

# Philippa Cole

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**Research interests:** dark matter, gravitational waves, primordial black holes, data analysis, machine-learning

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## Postdoctoral research experience

Postdoctoral researcher at University of Milano-Bicocca (Italy)

Oct 2023 - present

Postdoctoral researcher at GRAPPA, University of Amsterdam (UvA) (Netherlands)

Oct 2020 - Oct 2023

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## Education

PhD student in Cosmology at the University of Sussex (UK)

Sep 2016 - Mar 2020

Supervisor: Dr Christian Byrnes

BSc First Class Honours in Mathematics at the University of Durham (UK)

Oct 2012 - Jun 2015

Final project supervisor: Prof Richard Ward

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## Publications

P. S. Cole, J. Fumagalli, *pbhstat: A pip-installable code for calculating the PBH abundance from an initial primordial power spectrum*, arXiv:2509.14326, Universe 2025, 11(9), 322.

P. S. Cole, J. Alvey, L. Speri, C. Weniger, U. Bhardwaj, D. Gerosa and G. Bertone, *Sequential simulation-based inference for extreme mass ratio inspirals*, arXiv:2505.16795.

Abac et al. inc P.C, *The Science of the Einstein Telescope*, arXiv:2503.12263.

P. S. Cole, *Haloed, other dark matter candidates and astrophysical implications*, arXiv:2405.20125, published in the book "Primordial Black Holes", ed. Chris Byrnes, Gabriele Franciolini, Tomohiro Harada, Paolo Pani, Misao Sasaki; Springer (2024).

P. S. Cole, A. D. Gow, C. T. Byrnes and S. P. Patil, *Primordial black holes and single-field inflation: a fine-tuning audit*, arXiv:2304.01997, published in JCAP 08 (2023) 031.

P. S. Cole, G. Bertone, A. Coogan, D. Gaggero, P. Karydas, B. J. Kavanagh, T. Spijksma, G. Tomaselli, *Disks, spikes and clouds: distinguishing environmental effects on BBH gravitational waveforms*, arXiv:2211.01362, published in *Nature Astron.* 7 (2023) 8, 943-950.

G. Bertone, O. Buchmueller and P. S. Cole, *Perspectives on fundamental cosmology from space and low earth orbit*, arXiv:2302.03351, European Space Agency review article, published in npj Microgravity volume 9, Article number: 10.

P. S. Cole, A. Coogan, B. J. Kavanagh, G. Bertone, *Measuring dark matter spikes around primordial black holes with Einstein Telescope and Cosmic Explorer*, arXiv:2207.07576, published in Physical Review D (Vol. 107, No. 8)

P. S. Cole, A. D. Gow, C. T. Byrnes and S. P. Patil, *Steepest growth re-examined: repercussions for primordial black hole formation*, arXiv:2204.07573, published in JCAP 05 (2024) 022.

Baryakhtar et al. (inc. P. S. Cole), *Dark Matter In Extreme Astrophysical Environments*, 2022 Snowmass Summer Study, arXiv:2203.07984.

C. T. Byrnes and P. S. Cole, *Lecture notes on inflation and primordial black holes*, arXiv:2112.05716.

A. D. Gow, C. T. Byrnes, P. S. Cole and S. Young, *The power spectrum on small scales: Robust constraints and comparing PBH methodologies*, arXiv: 2008.03289 [astro-ph.CO], published in JCAP 02(2021)002.

P. S. Cole and J. Silk, *Small scale primordial fluctuations in the 21cm Dark Ages signal*, arXiv:1912.02171, published in MNRAS Volume 501, Issue 2, February 2021, Pages 1557–1567.

Chluba et al. (inc. P. S. Cole) *Spectral Distortions of the CMB as a Probe of Inflation, Recombination, Structure Formation and Particle Physics*, Astro2020 Science White Paper, arXiv:1903.04218, published in Bull.Am.Astron.Soc. 51 (2019) 3, 184.

C. T. Byrnes, P. S. Cole and S. P. Patil, *Steepest growth of the power spectrum and primordial black holes*, (2018), arXiv: 1811.11158 [astro-ph.CO], published in JCAP 1906 (2019) 028.

P. S. Cole and C. T. Byrnes, *Extreme Scenarios: the tightest possible constraints on the power spectrum due to primordial black holes*, (2017), arXiv:1706.10288 [astro-ph.CO], published in JCAP 1802 (2018) no.02, 019.

