

Patrick Armstrong

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EDUCATION

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

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

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

RECOGNITION & DISTINCTIONS

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