

Samuel Hinton

PhD, samuelreay@gmail.com, CosmicCoding.com.au

Education

- 2016–2020 **Doctor of Philosophy** University of Queensland
Analysing supernovae in the Dark Energy Survey using Hierarchical Bayesian models to help constrain the nature of dark energy.
- 2010–2015 **Bachelor of Science (Physics)(Hons, 1st)** University of Queensland
Thesis: Analysed the Baryon Acoustic Oscillation signal imprinted in the large scale structure of the universe using the WiggleZ survey. Won the Astronomical Society of Australia's award for best Australian Astrophysics honours thesis of the year.
- 2010–2014 **Bachelor of Engineering (Software)(Hons, 1st)** University of Queensland
Thesis: Created the first online client-only web-application to compute redshifts from telescope spectra. Won the GroudpProbe prize, IEEE student thesis prize and IET student prize.

Experience

- 2020–Now **Arenko Group** London, UK
Senior Data Scientist
Implemented MLOps pipelines for data engineering, model versioning and productionising code. Implemented ML models to predict energy markets, and created algorithms to utilise market predictions to produce optimal profit.
- 2020 **COVID-19 Critical Care Consortium** Brisbane, Queensland, Australia
Lead Data Analyst
Technical lead for the COVID-19 Critical Care Consortium. Created the data pipeline to automatically produce machine-learning-ready data products for use in the study. Created reports for clinical staff and hosted a dashboard for use in hospital sites to provide insights from the data products.
- 2020 **University of Queensland** Brisbane, Queensland, Australia
Postdoctoral Researcher
Continued research in the areas of supernova cosmology and large scale structure, focusing heavily upon analysis pipelines and systematics control through efficient use of simulations and mocks.
- 2019 **SuperDataScience** Sunshine Coast, Queensland, Australia
Course Instructor
Created a course on statistical analysis in Python for students. Focused on applied statistics and utilisation of modern code packages, with attention given to visual output and workflows for continuous validation of methodology.
- 2017, 2016 **Lawrence Berkeley National Laboratory** Berkeley, California
Research Fellowship
Research fellowship to work on Bayesian Hierarchical Modelling and its applications to Supernova Cosmology. Specifically, investigating how to use high dimensional hierarchical models to model individual supernova instead of populations to provide better constraints on cosmology using supernova discovered by the Dark Energy Survey.

2015–2016	Gemini & Australian Astronomical Observatory <i>Research Intern</i> Utilised photometric data of Maffei 1 to determine globular cluster candidates and their properties for spectroscopic follow-up. Utilised data reduction pipelines, automated analysis methods in Python, and applied machine learning techniques to perform object classification.	La Serena, Chile
2010–2014	GBST <i>Software Developer</i> Developed business intelligence reporting solutions, designing and developing server and client based web application code, creation of large scale SQL queries, optimising queries, databases and applications for network, processing and memory constraints, developed back-end server code and front-end web applications.	Brisbane, Queensland, Australia

Noteable Awards

2019	Lindau Nobel Laureate Delegate	Representing Australia at LINO19.	Australian Academy of Science
2019	Future Superstar Award	Science's highest performing PhD student.	University of Queensland
2016	Bok Prize	Best astrophysics honours thesis in Australia.	Astronomical Society of Australia
2016	Australian Postgraduate Award		Australian Government
2016	Science Faculty Graduate of the Year		University of Queensland
2016	Australian Institute of Physics Prize	Top physics graduate.	University of Queensland
2016	University Medal (Science)		University of Queensland
2015	Australian Gemini Undergraduate Summer Studentships		AAO
2015	AAO Honours Scholarship		Australian Astronomical Observatory
2015	University Medal (Engineering)		University of Queensland

