

# ALEXANDER C. JENKINS

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## ABOUT ME

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I'm a theoretical physicist, working at the interface between *cosmology*, *astrophysics*, *high-energy physics*, and *quantum matter*. My research looks at new ways of probing the fundamental laws of Nature, whether that's using *gravitational waves* as powerful new astronomical messengers, or using cutting-edge *quantum technologies* to simulate the early Universe.

## EMPLOYMENT

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**Postdoctoral Research Fellow** — *University College London* 2021–2024

Leading an international, interdisciplinary project to study false vacuum decay with quantum analogue experiments and numerical lattice simulations, as part of the [QSimFP Consortium](#)

Collaborating with Profs [Hiranya Peiris](#) and [Andrew Pontzen](#) | Member of the [Cosmoparticle Initiative](#)

## EDUCATION

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**PhD in Theoretical Physics** — *King's College London* 2017–2021

Funded by competitive faculty scholarship | [Theoretical Particle Physics and Cosmology Group](#)

Thesis: '*Cosmology and fundamental physics in the era of gravitational-wave astronomy*'

Nominated for four thesis prizes | Honorable Mention in the [GWIC-Braccini Thesis Prize](#) competition

Supervised by Prof [Mairi Sakellariadou](#) | Examined by Profs [Stephen Fairhurst](#) and [David Wands](#)

**MSci in Astrophysics (Part III)** — *University of Cambridge* 2016–2017

1st class | Ranked 5th in cohort | Elected a Bateman Scholar of Trinity Hall for 'excellent' exam results

Research project: '*Understanding the outcomes of planet-planet scattering*' (Distinction)

Supervised by Dr [Roman Rafikov](#)

**Leonid Grishchuk Internship Program** — *Cardiff University* Summer 2016

Competitive, funded summer research internship in the [Gravitational Physics Group](#)

Project: '*Constraining the scalar polarisation content of gravitational waves*'

Supervised by Prof [Patrick Sutton](#) and Dr Francesco Pannarale

**MA in Natural Sciences (Astrophysics)** — *University of Cambridge* 2013–2016

1st class | Elected a Scholar of Trinity Hall

## AWARDS AND ACHIEVEMENTS

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- Winner, [Buchalter Cosmology Prize](#) (2nd Prize) | [UCL press release](#) 2023  
International award recognising '*ground-breaking theoretical, observational, or experimental work in cosmology that has the potential to produce a breakthrough advance in our understanding*'
- Honorable Mention in the [GWIC-Braccini Thesis Prize](#) competition 2022
- Best Student Talk Prize at [BritGrav 21](#), sponsored by IoP Publishing 2021  
Corresponding paper published in *Classical and Quantum Gravity* as an invited submission
- [King's Education Award](#) for 'extraordinary contributions' to teaching 2020
- 'Rising Star' nominee, King's Education Awards (only PhD student nominee in Physics) 2019
- Bateman Scholar of Trinity Hall (Cambridge), recognising 'excellent' exam results 2017

## GRANTS AND FELLOWSHIPS SECURED (POST-PHD)

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- Gavin Boyle Fellowship, Kavli Institute for Cosmology Cambridge 2024  
5-year independent research fellowship, to commence Oct 2024
- UKRI Quantum Technologies for Fundamental Physics Additional Research Grant 2023  
Successful proposal for 6-month extension to my research within QSimFP (£68,800)
- UCL Astro Group Small Grant | Secured first dedicated funding for seminar series (£1,000) 2022

## RESPONSIBILITIES

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- Lead organiser, UCL Cosmology/Extragalactic Seminars 2022–2023  
Developed an ambitious program of in-person talks with speakers from across the UK and abroad, from what had previously been an online-only event due to COVID-19; secured and managed small grant (£1,000) for speaker expenses and group lunches to encourage student participation
- Co-organiser, [London Cosmology Discussion Meetings \(LCDM\)](#) 2018–2021  
Coordinated between five institutions to organise meetings at the Royal Astronomical Society on ‘Dark Matter in Cosmology’, ‘Neutrinos in Cosmology’, and ‘Cosmological Probes of New Physics’
- Organiser, Theoretical Particle Physics and Cosmology (TPPC) Journal Club 2021
- Organiser, TPPC Gravity Meetings 2018–2020  
Initiated a regular series of meetings with internal and external speakers on gravitational physics
- Expert referee for one UKRI Stephen Hawking Fellowship, 2019–present  
one NSF Research Grant, and one ERC Consolidator Grant
- Referee for 22 articles in *Physical Review Letters (PRL)*, *Nature Astronomy*, 2020–present  
*Physical Review D (PRD)*, *Journal of Cosmology and Astroparticle Physics (JCAP)*,  
*European Physical Journal C (EPJC)*, *The Astronomical Journal*, and *Universe*
- Student representative, KCL Physics Department Research Committee 2019–2021

