Andrew R. **Casey**

Astrophysicist · Aerospace Engineer

Monash Centre for Astrophysics, Monash University, Clayton, Australia

+61 (0) 431 296 185 | andy@astrowizici.st | astrowizici.st | andycasey | andrew-casey

Professional appointments

Research fellow in statistics and astrophysics — *Melbourne, Australia*

Monash Centre for Astrophysics, Monash University — *2017 – Present*

Post-doctoral researcher in astrophysics — *Cambridge, England*

Institute of Astronomy, University of Cambridge — *2014 – 2017*

Aerospace engineer — *Melbourne, Australia*

Victorian Partnership for Advanced Computing — *2007 – 2009*

Education

Australian National University — *Canberra, Australia*

Doctor of Philosophy (Astronomy & Astrophysics) — *2010 – 2013*

- Thesis title: A Tale of Tidal Tails in the Milky Way
- Thesis supervisors: Dr Stefan Keller, Prof Gary Da Costa, Prof Brian Schmidt AC FRS FAA (2011 Physics Nobel Prize winner)

Monash University — *Melbourne, Australia*

Bachelor of Aerospace Engineering (with Honours) — *2005 – 2008*

- Thesis title: A numerical investigation of a skip-and-feathered configuration for orbital re-enty
- Thesis score: 98/100
- Thesis supervisor: Dr Greg Sheard

Honors & Awards

Research

2015–2017	**Senior Member**, King's College, University of Cambridge	*Cambridge, UK*
2012	**Australian Prime Minister's Endeavour Award**, 12-month fellowship at MIT (award value $42,500)	*Boston, USA*
2011	**Vice-Chancellor's Award for Community Outreach**, Australian National University	*Canberra, Australia*
2012	**Vice-Chancellor's Higher Degree Research Grant**, Australian National University (award value $5,000)	*Canberra, Australia*
2012	**Alex Rodgers Scholarship**, Australian National University	*Cambridge, UK*
2012	**Gaia Research for European Astronomy Training (GREAT)**, European Science Foundation	*Nice, France*
2012	**Access to Major Research & Facilities Grant**, Australian Nuclear Science and Technology Organisation	*LCO, Chile*
2014–2015	**Travel grants for consecutively top-ranked telescope time proposal**, OPTICON	*Cambridge, UK*
2010–2013	**Doctor of Philosophy Scholarship**, Australian National University	*Canberra, Australia*

Entrepreneuring & Innovation

2011	**InnovationACT: First Prize Winner**, Most innovative idea and best business plan (award value $25,000)	*Canberra, Australia*
2011	**InnovationACT: Best Elevator Pitch**, Best 30-second elevator pitch (award value $2,500)	*Canberra, Australia*
2011	**InnovationACT: Best Initial Pitch**, Best 2-minute pitch (award value $1,500)	*Canberra, Australia*
2011	**ATP Innovation Grant**, Awarded $500 innovation grant	*Canberra, Australia*

Skills

Statistics	Bayesian inference, probabilistic programming, generative models, mathematical modelling
Data analysis	Algorithms, machine learning, data science, engineering large data systems
Programming	Python, PostgreSQL, Spark, Hadoop, C, FORTRAN, TEX, Ruby, Matlab, Javascript, HTML5, CSS, git, test-driven development

