Dr Gregory Ashton

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Personal profile

I am an aspiring leader in gravitational wave data analysis and astrophysical inference and have consistently published high impact work across these fields. I am the senior core developer of the second-generation gravitational wave inference package Bilby, which has been selected, amongst many strong alternatives, to be the flagship astrophysical inference code for the LIGO and the Virgo Scientific Collaboration. All future astrophysical discoveries from future gravitational wave detections will be made using Bilby. I am the chair of the international Bilby development team and have extensive experience in software development and deployment. I have been the subject of international news coverage for work published in Nature Astronomy, providing new insights into understanding neutron stars using radio pulsars glitches. I am on the paper writing team for GW190425, the second binary neutron star inspiral observed by LIGO & Virgo.

Education

2012-2016	PhD in Mathematics, University of Southampton (GB) and Albert Einstein Institute (Hannover, DE). Awarded 29$^{\text{th}}$ July 2016.
2008-2012	MPhys, 1$^{\text{st}}$ class (Hons), University of Southampton (GB).
2006-2008	General Certificate of Education Advanced Level, in Physics, Mathematics, and Music (AAC), Ferndown Upper School Sixth Form (GB).

Academic Experience

2018-2021	*Assistant Lecturer*: 3-year fixed term postdoctoral researcher, School of Physics and Astronomy, Monash University, (Melbourne, AU).
2016-2018	*Wissenshaftler (Scientist)*: 2-year fixed term postdoctoral researcher, Albert Einstein Institute (Hannover, DE).

Research Supervision

2018-2021	Nikhil Sarin, PhD candidate, Monash University, *The observational consequences of neutron star post-merger remnants.*
2019	Kshipraa Athar, 2019 Vacation Scholarship, Monash University, *Optimising tools for gravitational wave astronomy.*
2019	Tushar Nagar, PHS2360 Physics and Astronomy Introductory Research Project, Monash University, *Glitches in the Vela Pulsar: A Bayesian approach.*
2018	Chandana Anand, PHS2360 Physics and Astronomy Introductory Research Project, Monash University, *Magnetospheric switching in PSR B1828-11.*

Publications

Listed below are the 22 articles for which I have made significant personal contributions in just 4 years. Of these, I am the lead author on 13 articles, 9 of which are published in high impact journals, including one published in Nature Astronomy. These publications have been cited over 180 times and have a h-index of 8. I have more than 70 additional publications as part of the LIGO Scientific Collaboration. The total citation count for all articles is 21,000 with a h-index of 42.

[22] **Ashton, G.** and Khan, S. (2019). Multi-waveform inference of gravitational waves. *arXiv e-prints*, page arXiv:1910.09138 (submitted to Phys. Rev. D)

[21] Smith, R. and **Ashton, G.** (2019). Expediting Astrophysical Discovery with Gravitational-Wave Transients Through Massively Parallel Nested Sampling. *arXiv e-prints*, page arXiv:1909.11873 (submitted to Phys. Rev. Lett.)

[20] **Ashton, G.**, Thrane, E., and Smith, R. J. E. (2019c). Gravitational wave detection without boot straps: a Bayesian approach. *arXiv e-prints*, page arXiv:1909.11872 (submitted to Phys. Rev. D)

[19] **Ashton, G.**, Lasky, P. D., Graber, V., and Palfreyman, J. (2019b). Rotational evolution of the Vela pulsar during the 2016 glitch. *Nature Astronomy*, page 417 (3 citations)

[18] Lasky, P. D., Sarin, N., and **Ashton, G.** (2019). Neutron star merger remnants: Braking indices, gravitational waves, and the equation of state. In *American Institute of Physics Conference Series*, volume 2127 of *American Institute of Physics Conference Series*, page 020025

[17] **Ashton, G.**, Hübner, M., Lasky, P. D., Talbot, C., et al. (2019a). BILBY: A User-friendly Bayesian Inference Library for Gravitational-wave Astronomy. *Astrophys. J. Sup.*, 241(2):27 (22 citations)

[16] Sarin, N., Lasky, P. D., and **Ashton, G.** (2019). X-Ray Afterglows of Short Gamma-Ray Bursts: Magnetar or Fireball? *Astrophys. J.*, 872(1):114 (2 citations)

[15] Keitel, D. and **Ashton, G.** (2018). Faster search for long gravitational-wave transients: GPU implementation of the transient F-statistic. *Classical and Quantum Gravity*, 35(20):205003 (3 citations)

[14] **Ashton, G.**, Prix, R., and Jones, D. I. (2018c). A semicoherent glitch-robust continuous-gravitational-wave search method. *Phys. Rev. D*, 98(6):063011 (1 citations)

[13] Sarin, N., Lasky, P. D., Sammut, L., and **Ashton, G.** (2018). X-ray guided gravitational-wave search for binary neutron star merger remnants. *Phys. Rev. D*, 98(4):043011 (11 citations)

[12] **Ashton, G.**, Jones, D. I., and Prix, R. (2018b). Advances in our understanding of the free precession candidate PSR B1828-11. In Weltevrede, P., Perera, B. B. P., Preston, L. L., and Sanidas, S., editors, *Pulsar Astrophysics the Next Fifty Years*, volume 337 of *IAU Symposium*, pages 307–308

[11] **Ashton, G.**, Burns, E., Dal Canton, T., Dent, T., Eggenstein, H. B., Nielsen, A. B., Prix, R., Was, M., and Zhu, S. J. (2018a). Coincident Detection Significance in Multimessenger Astronomy. *Astrophys. J.*, 860(1):6 (8 citations)

