

Justin Clancy

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RESEARCH INTERESTS

• Analysis methods in astrophysics and cosmology • Observational cosmology • Cosmological foregrounds & polarization
• Cosmic microwave background anisotropies • Astronomical instrumentation & pipeline development • Time-domain astrophysics • Astrophysical transient detection and classification • Instrumental simulations • Statistical forecasting • Simons Observatory (SO) • Cosmological simulations

Current Research Projects

- Constructing a pipeline for blind detection of astrophysical transients in time-ordered data with the Simons Observatory large aperture telescope
 - Forecasting the rapid transient detection capabilities of the above instrument
- Simulating the observable effects of the relativistic Sunyaev-Zeldovich effect on galaxy cluster catalogue creation and parameter estimation

For details, please visit the corresponding page on the [github.io](https://github.com/justinc97) website linked at the top.

EDUCATION

Ph.D Physics, School of Physics, University of Melbourne Feb 2021 — Current
Research Topics: Cosmology & Extragalactic Astronomy, Astronomical Instrumentation and Time-Domain Astronomy
Thesis: *Searching for millimeter-wave transients with the Simons Observatory*
Supervisor: Christian Reichardt

M.Sc Physics, School of Physics, University of Melbourne Feb 2020 — Nov 2021
Thesis Title: *Measurement of Beam Functions with Compact Objects for the Simons Observatory*
Supervisor: Christian Reichardt

B.Sc Science (Major in Physics), University of Melbourne Feb 2016 — Nov 2018

PROFESSIONAL ACTIVITIES AND RESPONSIBILITIES

Member of the Simons Observatory Collaboration Since 2020

- Led the statistical analysis of the first measurements of polarization fraction from Galactic cold clumps in *Planck* satellite data and forecasts for observing these with the Simons Observatory. This was the first publication from the Sources and Transients analysis working group within the Simons Observatory.
- Engaged in ongoing simulations, forecasting and software development for transient detection pipelines to be used by the Simons Observatory large aperture telescope
- Leading the development of a time-domain based detection pipeline for the above project

Organiser of the astrophysics department weekly meetings & presentations, University of Melbourne Since 2023
Organiser of the astrophysics segment for the Victorian year 10 work experience program, University of Melbourne 2022
Member of the CMB-S4 collaboration Since 2022

SKILLS

- Programming: Python (Advanced), R (Intermediate), Julia (Intermediate), C (Basic), HTML & CSS (Basic)
- Technical & Software: HEALPix, pip distribution, multiprocessing (mpi4py & python multiprocessing), Machine Learning (scikit-learn), pandas, data visualisation (matplotlib & Seaborn)
- Supercomputing: MPI, clusters used: NERSC (USA), Princeton – Simons1, Tiger, Della (USA)
- Statistical Interpretation & Signal Processing: Fourier, Bayesian, Power Spectrum Analysis
- Software Development, Git
- Independent Problem Solving, Management and training, Administration

TEACHING EXPERIENCE

Tutor - Teaching Assistant

University of Melbourne

2022 — Current

- PHYC10003 — Physics 1
- PHYC10004 — Physics 2: Physical Science & Technology
- Examination Marking

Lab Demonstrator

University of Melbourne

2020 — 2021

- PHYC10003 — Physics 1
- PHYC10008 — From the Solar System to the Cosmos
- MULT10011 — Introduction to Life, Earth and Universe
- Examination Marking

RESEARCH PROJECTS & EXPERIENCE

Quantifying the observational impact of the relativistic Sunyaev-Zeldovich Effect on galaxy cluster catalogue creation & parameter estimation.

Melbourne, Australia

Melbourne-Manchester-Toronto (MMT) Research Collaboration — Ph.D project at the University of Melbourne

2024 — Current

Using the *WebSky* suite of cosmological simulations we are investigating how the relativistic Sunyaev-Zeldovich effect will impact the creation of galaxy cluster catalogues in comparison to standard cosmological contaminants such as instrumental noise, foregrounds and the CMB.

Advisors: Christian Reichardt, Adam Hincks, Jens Chluba

Detection and Classification of transients with the Simons Observatory.

Melbourne, Australia

Simons Observatory Collaboration — Ph.D project at the University of Melbourne

2023 — Current

Leading the development of a pipeline to detect rapid astrophysical transients in time-ordered data obtained by the Simons Observatory large aperture telescope.