Seminars & Conference Talks

2016	**Queen's University, Belfast**, Data-driven models for stellar spectroscopy	*Ireland*
2016	**Annual General Meeting of the Australian Astronomical Society**, The Li-rich giant star problem	*Australia*
2016	**University of Cambridge**, The Li-rich giant star problem	*England*
2016	**Durham University**, Extremely metal-poor stars from the cosmic dawn	*England*
2016	**University of Cambridge**, The Cannon	*England*
2016	**Massachusetts Institute of Technology**, Should all stellar spectroscopists be fired, or just most?	*USA*
2016	**University of Birmingham**, The Li-rich giant star problem	*England*
2016	**University of Cambridge**, Extremely metal-poor stars from the cosmic dawn	*England*
2015	**The Gaia-ESO Survey: Third science meeting**, Producing robust ensemble measurements from UVES data	*Lithuania*
2015	**Stellar Streams in the Local Universe**, Stellar stream chemistry	*Germany*
2015	**Sydney Institute for Astrophysics, University of Sydney**, Homogenisation of Gaia-ESO Survey data	*Australia*
2015	**Macquarie University Astrophysics & Astrophotonics**, Homogenisation of Gaia-ESO Survey data	*Australia*
2015	**Australian Astronomical Observatory**, The Best & Brightest Metal-poor Stars	*Australia*
2014	**University of Hertfordshire**, The Best & Brightest Metal-poor Stars	*England*
2014	**University of Cambridge**, The Orphan Stream	*England*
2013	**Monash University**, The Orphan Stream	*Australia*
2014	**Australian National University**, A Tale of Tidal Tails in the Milky Way	*Australia*
2013	**Annual General Meeting of the Australian Astronomical Society**, The Aquarius stream	*Australia*
2013	**New Advances in Stellar Physics**, The SkyMapper extremely metal-poor star program	*France*
2013	**Australian Astronomical Observatory**, Spectroscopy Made Hard	*Australia*
2013	**Macquarie University Astrophysics & Astrophotonics Department**,	*Australia*
2013	**Uppsala Universitet, Ångströmlaboratory**, The Aquarius stream is not a disrupted globular cluster	*Sweden*
2012	**Massachusetts Institute of Technology**, The Orphan Stream	*USA*
2012	**University of Heidelberg, Landessternwarte Königstuhl Zentrum für Astronomie**, SCOPE	*Germany*
2012	**The Gaia-ESO Survey Workshop on Spectral Analysis**, The AEGIS Survey	*France*

Student Mentorship

James Farr — *University of Cambridge*

Part III Astrophysics (Masters) Project: *The Anomalous and Rare 'Fe-rich' Stars* — *2016*

Louise Howes — *Australian National University*

Ph. D. project (primary supervisor: M. Asplund): *Extremely Metal-Poor Stars in the Bulge* — *2012–2015*

Andrew McCredie — *University of Cambridge*

Part III Astrophysics (Masters) Project: *Inferring TiO molecular data from stellar spectra* — *2015*

David Bennett — *University of Cambridge*

Part III Astrophysics (Masters) Project: *The impact of using $\langle 3D \rangle$ photospheric models* — *2015*

Lorenzo Orfali — *University of Cambridge*

Part III Astrophysics (Masters) Project:*Inferring the presence of binary companions from photometry* — *2014*

Austin Hayes — *MIT*

Undergraduate Research Opportunities Program project: *Extremely metal-poor stars in the bulge* — *2012*

Qinsi Yu — *MIT*

Undergraduate Research Opportunities Program project: *Extremely metal-poor stars in the bulge* — *2012*

Jennifer Walsh — *MIT*

Undergraduate Research Opportunities Program project: *Extremely metal-poor stars in the bulge* — *2012*

Leadership & Community Service

Gaia Sprints: `gaia.lol` — *NYC, USA*
Co-organiser — *2016*

Gaia UK workshops: `gaia.ac.uk/science/workshops` — *England*
Co-organiser — *2016*

The Gaia-ESO Survey — *Europe*
Awarded 'Builder' status (proprietary data access and co-authorship rights to future publications) — *2015*

The GALAH Survey — *Australia*
Awarded 'Builder' status (proprietary data access and co-authorship rights to future publications) — *2015*

Astronomical Society of Australia Council — *Australia*
Consecutively elected student representative — *2012, 2013*

Astronomical Society of Australia's Early Career Researcher chapter — *Australia*
Founding student member — *2013*

Referee
Astrophysical Journal, Monthly Notices of the Royal Astronomical Society, Astronomy & Astrophysics — *2014–Present*

Astronomical Observing Experience

Below is a list of telescope/instrument combinations that I have observed with, or reduced and analysed data from (usually with custom pipelines that I have written):