Other Awards

2015	Rhodes Scholarship Finalist		Oxford University
2015	A.W. Oakes Scholarship		St John's College
2015	Harriet Marks Bursary	Academic merit in science honours.	University of Queensland
2015	10x Deans Commendation		University of Queensland
2015	Helen Thompson Prize for All Round Excellence		St John's College
2015	IET Student Prize	Outstanding academic success.	The Institution of Engineering and Technology
2015	David Andrew Krnak Memorial Prize	Top engineering graduate.	University of Queensland
2014	UQ Future Leader		University of Queensland
2014	IEEE Student Thesis Prize	Best final year thesis.	IEEE
2014	GroundProbe Prize	Best final year thesis.	University of Queensland
2014	RWH Hawken Scholar		University of Queensland
2014	UQ Summer Research Scholarship		University of Queensland
2012	Walter Bruce Darker Scholarship		University of Queensland
2012	Exxon Mobil Achievement Award	Top mechanical engineering student.	University of Queensland
2011	Alstom Prize	Top electrical engineering student.	University of Queensland
2010	UQ Academic Excellence Scholarship		University of Queensland
2010	ICT Enabling Scholarship		University of Queensland
2010	John Black Prize		University of Queensland

Communication

2021	Industry Guest	CodeHers
	Gave workshops and presentations to highschool students on coding, machine learning, and careers in STEM.	
2021	Interviewed Data Scientist	SuperDataScience Podcast
	Participated in multiple SDS podcast episodes about topics in data science, from hypothesis testing to MLOps.	
2020	Scientific Correspondent	CNET, CBS
	Acted as a scientific correspondent for multiple organisations to break down complicated scientific research into everyday terms.	
2020	Coding@Home Industry Partner	Queensland Education, Coding@Home
	Shared the modern and future role of coding and machine learning from the perspective of an astronomer and scientist.	
2020	FameLab National Finalist	British Council
	National finalist in the FameLab program, with topic "Can you hear the Big bang?"	
2020	Science Friction Guest	ABC Radio National
	Discussed the huge transition from astrophysics to data analytics due to the COVID-19 pandemic, and the transferable skillset that science gives you.	
2020	NYSF Guest Panelist	National Youth Science Forum
	Shared my personal journey in science outreach, and presented on how to give effective presentations.	
2019-2017	ScopeTV Guest Scientist	ScopeTV, Channel 10
	Helped script, narrate and appear in ScopeTV educational astronomy episodes.	
2019	Science Says! Scientific Panelist	World Science Festival
	Panel scientist for Science Says, a comedy science show for Brisbane's World Science Festival.	
2019	Probably Science Podcast Guest Scientist	Probably Science Live Podcast and Comedy Show
	Guest scientist for Probably Science, joining the previous guests of Neil deGrasse Tyson, Sean Carroll and more.	
2019	2SER Radio Scientific Correspondent	Radio, 2SER
	Monthly scientific and astronomy updates.	
2019-2018	Podcast Host	Commuting the Cosmos
	Hosted and presented on a podcast about various space related concepts.	
2018	Curious Kids Writer	The Conversation
	Consulted and authored articles for The Conversation's Curious Kids program.	
2018	BrisScience Presenter	BrisScience & UQ
	Invited to talk at the monthly BrisScience event on the dark side of the universe.	
2018	Australian Survivor Invited Contestant, Academic Champion	Endemol Shine
	Cast as the academic champion for the 'Champions v. Contenders' season of Australian Survivor.	
2018-2017	School Guest Presenter	Clayfield College, Gumdale State School
	Talks to primary and secondary students on astronomy, science, STEM and career pathways.	
2019-2017	Science Communicator	Pint of Science, Physics in the Pub
	Gave public talks to a general audience about various topics in astronomy.	
2017	Invited Presenter	Research Education and Development Retreat
	Invited presenter at a progressional development program for physics PhD, honours and undergraduate students.	

2017	Workshop Organiser, Host and Presenter Created and presented a code workshop focusing on open-source science run across Australia.	CAASTRO Code Workshop
2017	Battle of the Brains Panel Scientist Invited participant in a games panel discussion for physicists during National Science Week.	National Science Week
2017	World Science Festival Tour Guide Scientific tour guide for the Large Hadron Collider exhibit during the World Science Festival.	Queensland Museum & UQ
2017	FameLab Australia Scientist State finalist FameLab scientist. Public communication through radio interview and stage presentation.	British Council
2016	Guest Scientist, An Evening with Dr Lisa Randall Gave the opening speech for the Brisbane event, talking about the exciting future of astronomy.	ThinkInc
2016	UQ Science Demo Troupe Member Joined the UQ Science Demo troupe to create resources for the group and participate in UQ demonstrations.	University of Queensland
2016	Uluru Astronomer in Residence Accompanied Sky Tours to answer scientific questions from the public and gave public lectures on popular astronomy topics.	CAASTRO

