HEATHER PRINCE

Postdoctoral Research Associate
Department of Physics and Astronomy
Rutgers University
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EDUCATION

2022   Ph.D. Astrophysical Sciences
Princeton University
Compressed likelihoods and early universe constraints for cosmic microwave background experiments

2018   M.A. Astrophysical Sciences
Princeton University

2016   M.Sc. Applied Mathematics, cum laude
University of KwaZulu-Natal, South Africa
Gravitational lensing of the cosmic microwave background: techniques and applications

2013   B.Sc.(Hons.), Applied Mathematics, summa cum laude
University of KwaZulu-Natal, South Africa
Real space gravitational lensing reconstruction from cosmic microwave background temperature and polarization

2012   B.Sc. Mathematics and Physics, with distinction
Rhodes University, South Africa

RESEARCH APPOINTMENTS

2022-   **Postdoctoral Research Associate**
Department of Physics and Astronomy, Rutgers University

PUBLICATIONS

H. Prince and J. Dunkley, *Compressed Python likelihood for large scale temperature and polarization from Planck*. Phys. Rev. D Volume 105 Issue 2 (2022), arXiv:2104.05715.

S. Aiola, E. Calabrese, L. Maurin, et al. (including **H. Prince**). *The Atacama Cosmology Telescope: DR4 maps and cosmological parameters*. JCAP 12 (2020) 047. arXiv:2007.07288.

S. K. Choi, M. Hasselfield, S.-P. P. Ho, et al. (including **H. Prince**). *The Atacama Cosmology Telescope: a measurement of the Cosmic Microwave Background power spectra at 98 and 150 GHz*. JCAP 12 (2020) 045. arXiv:2007.07289.

H. Prince and J. Dunkley, *Data compression in cosmology: A compressed likelihood for Planck data*. Phys. Rev. D Volume 100 Issue 8 (2019), arXiv:1909.05869.

R. Datta, S. Aiola, S. K. Choi, et al. (including **H. Prince**). *The Atacama Cosmology Telescope: two-season ACTPol extragalactic point sources and their polarization properties*. MNRAS 486, 5239 (2019). arXiv:1811.01854.

H. Prince, K. Moodley, J. Ridl., M. Bucher. *Real space lensing reconstruction using cosmic microwave background polarization*. JCAP 01 (2018) 034., arXiv:1709.02227.

B. Partridge,, L. Bonavera, M. López-Caniego, et. al. (including **H. Prince**). *Can CMB Surveys Help the AGN Community?* Galaxies, 5, 47 (2017).

AWARDS AND HONORS

Princeton University

2016	Dean's Grant (five year funding package)
	Princeton University First Year Fellowship

University of KwaZulu-Natal

2014	Vincent Maphai M.Sc.Scholarship
	Square Kilometer Array M.Sc. Bursary
2013	National Research Foundation of South Africa B.Sc. (Honors) Scholarship

Rhodes University

2012	Rhodes University Foundation Scholarship
	Alexander Ogg Prize for Physics
	David Williams Memorial Prize for Mathematics
	Investec Rhodes Top 100 Award for Academic Excellence in Science
2011	Rhodes Governors Scholarship
	Maryam Babangida Scholarship
	Trevor Williams Prize for Physics
	Sydney Cruise Memorial Prize for Mathematics
	Janinne Franke Prize for Computer Science
2010	Trevor Williams Prize for Physics
	Open Box Prize for Computer Science

INVITED TALKS

2021	Characterizing primordial fluctuations with the Atacama Cosmology Telescope
	Astronomy Seminar Columbia University
2021	Constraining isocurvature fluctuations with the Atacama Cosmology Telescope and the Simons Observatory
	Rutgers University

CONFERENCE PRESENTATIONS

2022	Foreground-marginalized likelihood for constraining primordial gravitational waves with the BICEP and Keck experiments
	American Astronomical Society Meeting, Seattle

2020   Data compression and likelihood-free inference in cosmology
        American Astronomical Society Meeting, Hawaii

2019   Data compression in cosmology: A lightweight *Planck* likelihood
        Cosmology on Safari Conference, South Africa

2015   Cross-correlating CMB lensing with post-reionisation HI intensity mapping surveys
        Square Kilometre Array Bursary Conference, Stellenbosch, South Africa

2015   Real space lensing reconstruction using cosmic microwave background polarization
        Cosmology on Safari Conference, South Africa