6 nights	**Very Large Telescope/FLAMES (UVES & GIRAFFE)**, Paranal Observatory	*Chile*
1 night	**Keck/DEIMOS**, Mauna Kea Observatory	*USA*
15 nights	**Magellan/MIKE**, Las Campanas Observatory	*Chile*
200 hours	**Gemini North/GMOS:N (queue)**, Mauna Kea Observatory	*USA*
200 hours	**Gemini South/GMOS:S (queue)**, Cerro Pachon Observatory	*Chile*
3 nights	**Mayall Telescope and Spectrograph**, Kitt Peak Observatory	*USA*
7 nights	**Automated Planet Finder (queue)**, Lick Observatory	*USA*
30 nights	**SkyMapper (commissioning)**, Siding Springs Observatory	*Australia*
3 nights	**ANU 2.3 m telescope**, Siding Springs Observatory	*Australia*
17 nights	**Australian Astronomical Telescope/AAOmega**, Siding Springs Observatory	*Australia*

Publications

As of April 24, 2017 I have 52 submitted or accepted publications with a total of 1226 citations (NASA/ADS).

My h-index is 14, which places me better than the top 5% of all Australian astronomers within 0–5 years post-PhD (Pimbblet 2011, PASA, 28, 140), despite currently being ≈3 years post-PhD.

First-author Publications (9)

1 **The Gaia-ESO Survey: revisiting the Li-rich giant problem**, Casey, A. R.; Ruchti, G.; Masseron, T.; Randich, S.; Gilmore, G.; Lind, K.; Kennedy, G. M.; Koposov, S. E.; Hourihane, A.; Franciosini, E. et al. *2016*

2 **The RAVE-on catalog of stellar atmospheric parameters and chemical abundances for chemo-dynamic studies in the Gaia era**, Casey, Andrew R.; Hawkins, Keith; Hogg, David W.; Ness, Melissa; Walter-Rix, Hans; Kordopatis, Georges; Kunder, Andrea; Steinmetz, Matthias; Koposov, Sergey; Enke, Harry et al. *2016*

3 **sick: The Spectroscopic Inference Crank**, Casey, Andrew R. *2016*

4 **The Cannon 2: A data-driven model of stellar spectra for detailed chemical abundance analyses**, Casey, Andrew R.; Hogg, David W.; Ness, Melissa; Rix, Hans-Walter; Ho, Anna Q Y; Gilmore, Gerry *2016*

5 **Chemistry of the Most Metal-poor Stars in the Bulge and the z ☒ 10 Universe**, Casey, Andrew R.; Schlaufman, Kevin C. *2015*

6 **The Aquarius comoving group is not a disrupted classical globular cluster**, Casey, A. R.; Keller, S. C.; Alves-Brito, A.; Frebel, A.; Da Costa, G.; Karakas, A.; Yong, D.; Schlaufman, K. C.; Jacobson, H. R.; Yu, Q. et al. *2014*

7 **Hunting the Parent of the Orphan Stream. II. The First High-resolution Spectroscopic Study**, Casey, Andrew R.; Keller, Stefan C.; Da Costa, Gary; Frebel, Anna; Maunder, Elizabeth *2014*

8 **Hunting the Parent of the Orphan Stream: Identifying Stream Members from Low-resolution Spectroscopy**, Casey, Andrew R.; Da Costa, Gary; Keller, Stefan C.; Maunder, Elizabeth *2013*

9 **Kinematics and Chemistry of Halo Substructures: The Vicinity of the Virgo Overdensity**, Casey, Andrew R.; Keller, Stefan C.; Da Costa, Gary *2012*

Second-author Publications (5)

1 **Chemical Tagging Can Work: Identification of Stellar Phase-space Structures Purely by Chemical-abundance Similarity**, Hogg, David W.; Casey, Andrew R.; Ness, Melissa; Rix, Hans-Walter; Foreman-Mackey, Daniel; Hasselquist, Sten; Ho, Anna Y. Q.; Holtzman, Jon A.; Majewski, Steven R.; Martell, Sarah L. et al. *2016*

2 **Extremely metal-poor stars from the cosmic dawn in the bulge of the Milky Way**, Howes, L. M.; Casey, A. R.; Asplund, M.; Keller, S. C.; Yong, D.; Nataf, D. M.; Poleski, R.; Lind, K.; Kobayashi, C.; Owen, C. I. et al. *2015*

3 **Kinematics and Chemistry of Recently Discovered Reticulum 2 and Horologium 1 Dwarf Galaxies**, Koposov, Sergey E.; Casey, Andrew R.; Belokurov, Vasily; Lewis, James R.; Gilmore, Gerard; Worley, Clare; Hourihane, Anna; Randich, S.; Bensby, T.; Bragaglia, A. et al. *2015*