Teaching

2020	Data Manipulation in Python	SuperDataScience
2019	Python for Statistical Analysis	SuperDataScience
2019	Frontiers of Astrophysics Guest Lecturer	University of Queensland
2018	Introduction to Astrophysics Guest Lecturer	University of Queensland
2018	Cosmology Tutor and Guest Lecturer	University of Queensland
2018	Supervisor - Capstone Project	University of Queensland
2017	Computational Physics Tutor	University of Queensland
2017	Computational Physics Content Creator	University of Queensland
2017	Supervisor - Summer Project	University of Queensland
2015	5-Minute Physics Content Creator	University of Queensland

Presentations

June 2020	Data Science Pipelines	DataScienceGo Virtual Conference
May 2020	Getting Started with Pippin	Duke University
Jan 2020	Supernova Cosmology updates from the Dark Energy Survey	AAS
Oct 2019	Pippin: A pipeline for SN Ia cosmology	SCAM
Jul 2019	Barry - A BAO model fitting framework	Python in Astronomy
Mar 2019	The path towards Photometric Supernova Cosmology with DES	Cosmology on Safari
Feb 2019	Hitting the Limits of Supernova cosmology	ANITA
Nov 2017	Coding Practises for the Busy Astronomer	CAASTRO
Jun 2017	Hierachical Bayesian Models for Supernova Cosmology	Lawrence Berkeley National Lab
Dec 2016	Introduction to git and code management	University of Cambridge
Dec 2016	Hierachical Bayesian Models for Supernova Cosmology	University of Southampton
Dec 2016	Hierachical Bayesian Models for Supernova Cosmology	University of Portsmouth
Nov 2016	Sound waves in Space: Wigglez and the BAO	Swinburne University of Technology
Aug 2016	Publishing Packages in Python	University of Queensland
Aug 2016	ChainConsumer: Plots and LaTeX from MCMC chains	CAASTRO
May 2016	Hieracrhical Bayesian Models for Supernova Cosmology	Standford University
Feb 2016	Detecting Globular Clusters in Maffei 1	Gemini Institute
Nov 2015	Marz - Redshifting software inside your browser	OzDES Workshop

Publications

Core Author

Pippin: A pipeline for supernova cosmology

Hinton, Samuel and Dillon Brout *Journal of Open Source Software* 5.47 (2020) p. 2122. *The Open Journal*

BARRY and the BAO model comparison

Hinton, Samuel R., Cullan Howlett, and Tamara M. Davis *MNRAS* 493.3 (Apr. 2020) pp. 4078–4093

Can redshift errors bias measurements of the Hubble Constant?

Davis, Tamara M. et al. *MNRAS* (Sept. 2019) p. 2279

Steve: A Hierarchical Bayesian Model for Supernova Cosmology

Hinton, S. R. et al. *The Astrophysical Journal* 876.1 (Apr. 2019) p. 15. *American Astronomical Society*

Measuring the 2D baryon acoustic oscillation signal of galaxies in WiggleZ: cosmological constraints

Hinton, S. R. et al. *MNRAS* 464 (Feb. 2017) pp. 4807–4822

ChainConsumer

Hinton, S. R. *JOSS* 1.4 (Aug. 2016). *The Open Journal*

Marz: Manual and automatic redshifting software

Hinton, S.R. et al. *Astronomy and Computing* 15 (2016) pp. 61–71

Science Contributions

OzDES multi-object fibre spectroscopy for the Dark Energy Survey: Results and second data release

Lidman, C. et al. *MNRAS* (May 2020)

Supernova Siblings: Assessing the Consistency of Properties of Type Ia Supernovae that Share the Same Parent Galaxies

Scolnic, D. et al. *ApJ* 896.1, L13 (June 2020) p. L13

First Cosmology Results using Supernovae Ia from the Dark Energy Survey: Survey Overview, Performance, and Supernova Spectroscopy

Smith, M. et al. *AJ* 160.6, 267 (Dec. 2020) p. 267

First cosmology results using type Ia supernovae from the Dark Energy Survey: the effect of host galaxy properties on supernova luminosity

