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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.
- 118 papers, (3 NatAstro and 1 PRL within last year)
- PhD begun in 2012

Education

2012–2016 **University of Cambridge**, *Ph.D. 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

Oct 2020– **Royal Society University Research Fellow**, *Cavendish Lab*, University of Cambridge
Bayesian machine learning and tensions in cosmology

Oct 2021– **Turing Fellow**, *Alan Turing Institute*

May 2021– **Fellow & College Lecturer**, *Gonville & Caius College*, University of Cambridge

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 **Ph.D. 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**, *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 2023 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*

£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*

£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*

£1.8k **Caius + Kavli**, *Summer 2019 student funding*

£1.5k **King's + Kavli**, *Summer 2018 student funding*

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*
Jun. 2018	Gruber Prize (Planck)	*Gruber Foundation*
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*

Students & postdocs willhandley.co.uk/students

Postdoc	David Yallup	*2021-present*
	Jianghui Lui	*2020*
	Kamran Javid	*2018-19*
Ph.D.	Metha Prathaban, Wei-Ning Deng, Sinah Legner	*2021-present*
	Adam Ormondroyd	*2021-present*
	George Carter, Kilian Scheutwinkel, Thomas Gessey-Jones	*2020-present*
	Thomas McAloone	*2020-21*

	Ayngaran Thavanesan	*2021-2022*
	Isidro Gómez Vargas	*2020*
	Ian Roque, Harry Bevins	*2019-present*
	Dominic Anstey	*2018-2022*
	Fruzsina Agocs, Will Barker	*2017-21*
	Lukas Hergt	*2017-20*
	Ed Higson	*2016-17*
Masters	Danielle Dineen, Sam Leeney, Zixiao Hu, Cole Meldorf, Sankalan Bhattacharyyan	*2022-*
	Allahyar Sahibzada, Yoann Launay, Oliver Normand, Xy Wang, Carola Zanoletti	*2021-22*
	Yi Jer Loh, Metha Prathaban	*2020-21*
	Thomas Gessey-Jones, Aleks Petrosyan, Ayngaran Thavanesan, Emma Shen	*2019-20*
	Deaglan Bartlet, Jamie Bamber, Ian Roque	*2018-19*
	Ward Haddadin, Jessica Rigley, Panagiotis Mavrogiannis	*2017-18*
	Fruzsina Agocs, Robert Knighton, Stephen Pickman, Daniel Manela	*2016-17*
Summer	Mary Letey, Beichen Xu, Artyom Baryshnikov	*2022*
	Zak Shumaylov, Mattia Varrone	*2021*
	Denis Werth, Maxime Jabarian, Liam Lau	*2019*
	Elizabeth Guest, Ward Haddadin, Shu-Fan Chen	*2018*

Lecturing

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

Workshops

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)*
2013–2018, 2021-present	Part II Physics: General relativity	*Supervising (136 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 github.com/williamjameshandley/talks † = remote

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*
2021–present	CDT in data intensive science executive committee	*University of Cambridge*
2022–present	KICC Scientific Strategy Committee	*KICC*
2022–present	KICC Visitor and Lecturer committee	*KICC*
2019–2022	Gonville & Caius College Council	*Gonville & Caius college*
2018–present	Science Research Fellowships committee	*Gonville & Caius college*
2018–present	Investments committee	*Gonville & Caius college*
2016–present	Undergraduate Admissions	*Gonville & Caius college*
2018–2020	Education and research committee	*Gonville & Caius college*
2020–present	Wine 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*, Ph.D.

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

Organisation of scientific meetings

2023	GAMBIT at the KICC	*KICC*
2023	Nested Sampling (currently organising)	*Munich*
2020	Scientific organising committee member of 3rd Global 21-cm Workshop	*KICC*
2019	Local organising committee member of KICC 10th anniversary symposium	*KICC*
2019	Secured funding for Likelihood free inference workshop	*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 72 reviews for journals including Physical Review D and Physical Review Letters;
`https://www.webofscience.com/wos/author/record/S-9134-2018`
PRD (32), MNRAS (7), JCAP (8), PRL (6), JOSS (2), APJ (2), EPJC (1), PLB (6), RASTI (1) Entropy (3), 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

PolyChord	Sole author and maintainer: github.com/PolyChord/PolyChordLite
anesthetic	Principle author and maintainer: github.com/williamjameshandley/anesthetic
fgivenx	Sole author and maintainer: github.com/williamjameshandley/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/

2019 **KICC annual report**, *Compromise-free Bayesian cosmology & AstroHack week*
kicc.cam.ac.uk/aboutus/kicc-annual-report-2019