4 **The Best and Brightest Metal-poor Stars**, Schlaufman, Kevin C.; Casey, Andrew R. *2014*

5 **Deriving Stellar Effective Temperatures of Metal-poor Stars with the Excitation Potential Method**, Frebel, Anna; Casey, Andrew R.; Jacobson, Heather R.; Yu, Qinsi *2013*

Nth-author Publications (37)

1 **The GALAH survey: observational overview and Gaia DR1 companion**, Martell, S. L.; Sharma, S.; Buder, S.; Duong, L.; Schlesinger, K. J.; Simpson, J.; Lind, K.; Ness, M.; Marshall, J. P.; Asplund, M. et al. *2017*

2 **The language of exoplanet ranking metrics needs to change**, Tasker, Elizabeth; Tan, Joshua; Heng, Kevin; Kane, Stephen; Spiegel, David; Brasser, Ramon; Casey, Andrew; Desch, Steven; Dorn, Caroline; Hernlund, John et al. *2017*

3 **The Galah Survey: Classification and Diagnostics with t-SNE Reduction of Spectral Information**, Traven, G.; Matijevič, G.; Zwitter, T.; Žerjal, M.; Kos, J.; Asplund, M.; Bland-Hawthorn, J.; Casey, A. R.; De Silva, G.; Freeman, K. et al. *2017*

4 **Gaia-ESO Survey: global properties of clusters Trumpler 14 and 16 in the Carina Nebula**, Damiani, F.; Klutsch, A.; Jeffries, R. D.; Randich, S.; Prisinzano, L.; Maíz Apellániz, J.; Micela, G.; Kalari, V.; Frasca, A.; Zwitter, T. et al. *2017*

5 **The Gaia-ESO Survey: the present-day radial metallicity distribution of the Galactic disc probed by pre-main-sequence clusters**, Spina, L.; Randich, S.; Magrini, L.; Jeffries, R. D.; Friel, E. D.; Sacco, G. G.; Pancino, E.; Bonito, R.; Bravi, L.; Franciosini, E. et al. *2017*

6 **The $Gaia$-ESO Survey: the inner disk intermediate-age open cluster NGC 6802**, Tang, B.; Geisler, D.; Friel, E.; Villanova, S.; Smiljanic, R.; Casey, A. R.; Randich, S.; Magrini, L.; San Roman, I.; Muñoz, C. et al. *2017*

7 **The GALAH survey: the data reduction pipeline**, Kos, Janez; Lin, Jane; Zwitter, Tomaž; Žerjal, Maruška; Sharma, Sanjib; Bland-Hawthorn, Joss; Asplund, Martin; Casey, Andrew R.; De Silva, Gayandhi M.; Freeman, Ken C. et al. *2017*

8 **The Gaia-ESO Survey: lithium depletion in the Gamma Velorum cluster and inflated radii in low-mass pre-main-sequence stars**, Jeffries, R. D.; Jackson, R. J.; Franciosini, E.; Randich, S.; Barrado, D.; Frasca, A.; Klutsch, A.; Lanzafame, A. C.; Prisinzano, L.; Sacco, G. G. et al. *2017*

9 **The Gaia-ESO Survey: Calibration strategy**, Pancino, E.; Lardo, C.; Altavilla, G.; Marinoni, S.; Ragaini, S.; Cocozza, G.; Bellazzini, M.; Sabbi, E.; Zoccali, M.; Donati, P. et al. *2017*

10 **3D NLTE analysis of the most iron-deficient star, SMSS0313-6708**, Nordlander, T.; Amarsi, A. M.; Lind, K.; Asplund, M.; Barklem, P. S.; Casey, A. R.; Collet, R.; Leenaarts, J. *2017*

11 **Galactic Doppelganger: The chemical similarity among field stars and among stars with a common birth origin**, Ness, M.; Rix, H-W.; Hogg, David W.; Casey, A. R.; Holtzman, J.; Fouesneau, M.; Zasowski, G.; Geisler, D.; Shetrone, M.; Minniti, D. et al. *2017*

