

PERSONAL DETAILS

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NATIONALITY: British

RESEARCH OVERVIEW

I am a cosmologist focusing on how surveys of large-scale structure can test our understanding of the Universe. Currently, my primary research field is HI intensity mapping where I investigate how we can constrain cosmological parameters in the presence of observational effects and systematics. Whilst I am working on pathfinder HI intensity mapping data, most of my work involves producing realistic simulations of survey data from which we can make forecasts and investigate the effects from systematics. I am also interested in the benefits to be gained from cross-correlations between optical surveys and HI intensity maps.

ACADEMIC POSITIONS

Oct 2019 - Present | Post-Doctoral Research Assistant
QUEEN MARY UNIVERSITY OF LONDON
Research Programme: Neutral Hydrogen intensity mapping with MeerKAT - funded by STFC
Grant ST/S000437/1.
Line Manager: Dr Alkistis Pourtsidou (Grant PI)

EDUCATION

Oct 2016 - Sep 2019 | Post-Graduate Research Student
Institute of Cosmology & Gravitation, UNIVERSITY OF PORTSMOUTH
PhD in Cosmology - 2019
Thesis: Synergies Between 21cm and Optical Redshift Surveys for Probing Large Scale Cosmic Structure
Supervisors: Prof David Bacon and Dr Alkistis Pourtsidou

Oct 2012 - Jun 2016 | Undergraduate Student
UNIVERSITY OF SOUTHAMPTON
BSc (Hons) Physics - *First Class Honours*
BSc Final Year Project: Investigating the Shape of the Stellar-to-Halo Mass Relationship for Galaxies at a Range of Redshifts - Supervisor: Dr Francesco Shankar

Summer 2015 | Summer Research Placement
Institute of Cosmology & Gravitation, UNIVERSITY OF PORTSMOUTH
Secured South East Physics Network (SEPnet) funding for an 8-week placement studying strong gravitational lensing, resulting in a [MNRAS publication](#).
Placement Supervisor: Dr Thomas Collett

PUBLICATIONS

11. [The HI intensity mapping bispectrum including observational effects](#)
Cunnington, S., Watkinson, C., Pourtsidou, A., (2021)
Submitted to MNRAS, arXiv:2102.11153
10. [HI constraints from the cross-correlation of eBOSS galaxies and Green Bank Telescope intensity maps](#)
Wolz, L., Pourtsidou, A., Masui, K., Chang, T.-C., ..., **Cunnington, S.** et al. (2021)
Submitted to MNRAS, arXiv:2102.04946
9. [HI intensity mapping with MeerKAT: Calibration pipeline for multi-dish autocorrelation observations](#)
Wang, J., Santos, M., Bull, P., Grainge, K., **Cunnington, S.** et al. (2020)
Submitted to MNRAS, arXiv:2011.13789
8. [21cm foregrounds and polarization leakage: a user's guide on cleaning and mitigation strategies](#)
Cunnington, S., Irfan, M., Carucci, I., Pourtsidou, A., Bobin, J., (2020)
Submitted to MNRAS, arXiv:2010.02907
7. [Multipole expansion for HI intensity mapping experiments: unbiased parameter estimation](#)
Soares, P., **Cunnington, S.**, Pourtsidou, A., Blake, C., (2021)
MNRAS 502, Issue 2, January 2021, 2549–2564, arXiv:2008.12102
6. [The degeneracy between primordial non-Gaussianity and foregrounds in 21cm intensity mapping experiments](#)
Cunnington, S., Camera, S., Pourtsidou, A., (2020)
MNRAS 499, Issue 3, December 2020, 4054–4067, arXiv:2007.12126
5. [Multipole expansion for HI intensity mapping experiments: simulations and modelling](#)
Cunnington, S., Pourtsidou, A., Soares, P., Blake, C., Bacon, D., (2020)
MNRAS 496, Issue 1, July 2020, 415–433, arXiv:2002.05626
4. [Impacts of Foregrounds on HI Intensity Mapping Cross-Correlations](#)
Cunnington, S., Wolz, L., Pourtsidou, A., Bacon, D., (2019)
MNRAS 488, Issue 4, October 2019, 5452–5472, arXiv:1904.01479
3. [Cosmology with Phase 1 of the Square Kilometre Array: Red Book 2018: Technical specifications and performance forecasts](#)
Square Kilometre Array Cosmology Science Working Group: Bacon, ..., **Cunnington, S.** et al. (2020)
Publ. Astron. Soc. Austral. 37, e007, March 2020, arXiv:1811.02743
2. [HI Intensity Mapping for Clustering-Based Redshift Estimation](#)
Cunnington, S., Harrison, I., Pourtsidou, A., Bacon, D., (2019)
MNRAS 482, Issue 3, January 2019, 3341–3355, arXiv:1805.04498
1. [Observational Selection Biases in Time-Delay Strong Lensing and their Impact on Cosmography](#)
Collett, T., **Cunnington, S.**, (2016)
MNRAS 462, Issue 3, November 2016, 3255–3264, arXiv:1605.08341

