Patrick Armstrong

omegalambda.au | patrick.armstrong@anu.edu.au | OmegaLambda1998 | 0000-0003-1997-3649

Education

Doctor of Philosophy (Astronomy & Astrophysics) — Australian National University
February 2020 – Present

Bachelor of Science (Adv.) (Hon.) — Australian National University
February 2016 – October 2019

Academic Experience

DES Builder — Dark Energy Survey
Develop & maintain the Pippin pipeline, Internal review of DES papers, Organise & host meetings. *July 2023 – Present*

MSATT Student Mentor — MSATT
Provide guidance and mentorship for highschool students completing astronomical projects. *February 2020 – Present*

Astronomical Tutor — Australian National University
Sole tutor for Galaxies and Cosmology (ASTR3002). *July 2019 – October 2022*

Other Experience

Student Seminar Planning Committee Member — Australian National University
[2022]: Senior planning committee member, [2021]: Planning committee member *February 2021 – October 2022*

Mt. Stromlo Outreach Officer — Australian National University
Deliver high quality outreach experience for school groups and families *January 2018 – December 2022*

Astronomical Consultant
[2020] Research for Questacon's Australia in Space exhibition
[2019] Research for Penguin Random House's Stargazer publication
[2018] Research and preparation for ABC's Stargazing Live 2018
[2018] Building backend code and moderation for the Skymapper Citizen Science Project: Supernova Sighting

Questacon Staff — Questacon
[2019 – 2020] Learning Programs Presenter (APS 4)
[2016 – 2019] Questacon Assistant (APS 2)
[2015 – 2019] Gallery Assistant (APS 1)

Recognition & Distinctions

ANU 2.3m Observing Time — Siding Spring Observatory
The Ultimate Low-z Supernova Sample for Cosmology *2023*

Alex Rodgers Travelling Scholarship — ANU College of Science
Travel to DES Collaboration Meeting 2022 *2022*

Commendation for Excellence in Tutoring or Demonstrating — ANU College of Science
Tutoring Galaxies and Cosmology (ASTR3002) *2022*

NCI ANU Merit Allocation Scheme — GADI
Forward Modelling Supernova Cosmology *2021 – 2022*

Australian Government Research Training Program — Australian National University
PhD Scholarship *2020 – Present*

RSAA Supplementary Scholarship — Australian National University
PhD Scholarship *2020 – Present*

ANU Science, Health, and Medicine Honours Scholarship — Australian National University
Honours Scholarship *2019*

ANU Summer Research Scholarship — Australian National University
Develop a TNS Bulk Report API for the SkyMapper Transient Survey *2016*

Boyapti Computer Science and Mathematics prize for first year — Australian National University
Top grades in mathematics and computing *2016*

Technical Skills

Python 3 Numpy, Scipy, Pandas, Emcee, GetDist, Ultranest
Covariance Matrix Calculator, Pippin Pipeline, Cosmology Validator

Julia Makie, PyCall, Unitful, AffineInvariantMCMC
Fit Supernovae Lightcurve, Approximate Supernovae Simulations

HTML, CSS, & Javascript Django, Franklin
DEBass Survey, Personal Website

Statistics
MCMC, ABC, and other Bayesian Inference, Frequentist Inference, Data Analysis, Data Visualisation

Publications

First Author

Probing the consistency of cosmological contours for supernova cosmology (doi: 10.1017/pasa.2023.40)
P. Armstrong, H. Qu, et. al. (2023); Publications of the Astronomical Society of Australia

SN2017jgh: a high-cadence complete shock cooling light curve of a SN IIb with the Kepler telescope (doi: 10.1093/mnras/stab2138)
P. Armstrong, B E. Tucker, et. al. (2022); Monthly Notices of the Royal Astronomical Society

Co-Author

The Dark Energy Survey Supernova Program: Cosmological Analysis and Systematic Uncertainties (doi: 10.48550/arXiv.2401.02945)
M. Vincenzi, D. Brout, ..., P. Armstrong, et. al. (2024); arXiv e-prints

The Dark Energy Survey: Cosmology Results With 1500 New High-redshift Type Ia Supernovae Using The Full 5-year Dataset (doi: 10.48550/arXiv.2401.02929)
DES Collaboration, T. M. C. Abbott, ..., P. Armstrong, et. al. (2024); arXiv e-prints

Binning is Sinning: Redemption for Hubble Diagram Using Photometrically Classified Type Ia Supernovae (doi: 10.3847/2041-8213/ace34d)
R. Kessler, M. Vincenzi, ..., P. Armstrong, et. al. (2023); The Astrophysical Journal Letters

VizieR Online Data Catalog: SN 2018agk spectra and NIR-UV light curves (Wang+, 2021) (bibcode: 2023yCat..19230167W)
Q. Wang, A. Rest, ..., P. Armstrong, et. al. (2024); VizieR Online Data Catalog

Revealing the Progenitor of SN 2021zby through Analysis of the TESS Shock-cooling Light Curve (doi: 10.3847/2041-8213/acb0d0)
Q. Wang, P. Armstrong, et. al. (2023); The Astrophysical Journal Letters