12 **The Gaia-ESO Survey: Structural and dynamical properties of the young cluster Chamaeleon I**, Sacco, G. G.; Spina, L.; Randich, S.; Palla, F.; Parker, R. J.; Jeffries, R. D.; Jackson, R.; Meyer, M. R.; Mapelli, M.; Lanzafame, A. C. et al. *2017*

13 **Observational Constraints on First-Star Nucleosynthesis. II. Spectroscopy of an Ultra metal-poor CEMP-no Star**, Placco, Vinicius M.; Frebel, Anna; Beers, Timothy C.; Yoon, Jinmi; Chiti, Anirudh; Heger, Alexander; Chan, Conrad; Casey, Andrew R.; Christlieb, Norbert *2016*

14 **Chemical Diversity in the Ultra-faint Dwarf Galaxy Tucana II**, Ji, Alexander P.; Frebel, Anna; Ezzeddine, Rana; Casey, Andrew R. *2016*

15 **Stellar twins determine the distance of the Pleiades**, Mädler, Thomas; Jofré, Paula; Gilmore, Gerard; Clare Worley, C.; Soubiran, Caroline; Blanco-Cuaresma, Sergi; Hawkins, Keith; Casey, Andrew R. *2016*

16 **The Gaia-ESO Survey: Hydrogen lines in red giants directly trace stellar mass**, Bergemann, Maria; Serenelli, Aldo; Schönrich, Ralph; Ruchti, Greg; Korn, Andreas; Hekker, Saskia; Kovalev, Mikhail; Mashonkina, Lyudmila; Gilmore, Gerry; Randich, Sofia et al. *2016*

17 **The Gaia-ESO Survey: pre-main-sequence stars in the young open cluster NGC 3293**, Delgado, A. J.; Sampedro, L.; Alfaro, E. J.; Costado, M. T.; Yun, J. L.; Frasca, A.; Lanzafame, A. C.; Drew, J. E.; Eislöffel, J.; Blomme, R. et al. *2016*

18 **The Gaia-ESO Survey: the selection function of the Milky Way field stars**, Stonkutė, E.; Koposov, S. E.; Howes, L. M.; Feltzing, S.; Worley, C. C.; Gilmore, G.; Ruchti, G. R.; Kordopatis, G.; Randich, S.; Zwitter, T. et al. *2016*

19 **The EMBLA survey - metal-poor stars in the Galactic bulge**, Howes, Louise M.; Asplund, Martin; Keller, Stefan C.; Casey, Andrew R.; Yong, David; Lind, Karin; Frebel, Anna; Hays, Austin; Alves-Brito, Alan; Bessell, Michael S. et al. *2016*

20 **The Gaia-ESO Survey: Metal-rich Bananas in the Bulge**, Williams, Angus A.; Evans, N. W.; Molloy, Matthew; Kordopatis, Georges; Smith, M. C.; Shen, J.; Gilmore, G.; Randich, S.; Bensby, T.; Francois, P. et al. *2016*

21 **Gaia-ESO Survey: Gas dynamics in the Carina nebula through optical emission lines**, Damiani, F.; Bonito, R.; Magrini, L.; Prisinzano, L.; Mapelli, M.; Micela, G.; Kalari, V.; Maíz Apellániz, J.; Gilmore, G.; Randich, S. et al. *2016*

22 **The Gaia-ESO Survey: Inhibited extra mixing in two giants of the open cluster Trumpler 20?**, Smiljanic, R.; Franciosini, E.; Randich, S.; Magrini, L.; Bragaglia, A.; Pasquini, L.; Vallenari, A.; Tautvaišienė, G.; Biazzo, K.; Frasca, A. et al. *2016*

23 **The Gaia-ESO Survey: Probes of the inner disk abundance gradient**, Jacobson, H. R.; Friel, E. D.; Jílková, L.; Magrini, L.; Bragaglia, A.; Vallenari, A.; Tosi, M.; Randich, S.; Donati, P.; Cantat-Gaudin, T. et al. *2016*

24 **The Gaia-ESO Survey: A lithium-rotation connection at 5 Myr?**, Bouvier, J.; Lanzafame, A. C.; Venuti, L.; Klutsch, A.; Jeffries, R.; Frasca, A.; Moraux, E.; Biazzo, K.; Messina, S.; Micela, G. et al. *2016*

