

Patrick Armstrong

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EDUCATION

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|--|---|
| Doctor of Philosophy (Astronomy & Astrophysics) | Australian National University <i>February 2020 – Present</i> |
| Bachelor of Science (Adv.) (Hon.) | Australian National University <i>February 2016 – October 2019</i> |

ACADEMIC EXPERIENCE

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|-----------------------------|---|
| DES Builder | Dark Energy Survey <i>Develop & maintain the Pippin pipeline, Internal review of DES papers, Organise & host meetings. July 2023 – Present</i> |
| MSATT Student Mentor | MSATT <i>Provide guidance and mentorship for highschool students completing astronomical projects. February 2020 – Present</i> |
| Astronomical Tutor | Australian National University <i>Sole tutor for Galaxies and Cosmology (ASTR3002). July 2019 – October 2022</i> |

OTHER EXPERIENCE

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| Student Seminar Planning Committee Member <i>[2022]: Senior planning committee member, [2021]: Planning committee member</i> | Australian National University <i>February 2021 – October 2022</i> |
| Mt. Stromlo Outreach Officer <i>Deliver high quality outreach experience for school groups and families</i> | Australian National University <i>January 2018 – December 2022</i> |
| Astronomical Consultant <i>[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</i> | |
| Questacon Staff <i>[2019 – 2020] Learning Programs Presenter (APS 4) [2016 – 2019] Questacon Assistant (APS 2) [2015 – 2019] Gallery Assistant (APS 1)</i> | Questacon |

RECOGNITION & DISTINCTIONS

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| ANU 2.3m Observing Time <i>The Ultimate Low-z Supernova Sample for Cosmology</i> | Siding Spring Observatory <i>2023</i> |
| Alex Rodgers Travelling Scholarship <i>Travel to DES Collaboration Meeting 2022</i> | ANU College of Science <i>2022</i> |
| Commendation for Excellence in Tutoring or Demonstrating <i>Tutoring Galaxies and Cosmology (ASTR3002)</i> | ANU College of Science <i>2022</i> |
| NCI ANU Merit Allocation Scheme <i>Forward Modelling Supernova Cosmology</i> | GADI <i>2021 – 2022</i> |
| Australian Government Research Training Program <i>PhD Scholarship</i> | Australian National University <i>2020 – Present</i> |
| RSAA Supplementary Scholarship <i>PhD Scholarship</i> | Australian National University <i>2020 – Present</i> |
| ANU Science, Health, and Medicine Honours Scholarship <i>Honours Scholarship</i> | Australian National University <i>2019</i> |
| ANU Summer Research Scholarship <i>Develop a TNS Bulk Report API for the SkyMapper Transient Survey</i> | Australian National University <i>2016</i> |
| Boyapti Computer Science and Mathematics prize for first year <i>Top grades in mathematics and computing</i> | Australian National University <i>2016</i> |

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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://ui.adsabs.org/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](https://ui.adsabs.org/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](https://ui.adsabs.org/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](https://ui.adsabs.org/2017ATel10444....1T))

B. E. Tucker, A. Moller, ..., P. Armstrong, et. al. (2022); The Astronomer's Telegram

DEbass Transient Classification Report (73 Reports)

B. Martin, P. Armstrong, ..., P. Armstrong, et. al.; Transient Name Server Classification Report

Transient Classification Report for 2021-10-12 (bibcode: [2021TNSCR3493....1L](https://ui.adsabs.org/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](https://ui.adsabs.org/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

COMMUNICATION

**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

DES SN 5 Year Methodology & Results

Invited Speaker

2023

DES Collaboration Meeting

DES 5 year supernova analysis

Invited Speaker

2020, 2021, 2022, 2023

ASA Annual Science Meeting

DES 5 year supernova analysis

Speaker

2020, 2021, 2022, 2023

Kepler K2 Extragalactic Data Analysis Meeting

Investigating transients in Kepler's K2 survey

Attendee

2018