Revealing Progenitor of SN 2021zby with Shock Cooling Light Curve from TESS (bibcode: 2023AAS...24110716W)
Q. Wang, P. Armstrong, et. al. (2024); American Astronomical Society Meeting Abstracts

Concerning colour: The effect of environment on type Ia supernova colour in the dark energy survey (doi: 10.1093/mnras/stac3711)
L. Kelsey, M. Sullivan, ..., P. Armstrong, et. al. (2023); Monthly Notices of the Royal Astronomical Society

The Dark Energy Survey supernova program: cosmological biases from supernova photometric classification (doi: 10.1093/mnras/stac1404)
M. Vincenzi, M. Sullivan, ..., P. Armstrong, et. al. (2022); Monthly Notices of the Royal Astronomical Society

Measuring Cosmological Parameters with Type Ia Supernovae in redMaGiC Galaxies (doi: 10.3847/1538-4357/ac8b82)
R. Chen, D. Scolnic, ..., P. Armstrong, et. al. (2023); The Astrophysical Journal

The Pantheon+ Analysis: Cosmological Constraints (doi: 10.3847/1538-4357/ac8e04)
D. Brout, D. Scolnic, ..., P. Armstrong, et. al. (2023); The Astrophysical Journal

The dark energy survey 5-yr photometrically identified type Ia supernovae (doi: 10.1093/mnras/stac1691)
A. Möller, M. Smith, ..., P. Armstrong, et. al. (2023); Monthly Notices of the Royal Astronomical Society

SN 2018agk: A Prototypical Type Ia Supernova with a Smooth Power-law Rise in Kepler (K2) (doi: 10.3847/1538-4357/ac2c84)
Q. Wang, A. Rest, ..., P. Armstrong, et. al. (2022); The Astrophysical Journal

Rates and delay times of Type Ia supernovae in the Dark Energy Survey (doi: 10.1093/mnras/stab1943)
P. Wiseman, M. Sullivan, ..., P. Armstrong, et. al. (2023); Monthly Notices of the Royal Astronomical Society

First Results of the SkyMapper Transient Survey (doi: 10.1017/S1743921318002077)
A. Möller, B. E. Tucker, ..., P. Armstrong, et. al. (2022); IAU Symposium

Spectroscopic classification of SN 2018bwp as a type Ia supernova a few weeks after peak brightness (bibcode: 2018ATel11671....1L)
A. Lopez-Sanchez, L. Galbany, ..., P. Armstrong, et. al. (2022); The Astronomer's Telegram

Spectroscopic classification of SN 2018bwq as a type Ia supernova a few days before maximum light. (bibcode: 2018ATel11667....1L)
A. Lopez-Sanchez, L. Galbany, ..., P. Armstrong, et. al. (2022); The Astronomer's Telegram

First Confirmed Supernova with the SkyMapper/Zooniverse Supernova Sighting Project (bibcode: 2017ATel10426....1T)
B. E. Tucker, A. Moller, ..., P. Armstrong, et. al. (2022); The Astronomer's Telegram

WiFeS Classification of SMT17kdl/SN2017edm as a Type Ia Supernova (bibcode: 2017ATel10444....1T)
B. E. Tucker, A. Moller, ..., P. Armstrong, et. al. (2022); The Astronomer's Telegram

DEbass Transient Classification Report (69 Reports)
C. Lidman, B. Martin, ..., P. Armstrong, et. al.; Transient Name Server Classification Report

Transient Classification Report for 2021-10-12 (bibcode: 2021TNSCR3493....1L)
C. Lidman, M. Dixon, ..., P. Armstrong, et. al. (2022); Transient Name Server Classification Report

Classification of 11 supernovae by DEBass (bibcode: 2021ATel14925....1L)
C. Lidman, S. Dhaka, ..., P. Armstrong, et. al. (2022); The Astronomer's Telegram

SkyMapper Transient Discovery Report (15 Reports)
A. Moller, B. Tucker, ..., P. Armstrong, et. al.; Transient Name Server Discovery Report

Communcation

SN2017jgh: a high-cadence complete shock cooling light curve of a SN IIb with the Kepler telescope
Over 180 items in print, radio, and online, across Australia and internationally
***Highlights:**, Al Jazeera, National Geographic Indonesia, Radio Canada, De Morgen, ABC Science online, The Guardian, Space Australia, Sky News Australia, 2GB and on the AAP wires*
2021

Conference Talks

CosmoPalooza — Invited Speaker
DES SN 5 Year Methodology & Results — *2023*

DES Collaboration Meeting — Invited Speaker
DES 5 year supernova analysis — *2020, 2021, 2022, 2023*

ASA Annual Science Meeting — Speaker
DES 5 year supernova analysis — *2020, 2021, 2022, 2023*

Kepler K2 Extragalactic Data Analysis Meeting — Attendee
Investigating transients in Kepler's K2 survey — *2018*