Smith, M. et al. *MNRAS* 494.3 (Apr. 2020) pp. 4426–4447

The host galaxies of 106 rapidly evolving transients discovered by the Dark Energy Survey

Wiseman, P. et al. *MNRAS* 498.2 (Oct. 2020) pp. 2575–2593

First Cosmology Results using Type Ia Supernovae from the Dark Energy Survey: Constraints on Cosmological Parameters

Abbott, T. M. C. et al. *ApJ* 872.2, L30 (Feb. 2019) p. L30

First Cosmology Results Using SNe Ia from the Dark Energy Survey: Analysis, Systematic Uncertainties, and Validation

Brout, D. et al. *ApJ* 874.2, 150 (Apr. 2019) p. 150

First Cosmology Results Using Type Ia Supernovae from the Dark Energy Survey: Photometric Pipeline and Light-curve Data Release

Brout, D. et al. *ApJ* 874.1, 106 (Mar. 2019) p. 106

First cosmology results using Type Ia supernova from the Dark Energy Survey: simulations to correct supernova distance biases

Kessler, R. et al. *MNRAS* 485.1 (May 2019) pp. 1171–1187

First cosmology results using Type Ia supernovae from the dark energy survey: effects of chromatic corrections to supernova photometry on measurements of cosmological parameters

Lasker, J. et al. *MNRAS* 485.4 (June 2019) pp. 5329–5344

First cosmological results using Type Ia supernovae from the Dark Energy Survey: measurement of the Hubble constant
 Macaulay, E. et al. *MNRAS* 486.2 (June 2019) pp. 2184–2196

OzDES multifibre spectroscopy for the Dark Energy Survey: 3-yr results and first data release
 Childress, M. J. et al. *Monthly Notices of the Royal Astronomical Society* 472 (Nov. 2017) pp. 273–288

OzDES multifibre spectroscopy for the Dark Energy Survey: first-year operation and results
 Yuan, F. et al. *Monthly Notices of the Royal Astronomical Society* 452 (Sept. 2015) pp. 3047–3063

Infrastructure / Data Contributions

The first Hubble diagram and cosmological constraints using superluminous supernovae
 Inserra, C. et al. *MNRAS* (Apr. 2021)

Is diffuse intracluster light a good tracer of the galaxy cluster matter distribution?
 Sampaio-Santos, H. et al. *MNRAS* 501.1 (Feb. 2021) pp. 1300–1315

STRIDES: Spectroscopic and photometric characterization of the environment and effects of mass along the line of sight to the gravitational lenses DES J0408-5354 and WGD 2038-4008
 Buckley-Geer, E. J. et al. *MNRAS* 498.3 (Nov. 2020) pp. 3241–3274

Increasing the census of ultracool dwarfs in wide binary and multiple systems using Dark Energy Survey DR1 and Gaia DR2 data
 dal Ponte, M. et al. *MNRAS* 499.4 (Dec. 2020) pp. 5302–5317

Studying Type II supernovae as cosmological standard candles using the Dark Energy Survey
 de Jaeger, T. et al. *MNRAS* (May 2020)

Validation of selection function, sample contamination and mass calibration in galaxy cluster samples
 Grandis, S. et al. *MNRAS* 498.1 (Oct. 2020) pp. 771–798

Dark Energy Survey identification of a low-mass active galactic nucleus at redshift 0.823 from optical variability
 Guo, Hengxiao et al. *MNRAS* 496.3 (Aug. 2020) pp. 3636–3647

DES16C3cje: A low-luminosity, long-lived supernova
 Gutiérrez, C. P. et al. *MNRAS* (May 2020)

Chemical Analysis of the Ultrafaint Dwarf Galaxy Grus II. Signature of High-mass Stellar Nucleosynthesis
 Hansen, T. T. et al. *ApJ* 897.2, 183 (July 2020) p. 183

The impact of spectroscopic incompleteness in direct calibration of redshift distributions for weak lensing surveys
 Hartley, W. G. et al. *MNRAS* 496.4 (Aug. 2020) pp. 4769–4786

