

# Patrick Armstrong

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## EDUCATION

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### Doctor of Philosophy (Astronomy & Astrophysics)

Australian National University  
*February 2020 – Present*

### Bachelor of Science (Adv.) (Hon.)

*Physics Major, Astrophysics Specialisation*

Australian National University  
*February 2016 – October 2019*

## ACADEMIC EXPERIENCE

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### DES Builder

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

Dark Energy Survey

### Infrastructure Lead

*Develop & maintain the DEBass Survey database and website.*

DEbass Survey  
*March 2021 – Present*

### MSATT Student Mentor

*Provide guidance and mentorship for high-school students completing astronomical projects.* *February 2020 – Present*

MSATT

### Astronomical Tutor

*Sole tutor for Galaxies and Cosmology (ASTR3002).*

Australian National University  
*July 2019 – October 2022*

## OTHER EXPERIENCE

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### Student Seminar Planning Committee Member

*[2022]: Senior planning committee member, [2021]: Planning committee member*

Australian National University  
*February 2021 – October 2022*

### Mt. Stromlo Outreach Officer

*Deliver high quality outreach experience for school groups and families*

Australian National University  
*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 back-end code and moderation for the SkyMapper Citizen Science Project: Supernova Sighting*

### Questacon Staff

*[2019 – 2020] Learning Programs Presenter (APS 4)*

*[2016 – 2019] Questacon Assistant (APS 2)*

*[2015 – 2019] Gallery Assistant (APS 1)*

Questacon

## RECOGNITION & DISTINCTIONS

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### ANU 2.3m Observing Time

*The Ultimate Low-z Supernova Sample for Cosmology*

Siding Spring Observatory  
*2023*

### Alex Rodgers Travelling Scholarship

*Travel to DES Collaboration Meeting 2022*

ANU College of Science  
*2022*

### Commendation for Excellence in Tutoring or Demonstrating

*Tutoring Galaxies and Cosmology (ASTR3002)*

ANU College of Science  
*2022*

### NCI ANU Merit Allocation Scheme

*Forward Modelling Supernova Cosmology*

GADI  
*2021 – 2022*

**Australian Government Research Training Program**  
*PhD Scholarship*

Australian National University  
*2020 – Present*

**RSAA Supplementary Scholarship**  
*PhD Scholarship*

Australian National University  
*2020 – Present*

**ANU Science, Health, and Medicine Honours Scholarship**  
*Honours Scholarship*

Australian National University  
*2019*

**ANU Summer Research Scholarship**  
*Develop a TNS Bulk Report API for the SkyMapper Transient Survey*

Australian National University  
*2016*

**Boyapti Computer Science and Mathematics prize for first year**  
*Top grades in mathematics and computing*

Australian National University  
*2016*

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## TECHNICAL SKILLS

### Python 3

*Example Projects:* Pippin Pipeline, Approximate Neyman Construction Cosmology Validator

### Julia

*Example Projects:* Fit Type II Shock Cooling Lightcurves, Approximate SALT2/3 Simulations,  
Create JLA-like Covariance Matrices

### HTML, CSS, & Javascript

*Example Projects:* DEBass Survey, Personal Website

### Statistics

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

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## 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](https://bibcode.org/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](https://ui.adsabs.org/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](#))

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

## COMMUNICATION

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### **SN2017jgh: a high-cadence complete shock cooling light curve of a SN I Ib 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

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### **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 Extra-galactic Data Analysis Meeting**

*Investigating transients in Kepler's K2 survey*

Attendee

2018