

Gonville & Caius College
Cambridge, UK, CB2 1TA
☎ +44 (0) 7718 622713
☎ +44 (0) 1223 767893
✉ wh260@cam.ac.uk

📄 www.kicc.cam.ac.uk/directory/wh260
orcid.org/0000-0002-5866-0445

Will Handley

Education

- 2012–2016 **University of Cambridge**, *PhD: Astrophysics*, Prof. A. Lasenby & Prof. M. Hobson.
2008–2012 **University of Cambridge**, *Msc, MA: Natural Sciences*, Gonville & Caius College.
2001–2008 **Alleyn's School**, *A levels, GCSEs*, London.

Research Experience

- 2016–present **Junior Research fellow**, *Gonville & Caius College*, University of Cambridge.
Jul-Sep 2016 **Postdoctoral position**, *Prof. H. Peiris*, University College London.
Searching for features in the primordial power spectrum.
Apr-Jul 2016 **Research Associate**, University of Cambridge.
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>

Awards & Prizes

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|-------------|--------------------------------------|-------------------------------------|
| Jun. 2018 | Gruber Prize (co-shared with 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 |

Teaching

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|--------------|-------------------------------------|-----------------------------|
| 2017–present | Bayesian Statistics | Graduate lecture course |
| 2013–2018 | Part II Physics: General relativity | Supervising |
| 2012–2017 | Part IA Mathematics for NatSci | Supervising, Tripos classes |

2013 Part II Theoretical Physics 1 & 2
2006–2012 Maths and Science Tuition

*Demonstrating
Individual coaching, key stage 1 — STEP*

Grants won

£25,000 **STFC IAA 2016**, *Interfacing PolyChord 2.0*.
£2,000 **KICC visitors 2017**, *Class and MontePython workshop*.
£42,000 **STFC IAA 2018**, *PolyChord and Bayesian Neural network recognition*.
£1,500 **King's + Kavli**, *Summer student funding*.
£15,000 **KICC Workshop 2019**, *AstroHack week 2019*.

Supervision of graduate students and postdoctoral fellows

Post-Doc	Kamran Javid	2018–present
PhD	Ed Higson, Lukas Hergt, Fruzsina Agocs, Will Barker	2016–present
Masters	Deaglan Bartlet, Jamie Bamber	2018–present
	Ward Haddadin, Jessica Rigley, Panagiotis Mavrogiannis	2017–2018
	Fruzsina Agocs, Robert Knighton, Stephen Pickman, Daniel Manela	2016–2017
Summer	Elizabeth Guest, Ward Haddadin, Shu-Fan Chen	2018

Academic Talks

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**, CCA, 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**, Max Planck Institute, 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.
Jan. 2014 **The first 3 yocto-pico seconds**, *Three minute wonder*, Cavendish Laboratory.

Institutional responsibilities

2017–present	Organiser of internal weekly group seminars	<i>Cavendish astrophysics group</i>
2018–present	Education and research committee	<i>Gonville & Caius college</i>
2018–present	Investments committee	<i>Gonville & Caius college</i>
2016–present	Undergraduate Admissions	<i>Gonville & Caius college</i>

Organisation of scientific meetings

2018	Secured funding for and organised CLASS+MontePython software workshop	<i>KICC</i>
2019	Secured funding for AstroHack week 2019	<i>KICC</i>

Software

PolyChord	Sole author and maintainer: ccpforge.cse.rl.ac.uk/gf/project/polychord
fgivenx	Sole author and maintainer: github.com/williamjameshandley/fgivenx
ModeCode	Maintainer: modecode.org
MultiNest	Maintainer: ccpforge.cse.rl.ac.uk/gf/project/multinest/
Open source	scipy: Weighted kernel density estimation in <code>scipy.stats.gaussian_kde</code> matplotlib: Vertical slider in <code>matplotlib.widgets.Slider</code>

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
Tesco	Consultancy work applying Bayesian inference to supply-chain management
CMAM	Consult for local finance company on Bayesian algorithmic trading