25 **The Gaia-ESO Survey: Sodium and aluminium abundances in giants and dwarfs. Implications for stellar and Galactic chemical evolution**, Smiljanic, R.; Romano, D.; Bragaglia, A.; Donati, P.; Magrini, L.; Friel, E.; Jacobson, H.; Randich, S.; Ventura, P.; Lind, K. et al. *2016*

26 **Climbing the cosmic ladder with stellar twins**, Jofré, P.; Mädler, T.; Gilmore, G.; Casey, A. R.; Soubiran, C.; Worley, C. *2015*

27 **The Gaia-ESO Survey: Insights into the inner-disc evolution from open clusters**, Magrini, L.; Randich, S.; Donati, P.; Bragaglia, A.; Adibekyan, V.; Romano, D.; Smiljanic, R.; Blanco-Cuaresma, S.; Tautvaišienė, G.; Friel, E. et al. *2015*

28 **First light results from the High Efficiency and Resolution Multi-Element Spectrograph at the Anglo-Australian Telescope**, Sheinis, Andrew; Anguiano, Borja; Asplund, Martin; Bacigalupo, Carlos; Barden, Sam; Birchall, Michael; Bland-Hawthorn, Joss; Brzeski, Jurek; Cannon, Russell; Carollo, Daniela et al. *2015*

29 **High-Resolution Spectroscopic Study of Extremely Metal-Poor Star Candidates from the SkyMapper Survey**, Jacobson, Heather R.; Keller, Stefan; Frebel, Anna; Casey, Andrew R.; Asplund, Martin; Bessell, Michael S.; Da Costa, Gary S.; Lind, Karin; Marino, Anna F.; Norris, John E. et al. *2015*

30 **Nucleosynthesis in a Primordial Supernova: Carbon and Oxygen Abundances in SMSS J031300.36-670839.3**, Bessell, Michael S.; Collet, Remo; Keller, Stefan C.; Frebel, Anna; Heger, Alexander; Casey, Andrew R.; Masseron, Thomas; Asplund, Martin; Jacobson, Heather R.; Lind, Karin et al. *2015*

31 **The GALAH survey: scientific motivation**, De Silva, G. M.; Freeman, K. C.; Bland-Hawthorn, J.; Martell, S.; de Boer, E. Wylie; Asplund, M.; Keller, S.; Sharma, S.; Zucker, D. B.; Zwitter, T. et al. *2015*

32 **The Gaia-ESO Survey: the most metal-poor stars in the Galactic bulge**, Howes, L. M.; Asplund, M.; Casey, A. R.; Keller, S. C.; Yong, D.; Gilmore, G.; Lind, K.; Worley, C.; Bessell, M. S.; Casagrande, L. et al. *2014*

33 **NGC 6522: a typical globular cluster in the Galactic bulge without signatures of rapidly rotating Population III stars**, Ness, Melissa; Asplund, Martin; Casey, Andrew R. *2014*

34 **A single low-energy, iron-poor supernova as the source of metals in the star SMSS J031300.36-670839.3**, Keller, S. C.; Bessell, M. S.; Frebel, A.; Casey, A. R.; Asplund, M.; Jacobson, H. R.; Lind, K.; Norris, J. E.; Yong, D.; Heger, A. et al. *2014*

35 **Astropy: A community Python package for astronomy**, Astropy Collaboration; Robitaille, Thomas P.; Tollerud, Erik J.; Greenfield, Perry; Droettboom, Michael; Bray, Erik; Aldcroft, Tom; Davis, Matt; Ginsburg, Adam; Price-Whelan, Adrian M. et al. *2013*

36 **The 300 km s⁻¹ Stellar Stream near Segue 1: Insights from High-resolution Spectroscopy of Its Brightest Star**, Frebel, Anna; Lunnan, Ragnhild; Casey, Andrew R.; Norris, John E.; Wyse, Rosemary F. G.; Gilmore, Gerard *2013*

37 **The Extragalactic Distance Scale without Cepheids. IV.**, Hislop, Lachlan; Mould, Jeremy; Schmidt, Brian; Bessell, Michael S.; Da Costa, Gary; Francis, Paul; Keller, Stefan; Tisserand, Patrick; Rapoport, Sharon; Casey, Andy *2011*