Advisors: Christian Reichardt, Adam Hincks, Carlos Hervias

Measuring the Polarization fraction of Planck Galactic cold clumps and forecasts for the Simons Observatory.

Melbourne, Australia

Simons Observatory Collaboration — Ph.D project at the University of Melbourne

2022 — 2023

Measured the mean-squared polarization fraction of a sample of Galactic cold clumps from the *Planck* satellite, tested for statistical dependencies and forecasted observational constraints for the Simons Observatory.

Publication: Clancy, J. et al. 2023

Advisors: Christian Reichardt, Giuseppe Puglisi

A Muse study of an extreme cluster merger.

La Serena, Chile

Cerro Tololo Inter-American Observatory & Gemini South

2019

Research Assistant — Self-organised unpaid internship

Obtained spectroscopic redshifts, galaxy velocity dispersions and galaxy spectra to define spectral classifications and features. Measured galaxy cluster merger dynamics and created Gemini Multi-Object Spectrograph (GMOS) masks.

Publication: Hernandez-Lang, D. et al. including Clancy, J. 2022

Advisors: Daniel Hernandez-Lang, Alfredo Zenteno

AWARDS AND SCHOLARSHIPS

Laby PhD Travelling Scholarship (*University of Melbourne*)

2024

Melbourne Research Scholarship (*University of Melbourne*)

2022

Research Training Program Scholarship (*University of Melbourne & Australian Government*)

2022 —

Klein Prize in Experimental Physics (*University of Melbourne*)

2022

PUBLICATIONS

Clancy, J. et al., (2023).

Polarization fraction of Planck Galactic cold clumps and forecasts for the Simons Observatory.

Published in Monthly Notices of the Royal Astronomical Society, doi: 10.1093/mnras/stac2099

Hernandez-Lang D. et al., including Clancy, J. (2022).

Clash of Titans: A MUSE dynamical study of the extreme cluster merger SPT-CL J0307-6225

Published in Monthly Notices of the Royal Astronomical Society, doi: 10.1093/mnras/stac2480

SCIENTIFIC PRESENTATIONS, COLLOQUIA AND SEMINARS

Invited Talks:

- May 2023. Pan-Experiment Galactic Science Group Talks, *virtual*, various institutions.
Polarization fraction of Planck Galactic cold clumps and forecasts for the Simons Observatory.
- Sep 2023. Astrophysics Seminar, *University of Melbourne*, Melbourne, Australia.
Exploring Millimeter Transients: Opportunities and Insights from Modern CMB Experiments and the Simons Observatory.
- Mar 2023. Astrophysics Seminar, *University of Melbourne*, Melbourne, Australia.
Polarization Fraction of Planck Galactic Cold Clumps and Forecasts for the Simons Observatory.
- Jul 2022. Astrophysics Seminar, *University of Melbourne*, Melbourne, Australia.
Polarization of Galactic Cold Clumps in the CMB.
- May 2021. Astrophysics Seminar, *University of Melbourne*, Melbourne, Australia.
Next Gen. CMB: The Future of Looking Back.

Contributed Talks:

- Dec 2024. 25th Congress of the Australian Institute of Physics (AIP), *Melbourne Convention and Exhibition Centre*, Melbourne, Australia.
Exploring Millimeter Transients: Opportunities and Insights from Modern CMB Experiments and the Simons Observatory.
- Jan 2024. Transients Down Under, *Swinburne University*, Melbourne, Australia.
Exploring Millimeter Transients: Opportunities and Insights from Modern CMB Experiments and the Simons Observatory.

Outreach Talks:

- Jun/Jul [2022, 2023, 2024]. Victorian Year 10 Work Experience Physics Lecture on Cosmology, *University of Melbourne*, Melbourne, Australia.

Posters:

- Jul 2024. Simons Observatory All-Hands Meeting, *University of Chicago*, Chicago, USA.
Finding Transients in Time Ordered Data.
- Jul 2023. Astronomical Society of Australia Annual Science Meeting, *Macquarie University*, New South Wales, Australia.
Polarization Fraction of Planck Galactic Cold Clumps and Forecasts for the Simons Observatory.
- Jul 2022. Simons Observatory All-Hands Meeting, *University of California, San Diego*, California, USA.
Polarization of Galactic Cold Clumps in the CMB.
- Jun 2022. Astronomical Society of Australia Annual Science Meeting, *University of Hobart*, Tasmania, Australia.
Polarization of Galactic Cold Clumps in the CMB.

REFERENCES

Please contact me via email for references.