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### Grants and Awards

Winner of Young Talents Italy - L'Oréal Italia UNESCO for Women in Science	June 2025
ISCRA HPC class C project grant (computing hours)	July 2024
Winner of the University of Sussex Astronomy Centre PhD Thesis Prize	Jul 2020
Winner of a Balzan fellowship with Prof Joseph Silk at Johns Hopkins University	Nov 2018

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### Panels and committees

Co-chair of Square Kilometre Array Observatory Gravitational Waves working group	July 2024 - present
Member of review panel for NASA Astrophysics Theory Program	Nov 2023

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### Refereeing

Referee for Physical Review D	Aug 2022 - present
Referee for Physical Review Letters	Oct 2020 - present
Referee for the Journal for Cosmology and Astroparticle Physics	Jun 2019 - present

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### Supervision and mentoring

Thesis supervisor for two MSc students at University of Milano-Bicocca	Feb 2024 - present
Thesis supervisor for two BSc students at University of Milano-Bicocca	Oct 2023 - Mar 2025
Thesis supervisor for visiting masters student at UvA	Apr 2023 - Jun 2023
Mentor for PhD student at UvA	Sep 2022 - Jan 2024
Thesis supervisor for two MSc students at UvA	Jan 2021 - Aug 2023
Mentor for an undergraduate research summer student at the University of Sussex	Jun 2019 - Aug 2019

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### Teaching

Convenor for ‘Current And Future Challenges In Gravitational-Wave Astronomy’ PhD class at University of Milano-Bicocca	May 2025 - Jun 2025
Guest lecturer for ‘Astrostatistics’ MSc course at University of Milano-Bicocca	May 2024
Guest lecturer for MSc course at Instituto de Fisica Cantabria, Santander on primordial black holes	Mar 2024
Lecturer at Sydney Spring School 2022 on primordial black holes	Dec 2022
Tutor for ‘Astroparticle Physics’ MSc course at UvA	Jan 2021 - Apr 2023
Guest lecturer for ‘Astroparticle Physics’ MSc course at UvA on neutrinos	Jan 2021 - Apr 2023
Guest lecturer at the Nikhef Gravitational Wave Workshop	Jan 2021 - Jan 2022
Tutor at GGI School on “Theoretical Aspects of Astroparticle Physics, Cosmology and Gravitation”, Firenze, Italy	Mar 2020
Tutor for ‘Analysis I’ first year undergraduate mathematics course at Sussex	Jan 2019 - May 2019
Tutor for ‘Mathematical Methods II’ 1st year undergraduate physics course at Sussex	Jan 2018 - May 2018

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### Talks and seminars (42 invited, 12 contributed)

5 invited plenary and keynote talks	Nov 2022 - Jul 2024
3 conference panellist invitations	Aug 2022 - Jul 2024
17 invited conference talks, 17 invited seminars or colloquia	Nov 2018 - Nov 2025

10 contributed talks and posters  
*See full details on pages 3-4.*

Jul 2017 - Dec 2023

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### Conference and seminar organisation

Scientific advisor for Early Universe from Home conference	Oct 2024 - Feb 2025
Co-organiser of Multi-Messenger Continuous Waves in Amsterdam	Jul 2023
Organiser of talk series 'Amsterdark' in Amsterdam	Sep 2022 - Sep 2023
Organiser and chair of South Coast Cosmology meetings held at Sussex	2017 - 2018

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### Relevant work experience

Astrophysics Editor for SEISMA magazine	Apr 2021 - present
Science writer at the London Institute for Mathematical Sciences	Jul 2020 - Oct 2022
BBC 'Sky At Night' and 'Horizon' Placement	Sep 2018
Physics Exam Scribe/Reader	Jan 2017 - Jan 2020
Physics Editorial Assistant at Cambridge University Press	Sep 2015 - May 2016
Research Intern in Cosmology at the University of Belgrade	Jul 2015 - Aug 2015

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### Volunteering and outreach

Outreach sessions on gravitational waves for local high school students in Milan	May 2024 - Apr 2025
English tutor for Ukrainian refugees in Amsterdam	Jan 2023 - Apr 2023
Volunteer for James Webb Space Telescope at BlueDot festival	Jul 2019
Author for Astrobites, see my articles here: <a href="https://astrobites.org/author/pcole/">https://astrobites.org/author/pcole/</a>	Feb 2018 - Dec 2019
Grapheel ( <a href="http://www.grapheel.com">www.grapheel.com</a> ) physics/maths sighted volunteer	Jan 2017 - Jun 2017
Cosmonauts exhibition volunteer at the Science Museum, London.	Sep 2015 - May 2016