## AFFILIATIONS

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### Scientific collaborations

- Quantum Simulators for Fundamental Physics (QSimFP) Consortium 2021–present
- LISA Consortium 2018–present
- Einstein Telescope (ET) Observational Science Board 2021–present
- LIGO Scientific Collaboration 2016–2021

### Professional bodies

- Member, Institute of Physics (MInstP) 2018–present
- Fellow, Royal Astronomical Society (FRAS) 2020–present
- Junior Member, European Astronomical Society 2020–present

## SELECTED PUBLICATIONS

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Citation statistics as of 17 May 2024 (data from [INSPIRE-HEP](#)):

<b>Lead-author only</b>	16 papers, 536 citations, $h$ -index = 10
<b>Non-LIGO only</b>	28 papers, 1,904 citations, $h$ -index = 18
<b>All publications</b>	103 papers, 27,235 citations, $h$ -index = 59

**Lead-author papers** (author list is ordered alphabetically in some cases)

- L1. **ACJ**, I. G. Moss, T. P. Billam, Z. Hadzibabic, H. V. Peiris, and A. Pontzen, *Generalized cold-atom analogues for vacuum decay* (2023), submitted to PRL, arXiv:2311.02156 [cond-mat.quant-gas]
- L2. **ACJ**, J. Braden, H. V. Peiris, A. Pontzen, M. C. Johnson, and S. Weinfurtner, *Analog vacuum decay from vacuum initial conditions* (2023), Phys. Rev. D **109**, 023506, arXiv:2307.02549 [cond-mat.quant-gas] | [Editor's Suggestion](#)
- L3. A. K.-W. Chung, **ACJ**, J. D. Romano, and M. Sakellariadou, *Targeted search for the kinematic dipole of the gravitational-wave background* (2022), Phys. Rev. D **106**, 082005, arXiv:2208.01330 [gr-qc]
- L4. M. R. Mosbech, **ACJ**, S. Bose, C. Boehm, M. Sakellariadou, and Y. Y. Y. Wong, *Gravitational-wave event rates as a new probe for dark matter microphysics* (2023), Phys. Rev. D **108**, 043512, arXiv:2207.14126 [astro-ph.CO]  
Co-lead author with Markus Mosbech; I developed the core idea and led  $\sim 50\%$  of the analysis  
[Featured](#) in a [Royal Astronomical Society press release](#) at the 2023 National Astronomy Meeting
- L5. **ACJ**, *Cosmology and Fundamental Physics in the Era of Gravitational-Wave Astronomy* (2022, PhD thesis), arXiv:2202.05105 [gr-qc]
- L6. D. Blas and **ACJ**, *Bridging the  $\mu\text{Hz}$  gap in the gravitational-wave landscape with binary resonance* (2022), Phys. Rev. Lett. **128**, 101103, arXiv:2107.04601 [astro-ph.CO]  
Awarded a [Buchalter Cosmology Prize](#) (2nd Prize), recognising 'potential for remarkable impact'  
Altmetric [attention score](#) of 397, in the top 0.3% of all publications ever tracked by Altmetric  
[Featured](#) in the *Daily Express*, *Physics* magazine, *Big Think*, *SYFY wire*, and 40+ other outlets
- L7. D. Blas and **ACJ**, *Detecting stochastic gravitational waves with binary resonance* (2022), Phys. Rev. D **105**, 064021, arXiv:2107.04063 [gr-qc]
- L8. **ACJ** and M. Sakellariadou, *Nonlinear gravitational-wave memory from cusps and kinks on cosmic strings* (2021), Class. Quant. Grav. **38**, 165004, arXiv:2102.12487 [gr-qc]  
[Invited submission](#) to CQG as winner of the Best Student Talk Prize at [BritGrav 21](#)
- L9. **ACJ** and M. Sakellariadou, *Primordial black holes from cusp collapse on cosmic strings* (2020), arXiv:2006.16249 [astro-ph.CO]
- L10. **ACJ**, J. D. Romano, and M. Sakellariadou, *Estimating the angular power spectrum of the gravitational-wave background in the presence of shot noise* (2019), Phys. Rev. D **100**, 083501, arXiv:1907.06642 [astro-ph.CO]
- L11. **ACJ** and M. Sakellariadou, *Shot noise in the astrophysical gravitational-wave background* (2019), Phys. Rev. D **100**, 063508, arXiv:1902.07719 [astro-ph.CO]
- L12. **ACJ**, R. O'Shaughnessy, M. Sakellariadou, and D. Wysocki, *Anisotropies in the astrophysical gravitational-wave background: The impact of black hole distributions* (2019), Phys. Rev. Lett. **122**, 111101, arXiv:1810.13435 [astro-ph.CO]
- L13. **ACJ**, A. G. A. Pithis, and M. Sakellariadou, *Can we detect quantum gravity with compact binary inspirals?* (2018), Phys. Rev. D **98**, 104032, arXiv:1809.06275 [gr-qc]
- L14. **ACJ**, M. Sakellariadou, T. Regimbau, and E. Slezak, *Anisotropies in the astrophysical gravitational-wave background: Predictions for the detection of compact binaries by LIGO and Virgo* (2018), Phys. Rev. D **98**, 063501, arXiv:1806.01718 [astro-ph.CO]
- L15. **ACJ** and M. Sakellariadou, *Anisotropies in the stochastic gravitational-wave background: Formalism and the cosmic string case* (2018), Phys. Rev. D **98**, 063509, arXiv:1802.06046 [astro-ph.CO]  
[Featured](#) in PRD's 'kaleidoscope' for Sep 2018

