quantifying the global parameter tensions between ACT, SPT, and Planck. *PRD*, 103(6):063529, March 2021.
- [2] **Will Handley**. Curvature tension: Evidence for a closed universe. *PRD*, 103(4):L041301, February 2021.
- [3] **Will Handley**. Primordial power spectra for curved inflating universes. *PRD*, 100(12):123517, July 2019.
- [4] **Will Handley** and Pablo Lemos. Quantifying tensions in cosmological parameters: Interpreting the DES evidence ratio. *PRD*, 100(4):043504, August 2019.
- [5] **Will Handley** and Pablo Lemos. Quantifying dimensionality: Bayesian cosmological model complexities. *PRD*, 100(2):023512, July 2019.

- [6] **Will Handley**, Anthony Lasenby, and Mike Hobson. Logolinear series expansions with applications to primordial cosmology. *PRD*, 99(12):123512, June 2019.
- [7] **Will Handley**. anesthetic: nested sampling visualisation. *JOSS*, 4:1414, May 2019.
- [8] **Will Handley** and Marius Millea. Maximum-Entropy Priors with Derived Parameters in a Specified Distribution. *Entropy*, 21(3):272, March 2019.
- [9] **Will J. Handley**, Anthony N. Lasenby, Hiranya V. Peiris, and Michael P. Hobson. Bayesian inflationary reconstructions from Planck 2018 data. *PRD*, 100(10):103511, November 2019.
- [10] **Will Handley**. fgivenx: A Python package for functional posterior plotting. *JOSS*, 3(28):849, August 2018.
- [11] **W. J. Handley**, A. N. Lasenby, and M. P. Hobson. Novel quantum initial conditions for inflation. *PRD*, 94(2):024041, July 2016.
- [12] **W. J. Handley**, A. N. Lasenby, and M. P. Hobson. The Runge-Kutta-Wentzel-Kramers-Brillouin Method. *arXiv*, 1612.02288, December 2016.
- [13] **W. J. Handley**, M. P. Hobson, and A. N. Lasenby. POLYCHORD: next-generation nested sampling. *MNRAS*, 453(4):4384–4398, November 2015.
- [14] **W. J. Handley**, M. P. Hobson, and A. N. Lasenby. polychord: nested sampling for cosmology. *MNRAS*, 450:L61–L65, June 2015.
- [15] **W. J. Handley**, S. D. Brechet, A. N. Lasenby, and M. P. Hobson. Kinetic initial conditions for inflation. *PRD*, 89(6):063505, March 2014.

Other publications

- [16] H. T. J. Bevins, A. Fialkov, E. de Lera Acedo, **W. J. Handley**, S. Singh, R. Subrahmanyam, and R. Barkana. Astrophysical constraints from the SARAS 3 non-detection of the cosmic dawn sky-averaged 21-cm signal. *Nature Astronomy*, 6:1473–1483, December 2022.
- [17] Greg Ashton, Noam Bernstein, Johannes Buchner, Xi Chen, Gábor Csányi, Andrew Fowlie, Farhan Feroz, Matthew Griffiths, **Will Handley**, Michael Habeck, Edward Higson, Michael Hobson, Anthony Lasenby, David Parkinson, Livia B. Pártay, Matthew Pitkin, Doris Schneider, Joshua S. Speagle, Leah South, John Veitch, Philipp Wacker, David J. Wales, and David Yallup. Nested sampling for physical scientists. *Nature Reviews Methods Primers*, 2:39, May 2022.
- [18] REACH collaboration. The REACH radiometer for detecting the 21-cm hydrogen signal from redshift $z \approx 7.5$ –28. *Nature Astronomy*, 6:984–998, July 2022.
- [19] Andrew Fowlie, Sebastian Hoof, and **Will Handley**. Nested Sampling for Frequentist Computation: Fast Estimation of Small p -Values. *PRL*, 128(2):021801, January 2022.
- [20] Gong-Bo Zhao, Marco Raveri, Levon Pogosian, Yuting Wang, Robert G. Crittenden, **Will J. Handley**, and et al. Dynamical dark energy in light of the latest observations. *Nature Astronomy*, 1:627–632, August 2017.
- [21] T. Gessey-Jones and **W. J. Handley**. Fully Bayesian Forecasts with Evidence Networks. *arXiv*, 2309.06942, September 2023.
- [22] Harry Bevins and **Will Handley**. Piecewise Normalizing Flows. *arXiv*, 2305.02930, May 2023.
- [23] David Yallup, **Will Handley**, Mike Hobson, Anthony Lasenby, and Pablo Lemos. Split personalities in Bayesian Neural Networks: the case for full marginalisation. *arXiv*, 2205.11151, May 2022.
- [24] David Yallup, Timo Janßen, Steffen Schumann, and **Will Handley**. Exploring phase space with nested sampling. *European Physical Journal C*, 82(8):678, August 2022.
- [25] David Yallup and **Will Handley**. Hunting for bumps in the margins. *Journal of Instrumentation*, 18(5):P05014, May 2023.
- [26] Aleksandr Petrosyan and **William James Handley**. SuperNest: accelerated nested sampling applied to astrophysics and cosmology. *arXiv*, 2212.01760, December 2022.
- [27] A. N. Lasenby, **W. J. Handley**, D. J. Bartlett, and C. S. Negreanu. Perturbations and the future conformal boundary. *PRD*, 105(8):083514, April 2022.
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