Design and rationale of the COVID-19 Critical Care Consortium international, multicentre, observational study
 Li Bassi, Gianluigi et al. *BMJ Open* 10.12 (2020). *British Medical Journal Publishing Group*

Constraints on the Physical Properties of GW190814 through Simulations Based on DECam Follow-up Observations by the Dark Energy Survey
 Morgan, R. et al. *ApJ* 901.1, 83 (Sept. 2020) p. 83

Milky Way Satellite Census. II. Galaxy-Halo Connection Constraints Including the Impact of the Large Magellanic Cloud
 Nadler, E. O. et al. *ApJ* 893.1, 48 (Apr. 2020) p. 48

The mystery of photometric twins DES17X1boj and DES16E2bjy
 Pursiainen, M. et al. *MNRAS* 494.4 (Apr. 2020) pp. 5576–5589

Supernova Host Galaxies in the Dark Energy Survey: I. Deep Coadds, Photometry, and Stellar Masses
 Wiseman, P. et al. *MNRAS* (May 2020)

Quasar Accretion Disk Sizes from Continuum Reverberation Mapping in the DES Standard-star Fields
 Yu, Zhefu et al. *ApJS* 246.1, 16 (Jan. 2020) p. 16

A joint SZ-Xray-optical analysis of the dynamical state of 288 massive galaxy clusters

Zenteno, A. et al. *MNRAS* (May 2020)

Cosmological Constraints from Multiple Probes in the Dark Energy Survey
Abbott, T. M. C. et al. *Phys. Rev. Lett.* 122 (17 May 2019) p. 171301. *American Physical Society*

C IV black hole mass measurements with the Australian Dark Energy Survey (OzDES)
Hoormann, J. K. et al. *MNRAS* 487.3 (Aug. 2019) pp. 3650–3663

Dark Energy Survey year 1 results: Cosmological constraints from galaxy clustering and weak lensing
Abbott, T. M. C. et al. *Phys. Rev. D* 98 (4 Aug. 2018) p. 043526. *American Physical Society*

The Dark Energy Survey: Data Release 1
Abbott, T. M. C. et al. *ApJS* 239, 18 (Dec. 2018) p. 18

The WiggleZ Dark Energy Survey: final data release and the metallicity of UV-luminous galaxies
Drinkwater, M. J. et al. *Monthly Notices of the Royal Astronomical Society* 474 (Mar. 2018) pp. 4151–4168

Dark Energy Survey year 1 results: Galaxy clustering for combined probes
Elvin-Poole, J. et al. *Phys. Rev. D* 98 (4 Aug. 2018) p. 042006. *American Physical Society*

Dark Energy Survey Year 1 Results: Cross-Correlation Redshifts - Methods and Systematics Characterization
Gatti, M. et al. *Monthly Notices of the Royal Astronomical Society* (Feb. 2018)

DES science portal: Computing photometric redshifts
Gschwend, J. et al. *Astronomy and Computing* 25 (Oct. 2018) pp. 58–80

Dark Energy Survey Year 1 Results: redshift distributions of the weak-lensing source galaxies
Hoyle, B et al. *Monthly Notices of the Royal Astronomical Society* 478.1 (2018) pp. 592–610

Quasar Accretion Disk Sizes from Continuum Reverberation Mapping from the Dark Energy Survey
Mudd, D. et al. *ApJ* 862, 123 (Aug. 2018) p. 123

Rapidly evolving transients in the Dark Energy Survey
Pursiainen, M et al. *Monthly Notices of the Royal Astronomical Society* 481.1 (2018) pp. 894–917

The Taipan Galaxy Survey: Scientific Goals and Observing Strategy
da Cunha, E. et al. *PASA* 34, e047 (Oct. 2017) e047

Discovery of a $z = 0.65$ post-starburst BAL quasar in the DES supernova fields
Mudd, D. et al. *Monthly Notices of the Royal Astronomical Society* 468 (July 2017) pp. 3682–3688

A Study of Quasar Selection in the Supernova Fields of the Dark Energy Survey
Tie, S. S. et al. *AJ* 153, 107 (Mar. 2017) p. 107

The 2-degree Field Lensing Survey: design and clustering measurements
Blake, C. et al. *Monthly Notices of the Royal Astronomical Society* 462 (Nov. 2016) pp. 4240–4265