## Other selected papers (with summary of my main contributions)

- O1. N. Kouvatsos, **ACJ**, A. I. Renzini, J. D. Romano, M. Sakellariadou, *Unbiased estimation of gravitational-wave anisotropies from noisy data* (2023), [arXiv:2312.09110 \[astro-ph.CO\]](#) | Proposed new analysis method and led theoretical work; informal supervision of PhD student (N. Kouvatsos)
- O2. M. Branchesi *et al.*, *Science with the Einstein Telescope: a comparison of different designs* (2023), *JCAP* **07**, 068, [arXiv:2303.15923 \[gr-qc\]](#) | Contributed to stochastic background sensitivity analysis for different Einstein Telescope configurations, guiding further development of the proposal
- O3. S. Gasparrotto, R. Vicente, D. Blas, **ACJ**, and E. Barausse, *Can gravitational-wave memory help constrain binary black-hole parameters? A LISA case study* (2023), *Phys. Rev. D* **107**, 124033, [arXiv:2301.13228 \[gr-qc\]](#) | Helped define project and methodologies; informal supervision of PhD student (S. Gasparrotto)
- O4. P. Auclair *et al.* (LISA Cosmology Working Group), *Cosmology with the Laser Interferometer Space Antenna* (2022), *Living Rev. Rel.* **26**, 5, [arXiv:2204.05434 \[astro-ph.CO\]](#) | LISA white paper; contributed to section on cosmic strings, led analysis of related gravitational-wave anisotropies
- O5. A. I. Renzini, B. Goncharov, **ACJ**, and P. M. Meyers, *Stochastic Gravitational-Wave Backgrounds: Current Detection Efforts and Future Prospects* (2022), *Galaxies* **10**, 34, [arXiv:2202.00178 \[gr-qc\]](#) | Invited review article; significant contributions to sections on gravitational-wave theory and sources
- O6. N. Bartolo *et al.* (LISA Cosmology Working Group), *Probing Anisotropies of the Stochastic Gravitational Wave Background with LISA* (2022), *JCAP* **11**, 009, [arXiv:2201.08782 \[astro-ph.CO\]](#) | LISA review paper; Coordinator for ‘topological defects’ section, with further contributions to ‘astrophysical sources’ section
- O7. P. Auclair, J. J. Blanco-Pillado, D. G. Figueroa, **ACJ**, M. Lewicki, M. Sakellariadou, S. Sanidas, L. Sousa, D. A. Steer, J. M. Wachter, and S. Kuroyanagi (LISA Cosmology Working Group), *Probing the gravitational wave background from cosmic strings with LISA* (2019), *JCAP* **04**, 034, [arXiv:1909.00819 \[astro-ph.CO\]](#) | LISA review paper; significant writing contributions throughout
- O8. B. P. Abbott *et al.* (LIGO, Virgo), *Directional limits on persistent gravitational waves using data from Advanced LIGO’s first two observing runs* (2019), *Phys. Rev. D* **100**, 062001, [arXiv:1903.08844 \[gr-qc\]](#) | Led interpretation of observational results in the context of cosmological and astrophysical source models, wrote corresponding section
- O9. B. P. Abbott *et al.* (LIGO, Virgo), *Search for the isotropic stochastic background using data from Advanced LIGO’s second observing run* (2019), *Phys. Rev. D* **100**, 061101, [arXiv:1903.02886 \[gr-qc\]](#) | Rapid communication | Led and wrote section on implications for cosmic string models