Computer skills

Programming	MPI parallelisation, C++, FORTRAN, Mathematica, Maple, Python
Computing	Unix, Bash, zsh, vim, git, svn, LaTeX, Ti*k*Z, 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. Subrahmanyan, 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] Harry Bevins and **Will Handley**. Piecewise Normalizing Flows. *arXiv*, 2305.02930, May 2023.
[22] 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.
[23] David Yallup, Timo Janßen, Steffen Schumann, and **Will Handley**. Exploring phase space with nested sampling. *European Physical Journal C*, 82(8):678, August 2022.
[24] David Yallup and **Will Handley**. Hunting for bumps in the margins. *Journal of Instrumentation*, 18(5):P05014, May 2023.
[25] Aleksandr Petrosyan and **William James Handley**. SuperNest: accelerated nested sampling applied to astrophysics and cosmology. *arXiv*, 2212.01760, December 2022.
[26] 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.
[27] D. J. Bartlett, **W. J. Handley**, and A. N. Lasenby. Improved cosmological fits with quantized primordial power spectra. *PRD*, 105(8):083515, April 2022.
[28] Metha Prathaban and **Will Handley**. Rescuing palindromic universes with improved recombination modeling. *PRD*, 105(12):123508, June 2022.
[29] Mary I. Letey, Zakhar Shumaylov, Fruzsina J. Agocs, **Will J. Handley**, Michael P. Hobson, and Anthony N. Lasenby. Quantum Initial Conditions for Curved Inflating Universes. *arXiv*, 2211.17248, November 2022.
[30] F. J. Agocs, M. P. Hobson, **W. J. Handley**, and A. N. Lasenby. Dense output for highly oscillatory numerical solutions. *arXiv*, 2007.05013, July 2020.
[31] F. J. Agocs, **W. J. Handley**, A. N. Lasenby, and M. P. Hobson. Efficient method for solving highly oscillatory ordinary differential equations with applications to physical systems. *Physical Review Research*, 2(1):013030, January 2020.
[32] F. J. Agocs, L. T. Hergt, **W. J. Handley**, A. N. Lasenby, and M. P. Hobson. Quantum initial conditions for inflation and canonical invariance. *PRD*, 102(2):023507, July 2020.
[33] L. T. Hergt, F. J. Agocs, **W. J. Handley**, M. P. Hobson, and A. N. Lasenby. Finite inflation in curved space. *PRD*, 106(6):063529, September 2022.
[34] L. T. Hergt, **W. J. Handley**, M. P. Hobson, and A. N. Lasenby. Bayesian evidence for the tensor-to-scalar ratio r and neutrino masses m_ν : Effects of uniform versus logarithmic priors. *PRD*, 103(12):123511, June 2021.
[35] L. T. Hergt, **W. J. Handley**, M. P. Hobson, and A. N. Lasenby. Case for kinetically dominated initial conditions for inflation. *PRD*, 100(2):023502, July 2019.
[36] L. T. Hergt, **W. J. Handley**, M. P. Hobson, and A. N. Lasenby. Constraining the kinetically dominated universe. *PRD*, 100(2):023501, July 2019.
[37] Ayngaran Thavanesan, Denis Werth, and **Will Handley**. Analytical approximations for curved primordial power spectra. *PRD*, 103(2):023519, January 2021.
[38] Zakhar Shumaylov and **Will Handley**. Primordial power spectra from k -inflation with curvature. *PRD*, 105(12):123532, June 2022.
[39] T. Gessey-Jones and **W. J. Handley**. Constraining quantum initial conditions before inflation. *PRD*, 104(6):063532, September 2021.
[40] Jamie Bamber and **Will Handley**. Beyond the Runge-Kutta-Wentzel-Kramers-Brillouin method. *PRD*, 101(4):043517, February 2020.

[41] W. I. J. Haddadin and **W. J. Handley**. Rapid numerical solutions for the Mukhanov-Sasaki equation. *PRD*, 103(12):123513, June 2021.
[42] W. E. V. Barker, A. N. Lasenby, M. P. Hobson, and **W. J. Handley**. Nonlinear Hamiltonian analysis of new quadratic torsion theories: Cases with curvature-free constraints. *PRD*, 104(8):084036, October 2021.
[43] W. E. V. Barker, A. N. Lasenby, M. P. Hobson, and **W. J. Handley**. Systematic study of background cosmology in unitary Poincaré gauge theories with application to emergent dark radiation and H_0 tension. *PRD*, 102(2):024048, July 2020.
[44] W. E. V. Barker, A. N. Lasenby, M. P. Hobson, and **W. J. Handley**. Mapping Poincaré gauge cosmology to Horndeski theory for emergent dark energy. *PRD*, 102(8):084002, October 2020.
[45] W. E. V. Barker, A. N. Lasenby, M. P. Hobson, and **W. J. Handley**. Static energetics in gravity. *JMAP*, 60(5):052504, May 2019.
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