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### Equity, Diversity and Inclusion

EDI session organised by the Department of Psychology at Milano-Bicocca	May 2024
Advocated for safeguarding information to be placed inside toilet cubicles at the University of Amsterdam, by arrangement with the Institute Manager.	March 2023
Bystander Intervention training	March 2023
Moderator for the discussion "Towards a Welfare-Focused Work Environment," led by Andrew Pontzen from UCL.	Sep 2021

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### Languages

English (native - UK and Irish dual citizen)  
Italian - B2  
Dutch - A2

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### Invited talks and seminars

Primordial Black Holes in the Multi-Messenger Era at IFPU, Trieste	Nov 2025
TeVPA 2025, Valencia	Nov 2025
Seminar at the Albert Einstein Institute, Potsdam	Oct 2025
Seminar at Centro de Astrofísica e Gravitação, Lisbon	Oct 2025
EMRI Search and Inference within the LISA Global Fit, Paris	June 2025
Environmental effects Focus Week at IFPU, Trieste	May 2025
Beyond WIMPS, Oxford University	Apr 2025
Seminar at the University of Helsinki	Feb 2025
Seminar at the University of Pisa	Jan 2025
Discovering Continuous GW with Nuclear, Astro, and Particle Physics	Nov 2024
Roma International Conference on Astro-Particle Physics	Sep 2024
GEMMA2 workshop in Rome	Sep 2024

Keynote at “New Frontiers in Strong Gravity” in Benasque	July 2024
Panelist at PAX 2024 at Kings College London	July 2024
Colloquium at the University of Aachen	June 2024
IPTA Student week	June 2024
Barcelona Black Holes I: Primordial Black Holes	May 2024
Plenary at Moriond Cosmology	Apr 2024
Colloquium at the University of Zurich	Apr 2024
Fundamental Physics JENAS workshop in Rome	Feb 2024
Primordial Black Holes and Gravitational Waves in Paris	Nov 2023
Keynote at Gravitational waves for fundamental physics in Osaka	Nov 2023
NEHOP 2023 in Naples	Jun 2023
Plenary and panelist at Dark Matter 2023 in Santander	May 2023
Seminar at UC Louvain	March 2023
Seminar at Leiden University	Feb 2023
Keynote at ARC Centre for Excellence Cold Dark Matter workshop, Australia	Nov 2022
Seminar at Nottingham University	Nov 2022
Seminar at the Niels Bohr Institute, Copenhagen	Nov 2022
Neutrino Oscillation Workshop in Puglia	Sep 2022
Panelist at PAX 2022 held at MIT	Aug 2022
European Astronomical Society meeting in Valencia	Jun 2022
“Gravitational wave probes of black hole environments” workshop in Rome	Jun 2022
Seminar at the University of Portsmouth	Jun 2022
Seminar at the University of Utrecht	Nov 2021
Seminar at Université Libre de Bruxelles	April 2021
Seminar at University of Manchester	April 2020
25th annual PASCOS meeting in Manchester	Jul 2019
Seminar at Queen Mary University of London	May 2019
Hot Topics in Modern Cosmology at Inst. d'Études Scientifiques de Cargèse	May 2019
Seminar at the Institute for Cosmology and Gravitation, Portsmouth	Mar 2019
Seminar at Penn State University	Nov 2018

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### **Contributed talks and posters**

Speaker at SIGRAV 2025 in Milan	Sep 2025
Speaker at GR-Amaldi in Glasgow	July 2025
Speaker at TeonGRAV in Naples	Dec 2023
Speaker at GRAPPA 10 conference in Amsterdam	Jul 2023
Seminar speaker at Columbia University	Oct 2022
Speaker at GWPAW 2021 in Hannover	Dec 2021
Lightning talk at EUCAPT symposium	May 2021
Seminar speaker for CosmoDonuts series at Imperial College London	Apr 2019
Speaker at UKCosmo in Nottingham	Jan 2019
Poster at Tonale Winter School in Cosmology	Dec 2017
Speaker at South Coast Cosmology in Portsmouth	Nov 2017
Firetalk at Advances in Theoretical Cosmology in Light of Data in Stockholm	Jul 2017