

# Dr. Natalie B. Hogg

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Postdoctoral researcher at the [Institut de Physique Théorique, CEA Paris-Saclay](#)

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## Employment

- 02/2022 – present    **Postdoctoral researcher**, IPhT CEA Paris-Saclay, Paris, France  
Investigating the weak lensing of strong lensing and its application to cosmology.  
Supervisor: Dr. Pierre Fleury
- 06/2021 – 02/2022    **Postdoctoral researcher**, IFT UAM-CSIC, Madrid, Spain  
Investigating the weak lensing of strong lensing and its application to cosmology.  
Forecasting constraints on primordial black hole abundance via gravitational wave observations.  
Supervisors: Dr. Pierre Fleury, Dr. Matteo Martinelli
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## Education

- 10/2017 – 02/2021    **PhD in Cosmology**, University of Portsmouth  
Thesis: [Beyond  \$\Lambda\$ CDM: current and future constraints on alternative cosmological models](#)  
Supervisors: [Dr. Marco Bruni](#), [Prof. David Wands](#), [Prof. Robert Crittenden](#)
- 09/2013 – 07/2017    **MPhys Astrophysics 1<sup>st</sup> class hon.**, Aberystwyth University  
with **Breen Prize** for best Master's dissertation in physics  
Master's dissertation: [Dynamical models of dark energy & their background cosmological evolution](#)  
Supervisor: [Prof. Carsten van de Bruck](#) (University of Sheffield; supervised remotely)
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## Major awards

- 05/2021    **G-Research quantitative research grant**    £2000  
[Hardship grant from UK-based financial technology company](#)
- 07/2017    **Breen Prize**    £2000  
Best Master's dissertation in physics, Aberystwyth University

Plus **travel grants** from STFC, EU COST-Action CANTATA and Santander Bank totalling approximately £6000.

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## Talks

- Invited seminars:** 11 since 2019, including at the Dutch Theoretical Cosmology meeting and the Sorbonne.  
**Contributed talks:** 18 since 2017, including at the TEXAS Symposium and [Cosmology from Home](#).  
**Outreach:** 4 since 2018, including a [Youtube video](#) on standard sirens with over 14,000 views.  
**Prizes:** 3 prizes for best talk and 1 prize for best poster, all awarded during my PhD.
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## Supervision and teaching

- Supervision:** Jason Makechemu, undergraduate summer research project on strong lensing, July & August 2022. Jason is now applying for Master's and PhD programmes in the UK, USA and France.
- Teaching:** Lab demonstrator for Computational Physics course and coursework and exam marking for various physics courses during my PhD (2017 – 2019).
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## Software development

- `lenstronomy` [Top 5 contributor](#) to this open-source Python package for strong gravitational lensing simulations.  
→ I led the implementation of a new subpackage for line-of-sight effects.  
→ I implemented the `zeus` ensemble slice sampler for MCMC parameter inference.
- `analsis` Lead developer of this Python wrapper for `lenstronomy`, created to systematically generate and analyse large catalogues of strong lensing images.
- `darksirens` Co-developer of this open-source Python package for creating mock gravitational wave event catalogues.

Experienced user of Python, Fortran, Bash, Git, and HPC (SLURM, PBS).

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## Service

- 2022 – present **Organiser**, IPhT cosmology & gravity journal club  
**Founder and organiser**, IPhT cosmology seminars
- 2020 – present **Referee** for Monthly Notices of the Royal Astronomical Society, Physics of the Dark Universe, Astronomy and Computing
- 2020 **Chair**, local organising committee, [South Coast Cosmology](#) meeting, University of Portsmouth
- 2019 **Member**, local organising committee, [A History of the Universe in Redshift](#) conference
- 2018/19 **PhD student representative**, ICG management committee, University of Portsmouth  
**PhD student representative**, Faculty research degrees committee, University of Portsmouth
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## Publications

- [1] **Natalie B. Hogg**, Pierre Fleury, Julien Larena and Matteo Martinelli, *Measuring line-of-sight shear with Einstein rings: a proof of concept*, [2210.07210](#).
- [2] Matteo Martinelli, Francesca Scarcella, **Natalie B. Hogg**, Bradley J. Kavanagh, Daniele Gaggero and Pierre Fleury, *Dancing in the dark: detecting a population of distant primordial black holes*, *Journal of Cosmology and Astroparticle Physics* (2022) 006 [[2205.02639](#)].
- [3] Fabrizio Renzi, **Natalie B. Hogg** and William Giarè, *The resilience of the Etherington–Hubble relation*, *Monthly Notices of the Royal Astronomical Society* (2022) 4004 [[2112.05701](#)].
- [4] **Natalie B. Hogg** and Marco Bruni, *Shan–Chen interacting vacuum cosmology*, *Monthly Notices of the Royal Astronomical Society* (2022) 4430 [[2109.08676](#)].
- [5] Fabrizio Renzi, **Natalie B. Hogg**, Matteo Martinelli and Savvas Nesseris, *Strongly lensed supernovae as a self-sufficient probe of the distance duality relation*, *Physics of the Dark Universe* (2021) 100824 [[2010.04155](#)].

- [6] **Natalie B. Hogg**, Matteo Martinelli and Savvas Nesseris, *Constraints on the distance duality relation with standard sirens*, *Journal of Cosmology and Astroparticle Physics* (2020) 019 [2007.14335].
- [7] **Natalie B. Hogg**, Marco Bruni, Robert Crittenden, Matteo Martinelli and Simone Peirone, *Latest evidence for a late time vacuum-geodesic CDM interaction*, *Physics of the Dark Universe* (2020) 100583 [2002.10449].
- [8] Matteo Martinelli, **Natalie B. Hogg**, Simone Peirone, Marco Bruni and David Wands, *Constraints on the interacting vacuum-geodesic CDM scenario*, *Monthly Notices of the Royal Astronomical Society* (2019) 3423 [1902.10694].

### Bibliometrics

- Total citations: 172
- Mean citations: 24.6
- h-index: 6

Numbers from [Inspire-HEP](#), for published papers with fewer than ten authors.

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### References

Dr. Marco Bruni	marco.bruni@port.ac.uk
Dr. Pierre Fleury	pierre.fleury@ipht.fr
Dr. Matteo Martinelli	matteo.martinelli@inaf.it
Prof. Carsten van de Bruck	c.vandebruck@sheffield.ac.uk

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