2014   Real space lensing reconstruction using cosmic microwave background polarization
        Square Kilometre Array Bursary Conference, Stellenbosch, South Africa

2014   Real space lensing reconstruction using cosmic microwave background polarization
        South African Gravity Society Conference, Cape Town, South Africa

2014   Real space lensing reconstruction using cosmic microwave background polarization
        Dark Side of the Universe Conference, Cape Town, South Africa

2014   Real space lensing reconstruction using cosmic microwave background polarization
        South African Institute of Physics Conference, Johannesburg, South Africa

CAMPUS AND COLLABORATION TALKS

2023   Forecasting dark energy constraints for the Rubin Observatory Legacy Survey of Space and Time
        Astronomy Seminar, Rutgers University

2022   Compressed likelihoods and early universe constraints for cosmic microwave background experiments
        Dissertation Talk, Princeton University

2018   Variability of blazars at 148 GHz in the Atacama Cosmology Telescope data
        Atacama Cosmology Telescope collaboration meeting, Princeton

2015   Cross-correlating CMB lensing with post-reionisation HI intensity mapping surveys
        University of KwaZulu-Natal Research Day, South Africa

2014   Real space lensing reconstruction using cosmic microwave background polarization
        University of KwaZulu-Natal Research Day, South Africa

TEACHING

Princeton University Prison Teaching Initiative
Instruct a unit (3-6 weeks) of a semester-long course accredited by Raritan Valley Community College or Rutgers University in a New Jersey correctional facility

Introductory Astronomy Course Developer (to be taught in Fall 2023)
Mathematics in the Courtroom (Spring 2023)
Mathematics: Pre-Algebra (Fall 2022, Spring 2019)
Introductory Physics with Laboratories (Spring 2020)
Mathematics: Pre-Calculus (Fall 2018)

Princeton University
Planets in the Universe: Teaching Assistant (Fall 2017)

University of KwaZulu-Natal
Physics Tutor, upper-level undergraduate classes (2014-2015)

Rhodes University
Physics Tutor (2011-2012)
Physics and Electronics Laboratories (2012)

RELEVANT COURSEWORK AND WORKSHOPS TAKEN

2021   Fundamentals of Machine Learning, Princeton University

2021   Modern Statistics, Princeton University

2019   Workshop on the Bolztmann-Einstein solvers CLASS and SONG, Center for Computational Astrophysics, New York

2017   Physics of the Universe, Princeton University

2016   Software Engineering for Scientific Computing, Princeton University

2014   Radio Astronomy School, University of KwaZulu-Natal, Durban, South Africa

2014   Exploiting Nature's Telescopes: A first look at the Hubble Space Telescope Frontier Fields, Durban, South Africa

TECHNICAL SKILLS

Programming Languages
C/C++
Python

Markup Languages
LaTeX

Software
NumPy, SciPy, pandas
scikit-learn
Astropy
Core Cosmology Library
Cosmological parameter estimation codes including CosmoSIS and Cobaya
Boltzmann codes including CLASS and CAMB
MCMC sampling codes including emcee
Simulation based inference codes including pydelfi

OUTREACH

2023   Illuminating the dark sector of the universe from the Atacama Desert (April 2023)
        Amateur Astronomers, Inc. Lecture, Cranford NJ

2022   Infrared light and the James Webb Space Telescope
        Elementary school science day activities

2019   Astronomy talk and Q&A
        Skype a Scientist virtual classroom talk, California

2019	Junior Girl Scout Career Talk Cranford NJ
2019	Girl Scout Career Day Panel Springfield NJ
2014- 2015	Astrophysics presentations at several high schools Durban, South Africa

ORGANIZER

2021	Mental health workshop for graduate students, Princeton NJ
2019	Astrophysics Department discussion on Maunakea and the Thirty Meter Telescope, Princeton NJ
2018	Free weekly yoga classes for students and staff in the Astrophysics Department, Princeton NJ

REFERENCES

Jo Dunkley
Department of Physics, Department of Astrophysical Sciences
Princeton University
jdunkley@princeton.edu

Eric Gawiser
Department of Physics and Astronomy
Rutgers University
gawiser@physics.rutgers.edu

Jenny Greene (teaching reference)
Department of Astrophysical Sciences
Princeton University
jgreene@astro.princeton.edu