Dr. Natalie B. Hogg

Postdoctoral researcher in cosmology at the Laboratoire Univers et Particules, Université de Montpellier

Email: natalie.hogg@lupm.in2p3.fr | Phone: +33 7 66 72 42 18 | Website: nataliebhogg.com | Github: 🗘

Employment

Oct 2023 – Laboratoire Univers et Particules, Université de Montpellier

present Postdoctoral researcher

Studying line-of-sight shear in strong lensing and its applications to cosmology, with Dr. Julien Larena.

Feb 2022 – Institut de physique théorique, Paris-Saclay

Oct 2023 Postdoctoral researcher

Studying line-of-sight shear in strong lensing and its applications to cosmology, with Dr. Pierre Fleury.

Jun 2021 – Instituto de física téorica, Universidad Autonoma de Madrid

Feb 2022 Postdoctoral researcher

Working on applications of strong lensing and gravitational waves to cosmology, with Dr. Pierre Fleury and Dr. Matteo Martinelli.

Education

2017 – 2021 PhD in Cosmology, University of Portsmouth

Thesis: Beyond ΛCDM: current and future constraints on alternative cosmological models

Supervisors: Dr. Marco Bruni, Prof. David Wands, Prof. Robert Crittenden

2013 – **2017 MPhys Astrophysics r**st class hons., 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)

Major awards

2021 G-Research quantitative research grant: £2000

Hardship grant from major financial technology company

2017 Breen Prize: £2000

Best Master's dissertation in physics, Aberystwyth University

Plus **travel grants** awarded over the period 2017 – 2020 from STFC, EU COST-Action CANTATA and Santander Bank totalling approximately £6000.

Selected recent talks

Aug 2023 Strong and weak lensing for cosmology

Invited plenary talk, "Lensing at Different Scales" workshop, University of Chicago

Apr 2023 The weak lensing of strong lensing: a new cosmological probe

Invited seminar, LUTH, Observatoire de Paris

Sep 2022 Dancing in the dark: detecting a population of distant primordial black holes

Invited seminar, IAS, Orsay

Apr 2022 The distance duality relation: violations, constraints and biases

Invited seminar, IAP, Paris

Since 2017, I have given 14 invited talks, contributed talks at 21 conferences and workshops, won 3 best talk prizes and given 5 outreach talks, including a Youtube video on the topic of standard sirens which has over 15,000 views .

Open-source software development

lenstronomy ()

Top 3 contributor to this open-source Python package for strong gravitational lensing simulations.

- \rightarrow I led the implementation of a new sub-package for line-of-sight effects.
- \rightarrow I implemented the zeus ensemble slice sampler for MCMC parameter inference.
- \rightarrow I initiated a restructuring of the MCMC sub-package to make it easier and more intuitive to use.

tdcosmo_ext ()

Sole developer of this external strong lensing likelihood package for the Bayesian analysis software Cobaya.

analosis ()

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).

Other codes and software used includes CAMB, CosmoMC, Cobaya, emcee, zeus, dynesty and Polychord.

Supervision and teaching

Supervision Jason Makechemu, undergraduate summer research project on strong lensing, July & August 2022.

Jason is now a PhD student at the University of Lancaster supervised by Dr. Brooke Simmons.

Teaching Lab demonstrator for Computational Physics course; coursework and exam marking for various

physics courses during my PhD (2017 - 2019).

Service

2022 – 2023 Organiser, IPhT cosmology & gravity journal club and IPhT cosmology seminar series.

2020 – **present** Referee for Monthly Notices of the Royal Astronomical Society & Physics of the Dark Universe.

Chair, local organising committee, South Coast Cosmology meeting, University of Portsmouth.

2018 – 2019 PhD student representative, ICG management committee & Faculty Research Degrees committee,

University of Portsmouth.

References

Dr. Marco Bruni marco.bruni@port.ac.uk
Dr. Pierre Fleury pierre.fleury@lupm.in2p3.fr
Dr. Matteo Martinelli matteo.martinelli@inaf.it
Prof. Carsten van de Bruck c.vandebruck@sheffield.ac.uk