## SELECTED TALKS

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Total of 29 invited talks across three continents

- **GEMMA2 Workshop** (Invited) *Sep 2024*  
*Sapienza University of Rome*
- **Cold atoms and molecules for fundamental physics** (Invited) *Jul 2024*  
*Cambridge*
- **Frontiers in Cosmology and Gravitational Physics** *May 2024*  
*Institute of Cosmology and Gravitation (ICG), University of Portsmouth*
- **4th EuCAPT Symposium** (Invited plenary talk) *May 2024*  
*CERN, Geneva*
- **British Applied Mathematics Colloquium (BAMC)** (Invited) *Apr 2024*  
*Newcastle University*

- **Cosmology Lunch Seminar** ([Invited](#)) *Feb 2024*  
*DAMTP, University of Cambridge*
- **Gravitational-Wave Group Meeting** ([Invited](#)) *Jan 2024*  
*Institute of Cosmology and Gravitation (ICG), University of Portsmouth*
- **Next generation gravitational wave observatories** (One of six talks selected) *Dec 2023*  
*Royal Astronomical Society, London*
- **Oberthaler Group Seminar** ([Invited](#)) *Nov 2023*  
*Kirchhoff Institute for Physics (KIP), Heidelberg*
- **COSMO23** *Sep 2023*  
*Institute for Theoretical Physics (IFT), Madrid*
- **Amaldi15** *Jul 2023*  
*Online*
- **Cosmology from Home** ([Invited](#) expert panellist) *Jul 2023*  
*Online*
- **National Astronomy Meeting** ([RAS press release](#)) *Jul 2023*  
*Cardiff University*
- **Quantum Simulators for Fundamental Physics Workshop** ([Invited](#)) *Jun 2023*  
*Perimeter Institute for Theoretical Physics, Waterloo, Canada*
- **Astrophysics Seminar** ([Invited](#)) *May 2023*  
*University of Leicester*
- **Cosmology Seminar** ([Invited](#)) *May 2023*  
*Beecroft Institute, Oxford*
- **Theory Group Seminar** ([Invited](#)) *May 2023*  
*Astroparticle and Cosmology Laboratory (APC), Paris*
- **Cosmology and Relativity Seminar** ([Invited](#)) *Apr 2023*  
*Queen Mary University of London*
- **London Gravity Meeting** ([Invited](#)) *Mar 2023*  
*Royal Society, London*
- **UK-QFT XI** *Jan 2023*  
*DAMTP, University of Cambridge*
- **‘Dark Matters’ Workshop** ([Invited](#)) *Nov 2022*  
*Université Libre de Bruxelles (ULB)*
- **London-Oldenburg Relativity Seminar** ([Invited](#)) *Nov 2022*  
*University College London/University of Oldenburg (online)*
- **ICTP-AP Seminar** ([Invited](#)) *Sep 2022*  
*International Centre for Theoretical Physics, Asia-Pacific (online)*
- **Quantum Simulators for Fundamental Physics Workshop** ([Invited](#)) *Sep 2022*  
*Science Gallery London*
- **‘Gravitational-Wave Orchestra’ Workshop** ([Invited](#)) *Sep 2022*  
*Université Catholique de Louvain, Belgium*
- **International LISA Symposium XIV** *Jul 2022*  
*University of Glasgow (online)*