COLLABORATIONS

In approximate descending order of active contribution

- SKA Cosmology SWG 2018 - Present
An active member of various focus groups within the collaboration. Contributed towards the SKA 2018 Red Book. One of eight members currently working on an SKA intensity mapping data challenge project, the first of its kind.
- MeerKLASS 2019 - Present
Focused on using the MeerKAT radio telescope to perform single-dish intensity mapping LSS surveys. Currently working on science verification data which aims to make the first cosmological detection using auto-correlation.
- Euclid 2018 - Present
Leading the 21cm-Euclid synergies sub-project within the Additional Probes Galaxy Clustering WP in Euclid. This has the potential to improve photometric redshift constraints and limit other systematics.

ACADEMIC TALKS PRESENTED

- Excluding presentations in collaboration telecons

SKA-Cosmology SWG Meeting - <i>Virtual Conference</i>	14th Jan 21
London Cosmology Discussion Meeting - <i>Virtual Conference</i>	19th Nov 20
SKA SWG Meeting - <i>École Normale Supérieure, Paris, France</i>	22nd Jan 20
Texas Symposium - <i>University of Portsmouth, Guildhall, Portsmouth, UK</i>	17th Dec 19
CoSyne: Cosmological Synergies - <i>Institut d'astrophysique de Paris, France</i>	11th Dec 19
Cosmology Seminar - <i>University of the Western Cape, South Africa</i>	29th Nov 19
SEPnet Student-Led Conference - <i>University of Southampton, UK</i>	4th Apr 19
Euclid UK Meeting - <i>University of Oxford, UK</i>	18th Dec 18
Cosmology Seminar - <i>Queen Mary University of London, UK</i>	7th Nov 18
Cosmology Seminar - <i>Institute of Cosmology & Gravitation, Portsmouth, UK</i>	24th Apr 18
EWASS/NAM 2018 - <i>Arena & Convention Centre (ACC), Liverpool, UK</i>	3rd Apr 18
SEPnet Student-Led Conference - <i>University of Southampton, UK</i>	22nd Mar 18
South Coast Cosmo - <i>Institute of Cosmology & Gravitation, Portsmouth, UK</i>	29th Nov 17
LSST:UK Multi-wavelength Workshop - <i>University of Cambridge, UK</i>	27th Sep 17

TEACHING & SUPERVISION

Paula S. Soares - <i>PhD Student, Queen Mary University of London</i> Assisting the supervision of PhD projects	Oct 2019 - Present
Andrew Scullane - <i>MSc Student, Queen Mary University of London</i> Assisting the supervision of Masters project	Oct 2020 - Present

ASSESSMENT & REFEREEING

Referee for MNRAS	Feb 2020 - Present
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TECHNICAL SKILLS

Coding Languages Python, C++, C, Fortran, MATLAB, Mathematica

OS and HPC Mac OS X and Unix/Linux operating systems. Regular experience with High Performance Computing (HPC) Clusters.

PUBLIC OUTREACH & VOLUNTEERING

- Astronomy on Tap Organiser (28th Feb 2018)
- Stargazing Live Portsmouth Volunteer (2017-2019)
- Student representative for Athena Swan Committee (2017-2019)
- Organiser for a series of University of Portsmouth Physics Staff v Students charity football matches (2017-2019)

Outreach Talks Presented:

East Sussex Astronomical Soc. - <i>Egerton Park, East Sussex, UK</i>	4th Jul 19
Chichester U3A Science Group - <i>Fishbourne Centre, West Sussex, UK</i>	24th Jun 19
The Local Group Astronomy Club - <i>Cooden Beach Hotel, East Sussex, UK</i>	12th Feb 19
Eastbourne Astronomical Soc. - <i>Willingdon Memorial Hall, East Sussex, UK</i>	6th Oct 18
Winchester Cafe Sci - <i>Winchester Discovery Centre, Hampshire, UK</i>	3rd Sep 18
The Local Group Astronomy Club - <i>Cooden Beach Hotel, East Sussex, UK</i>	8th May 18