

Lennart Balkenhol

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RESEARCH INTERESTS

- Cosmology: phenomenology and data analysis
- Cosmic microwave background anisotropies
- Extensions to the standard model
- Inflation
- Dark matter
- Dark energy
- Cosmological structure formation
- Neutrino physics
- Cosmological concordance
- Statistical methods in astrophysics
- Weak gravitational lensing
- Sunyaev-Zel'dovich effects and tomography

EDUCATION

DOCTOR OF PHILOSOPHY

Since 06/2019

University of Melbourne

Thesis: Constraining Cosmology with Cosmic Microwave Background Observations of SPT-3G

Advisory Committee: Christian Reichardt, Rachel Webster, Raymond Volkas

MASTER OF SCIENCE IN PHYSICS

02/2017 - 12/2018

University of Melbourne

Advisor: Christian Reichardt

BACHELOR OF SCIENCE WITH HONOURS IN PHYSICS WITH ASTROPHYSICS

09/2013 - 06/2016

University of Sussex

Advisor: Robert E. Smith

PROFESSIONAL ACTIVITIES AND RESPONSIBILITIES

Member of the South Pole Telescope Collaboration

Since 2019

- Led the high-level analysis of the first SPT-3G power spectrum, including writing the likelihood software, carrying out the MCMC analysis, and interpreting cosmological results.
- Engaged in ongoing data analysis efforts and planning future cosmological analyses.

Organiser of the cosmology journal club, University of Melbourne

Since 2020

Telescopes in schools volunteer, University of Melbourne

Since 2018

SKILLS

- Technical: Python (Advanced), Objective-C (Intermediate), Fortran (Intermediate), C (Basic), HTML & CSS (Basic), Unix scripting (Basic), OpenMP, supercomputing on NERSC (USA)
- Scientific Software: CosmoMC, CAMB, Cobaya, HEALPix, polspice, scikit-learn, pandas
- Other: Data Visualisation, Signal Processing, Statistical Interpretation, German language (native)

AWARDS AND SCHOLARSHIPS

2021 Laby PhD Travelling Scholarship
2019 Melbourne Research Scholarship
2017 Elite Athlete Scholarship
2017 International Postgraduate Coursework Scholarship
2016 Andrew J. Symonds Memorial Award
2013 Scholar of the German National Academic Foundation

TEACHING

TEACHING ASSISTANT

University of Melbourne

- Introduction to Life, Earth and Universe 2021
- From the Solar System to the Cosmos 2020
- Physics first year laboratory 2017-2020

TEACHING ASSISTANT

University of Sussex

- Introduction to scientific Python programming 2015-2016

PROFESSIONAL EXPERIENCE

DATA ANALYST

08/2018-06/2019

Crypton Capital

96 Pelham St, Carlton VIC 3053, Australia

DEVELOPMENT INTERN

08/2018-06/2019

Touch Fantastic

Werks Central, 15-17 Middle Street, Brighton BN1 1AL, United Kingdom

INTERESTS

FENCING

- Achieved podium results at German, British, and Australian national competitions.
- British coaching qualification.
- Australian referee accreditation.
- Volunteered as University of Sussex Fencing Club secretary (2015-2016).

PRESENTATIONS AT SCIENTIFIC CONFERENCES

* = Talk; Inv. = Invited talk; Sem. = Seminar

- * 2021 August, Cosmo21, University of Illinois, USA — '*Constraints on Cosmology from the SPT-3G 2018 EE/TE Power Spectra*'
- * 2021 July, ASA2021, University of Melbourne, Australia — '*Constraints on Cosmology from the SPT-3G 2018 EE/TE Power Spectra*'
- Inv. 2021 June, Six week summer webinar series on the growth of structure over cosmic time — '*CMB Measurements of the Growth of Structure from SPT*'
- Sem. 2021 May, University of Sussex, UK — '*Constraints on Cosmology from the SPT-3G 2018 EE/TE Power Spectra*'
- Sem. 2021 April, KIPAC Tea Talk, Stanford University, USA — '*Constraints on Λ CDM Extensions from the SPT-3G 2018 EE/TE Power Spectra and their Implications for the Hubble Constant*'
- * 2019 December, AIP Summer Meeting 2019, RMIT, Australia — '*Preparing Next-Generation CMB Experiments for Big Data Challenges Using Extreme Digitisation*'
- * 2018 June, ASA 2018, Swinburne University, Australia — '*Using Extreme Digitisation to Combat Data Challenges in CMB Observations*'

LIST OF PUBLICATIONS

53 total citations of published works, average of 17.7 per paper, h-index of 3, according to Inspire

1. '*The Parameter-Level Performance of Covariance Matrix Conditioning in Cosmic Microwave Background Data Analyses*'
L. Balkenhol and C. L. Reichardt
Submitted to Monthly Notices of Royal Astronomical Society, arXiv:2110.03180
2. '*Consistency of Planck, ACT and SPT constraints on magnetically assisted recombination and forecasts for future experiments*'
S. Galli, L. Pogosian, K. Jedamzik, and **L. Balkenhol**
Submitted to Physical Review D, arXiv:2109.03816
3. '*Constraints on Λ CDM extensions from the SPT-3G 2018 EE and TE power spectra*'
L. Balkenhol, D. Dutcher, ... et al. [120 authors]
Physical Review D 104 (2021) 8, 083509
4. '*Measurements of the E -mode polarization and temperature-E -mode correlation of the CMB from SPT-3G 2018 data*'
D. Dutcher, **L. Balkenhol**, ... et al. [121 authors]
Physical Review D 104 (2021) 2, 022003
5. '*Extreme digitization for ground-based cosmic microwave background experiments*'
L. Balkenhol and C. L. Reichardt
Monthly Notices of Royal Astronomical Society vol. 487 (2019), no. 3, pp. 3279–3287.