- **National Astronomy Meeting** *Jul 2022*  
*University of Warwick*
- **Theory Group Seminar** (Invited) *May 2022*  
*Institute of High-Energy Physics (IFAE), Barcelona*
- **UKCosmo meeting** (One of seven ‘long’ talks selected) *May 2022*  
*Newcastle University*
- **Quantum Technology Seminar** (Invited) *May 2022*  
*London Centre for Nanotechnology, University College London*
- **9th LISA Cosmology Workshop** *Dec 2021*  
*Online*
- **Cosmology/Extragalactic Seminar** *Nov 2021*  
*University College London*
- **Theory Group Seminar** (Invited) *Oct 2021*  
*Astroparticle and Cosmology Laboratory (APC), Paris*
- **European Physical Society Conference on High-Energy Physics** *Jul 2021*  
*DESY/University of Hamburg (online)*
- **Ibarra Group Seminar** (Invited) *Jul 2021*  
*Technical University of Munich (online)*
- **Gravitational Wave Probes of Physics Beyond the Standard Model** (Invited) *Jul 2021*  
*University of Warsaw (online)*
- **BritGrav 21** (Winner of the Best Student Talk Prize) *Apr 2021*  
*University College Dublin (online)*
- **London Cosmology Discussion Meeting (LCDM)** (Invited) *Dec 2020*  
*Royal Astronomical Society, London (online)*
- **Theoretical Cosmology Seminar** (Invited) *May 2020*  
*Institute of Cosmology and Gravitation (ICG), University of Portsmouth (online)*
- **Cosmology Seminar** (Invited) *May 2020*  
*Beecroft Institute, University of Oxford (online)*
- **London Cosmology Discussion Meeting (LCDM)** *Feb 2020*  
*Royal Astronomical Society, London*
- **30th Texas Symposium on Relativistic Astrophysics** (IoP travel award) *Dec 2019*  
*Institute of Cosmology and Gravitation (ICG), University of Portsmouth*
- **Gravitational Wave Probes of Fundamental Physics** (Invited) *Nov 2019*  
*EuCAPT workshop, Amsterdam*
- **UKCosmo meeting** (One of nine talks selected) *May 2019*  
*DAMTP, University of Cambridge*
- **14th Iberian Cosmology Meeting (IberiCOS)** *Apr 2019*  
*University of the Basque Country, Bilbao*
- **1st European Physical Society Conference on Gravitation** *Feb 2019*  
*Sapienza University of Rome*
- **Seminar** (Invited) *Feb 2019*  
*Virtual Institute of Astroparticle Physics (online)*

- **Cosmology Coffee Seminar** Oct 2018  
*Imperial College London*
- **UKCosmo meeting** May 2018  
*Swansea University*
- **BritGrav 18** Apr 2018  
*Institute of Cosmology and Gravitation (ICG), University of Portsmouth*

## TEACHING

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### University College London

2021–present

- Lead supervisor of research projects for two masters students: Phoebe Routh (ongoing) and David Moody (distinction and awarded departmental prize, now working in data science)
- Postgraduate Teaching Assistant for 3rd-year *Physical Cosmology*: developed problem sets and delivered problem-solving tutorials

### King's College London

2017–2021

- Winner of a 2020 [King's Education Award](#), recognising 'extraordinary contributions' to teaching
- 'Rising Star' nominee in the 2019 King's Education Awards (only PhD student nominee in Physics)
- Co-wrote lecture notes for 3rd-year *General Relativity and Cosmology*
- Examples class demonstrator for numerous courses, including 4th-year *Astroparticle Cosmology*, 3rd-year *General Relativity and Cosmology*, 2nd-year *Astrophysics*, 1st-year *Mathematics for Physicists*, ...

## SOFTWARE AND NUMERICS

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- Lead developer of Fortran lattice field theory code `lattice-fvd` and Python code [gw-resonance](#)
- Experience with advanced numerical techniques including, e.g., Fourier and Chebyshev pseudospectral methods and symplectic integration
- Extensive experience in Unix environments (Ubuntu/MacOS), including in HPC settings
- Advanced Python user (object-oriented programming; data handling and visualisation; Jupyter, NumPy, SciPy, h5py, Astropy, healpy, sympy, ...)
- Other languages and software include Fortran, C++, Mathematica, Git, MATLAB, SageMath, SQL, L<sup>A</sup>T<sub>E</sub>X (including TikZ), ...

## PUBLIC ENGAGEMENT AND OUTREACH

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- Invited speaker for the [Cambridge Astronomical Association](#) 2024
- My research and simulations featured in the documentary '*Do we live in a multiverse?*' 2024  
Aired on [French](#) and [German](#) TV — more than 1.5 million combined views on YouTube
- YouTube video interview on '*Early Universe Cosmology in the Lab*' 2023
- Outreach talk for alumni of UCL's '[Introduction to Astronomy](#)' course, 2023  
aimed at amateur astronomers and members of the public
- Participated in five interviews for media pieces on my paper *'Bridging the  $\mu\text{Hz}$  gap in the gravitational-wave landscape with binary resonance'* 2022
- Maths and physics tutor at Open Tutors London 2017–2020  
Co-initiated free tutoring program for University of London students from under-represented groups
- Helped run an interactive exhibit on Dark Matter at [Science Gallery London](#) 2019
- Local co-organiser, [Pint of Science Festival](#) 2018