Computer skills

Programming	MPI parallelisation, C++, FORTRAN, Mathematica, Maple, Python
Computing	Unix, Bash, zsh, vim, git, svn, L ^A T _E X, TikZ, VMs
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. Hiranya Peiris, +44 (0)203 5495831, h.peiris@ucl.ac.uk

Publications

- [1] W. Handley, M. Hobson, and A. Lasenby, MNRAS **453**, 4384 (2015), [arXiv:1506.00171](https://arxiv.org/abs/1506.00171) .
- [2] W. Handley, M. Hobson, and A. Lasenby, MNRAS **450**, L61 (2015), [arXiv:1502.01856](https://arxiv.org/abs/1502.01856) .
- [3] W. J. Handley, M. P. Hobson, and A. N. Lasenby, ASCL (2015), [ascl:1502.011](https://arxiv.org/abs/1502.011) .
- [4] W. Handley, S. Brechet, A. Lasenby, and M. Hobson, PRD **89**, 063505 (2014), [arXiv:1401.2253](https://arxiv.org/abs/1401.2253) .
- [5] W. Handley, A. Lasenby, and M. Hobson, arXiv (2016), [arXiv:1612.02288](https://arxiv.org/abs/1612.02288) .
- [6] W. Handley, A. Lasenby, and M. Hobson, PRD **94**, 024041 (2016), [arXiv:1607.04148](https://arxiv.org/abs/1607.04148) .
- [7] W. Handley and M. Millea, ArXiv e-prints , [arXiv:1804.08143](https://arxiv.org/abs/1804.08143) (2018), [arXiv:1804.08143](https://arxiv.org/abs/1804.08143) .
- [8] W. Handley, The Journal of Open Source Software **3** (2018), [10.21105/joss.00849](https://doi.org/10.21105/joss.00849).
- [9] R. D. Hall, S. J. Thompson, W. Handley, and D. Quelo, MNRAS **479**, 2968 (2018).
- [10] W. I. J. Haddadin and W. J. Handley, ArXiv e-prints (2018), [1809.11095](https://arxiv.org/abs/1809.11095) .
- [11] L. T. Hergt, W. J. Handley, M. P. Hobson, and A. N. Lasenby, ArXiv e-prints (2018), [1809.07737](https://arxiv.org/abs/1809.07737) .
- [12] L. T. Hergt, W. J. Handley, M. P. Hobson, and A. N. Lasenby, ArXiv e-prints (2018), [1809.07185](https://arxiv.org/abs/1809.07185) .

- [13] E. Higson, W. Handley, M. Hobson, and A. Lasenby, ArXiv e-prints (2018), 1809.04598 .
- [14] A. J. K. Chua, S. Hee, W. J. Handley, E. Higson, C. J. Moore, J. R. Gair, M. P. Hobson, and A. N. Lasenby, MNRAS **478**, 28 (2018).
- [15] E. Higson, W. Handley, M. Hobson, and A. Lasenby, ArXiv e-prints (2018), 1804.06406 .
- [16] G.-B. Zhao, M. Raveri, L. Pogosian, Y. Wang, R. G. Crittenden, W. J. Handley, and et al., Nature Astronomy **1**, 627 (2017).
- [17] S. Hee, J. A. Vázquez, W. J. Handley, M. P. Hobson, and A. N. Lasenby, MNRAS **466**, 369 (2017).
- [18] E. Higson, W. Handley, M. Hobson, and A. Lasenby, ArXiv e-prints (2017), 1704.03459 .
- [19] E. Higson, W. Handley, M. Hobson, and A. Lasenby, ArXiv e-prints (2017), 1703.09701 .
- [20] C. Rumsey, M. Olamaie, Y. C. Perrott, H. R. Russell, F. Feroz, K. J. B. Grainge, W. J. Handley, M. P. Hobson, R. D. E. Saunders, and M. P. Schammel, MNRAS **460**, 569 (2016).
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- [26] CORE collaboration, Journal of Cosmology and Astro-Particle Physics **2018**, 019 (2018).
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- [42] Planck Collaboration, ArXiv e-prints (2018), 1801.04945 .
- [43] Planck Collaboration, A&A **594**, A20 (2016).
- [44] Planck Collaboration, A&A **594**, A1 (2016).