[10] **Ashton, G.** and Prix, R. (2018). Hierarchical multistage MCMC follow-up of continuous gravitational wave candidates. *Phys. Rev. D*, 97(10):103020 (7 citations)

[9] LIGO Scientific Collaboration, Virgo Collaboration, et al. (2017). First low-frequency Einstein@Home all-sky search for continuous gravitational waves in Advanced LIGO data. *Phys. Rev. D*, 96(12):122004 (27 citations)

[8] **Ashton, G.**, Prix, R., and Jones, D. I. (2017b). Statistical characterization of pulsar glitches and their potential impact on searches for continuous gravitational waves. *Phys. Rev. D*, 96(6):063004 (18 citations)

[7] Jones, D. I., **Ashton, G.**, and Prix, R. (2017). Implications of the Occurrence of Glitches in Pulsar Free Precession Candidates. *Phys. Rev. Lett.*, 118(26):261101 (8 citations)

[6] **Ashton, G.**, Jones, D. I., and Prix, R. (2017a). On the free-precession candidate PSR B1828-11: Evidence for increasing deformation. *Mon. Notices Royal Astron. Soc.*, 467(1):164–178 (10 citations)

[5] Baker, A., Beg, M., **Ashton, G.**, Albert, M., et al. (2017). Proposal of a micromagnetic standard problem for ferromagnetic resonance simulations. *Journal of Magnetism and Magnetic Materials*, 421:428–439 (11 citations)

[4] **Ashton, G.**, Birnholtz, O., Cabero, M., Capano, C., et al. (2016a). Comments on: "Echoes from the abyss: Evidence for Planck-scale structure at black hole horizons". *arXiv e-prints*, page arXiv:1612.05625 (58 citations)

[3] **Ashton, G.**, Jones, D. I., and Prix, R. (2016b). Comparing models of the periodic variations in spin-down and beamwidth for PSR B1828-11. *Mon. Notices Royal Astron. Soc.*, 458(1):881–899 (10 citations)

[2] **Ashton, G.**, Jones, D. I., and Prix, R. (2015). Effect of timing noise on targeted and narrow-band coherent searches for continuous gravitational waves from pulsars. *Phys. Rev. D*, 91(6):062009 (11 citations)

[1] LIGO Scientific Collaboration, Virgo Collaboration, et al. (2015). Narrow-band search of continuous gravitational-wave signals from Crab and Vela pulsars in Virgo VSR4 data. *Phys. Rev. D*, 91(2):022004 (30 citations)

Selected conferences, seminars, and workshops

Sep 2019	*GW190425: A Binary Neutron-Star Coalescence observed by LIGO and Virgo*, plenary talk on behalf of the paper writing team, LIGO/Virgo meeting (Warsaw, PO)
Sep 2019	*Introduction to Bilby*, organised and helped deliver, LSC Academic Advisory Committee, LIGO/Virgo meeting (Warsaw, PO)
Jul 2019	*Introduction to Bayesian data analysis and its application to the Vela pulsar during the 2016 glitch*, invited talk, Masterclass in Relativistic Fluid Dynamics, University of Southampton (Southampton, GB)
Jul 2019	*Gravitational Wave Detection: A Fully Bayesian Approach*, GR22/Amaldi13 (Valencia, ES)
Jun 2019	*Internal neutron-star physics from the 2016 Vela glitch*, International Pulsar Timing Array Annual Meeting (Pune, IN)
Dec 2018	*Status of the inference program*, invited talk, Annual OzGrav retreat (Perth, AU)
Oct 2018	*Astrophysical inference and transient gravitational wave astronomy*, Astrophysics Colloquium, University of Melbourne (Melbourne, AU)
Sep 2018	*Fully Bayesian detection without time-slides*, LIGO/Virgo annual meeting (Maastricht, NL)
Jun 2018	*Multimessenger follow-up of continuous gravitational wave candidates*, Astronomical Soc. of Australia, Annual Meeting (Melbourne, AU)
Apr 2018	*Continuous wave parameter estimation and non-standard signal follow up*, invited talk, INT-18-71W, Astro-Solids, Dense Matter, and Gravitational Waves, Institute for Nuclear theory (Seattle, US)
Dec 2017	*Neutron stars as continuous gravitational wave emitters*, invited plenary, 11th Bonn workshop (Bonn, DE)
Jun 2017	*Continuous gravitational waves*, Aspen Center for Physics summer workshop "Neutron Stars: Linking Nuclear Physics of the Interior to Electromagnetic Observations and Gravitational Radiation" (Aspen, US)
Apr 2017	*Learning about neutron stars from pulsar precession observations* , NewCompStar Annual Meeting (Warsaw, PL)
Mar 2017	*MCMC follow-up method for continuous gravitational wave candidates*, LIGO/Virgo annual meeting (Pasadena, US)
Mar 2017	*Statistical characterization of pulsar glitches and their potential impact on searches for continuous gravitational waves*, invited seminar, Glasgow University Physics Colloquium (Glasgow, GB)
Aug 2016	*Effect of neutron star glitches on searches for continuous waves*, LIGO/Virgo annual meeting (Glasgow, GB)
Apr 2016	*Learning about neutron stars from pulsar precession observations*, NewCompStar Annual Meeting (Istanbul, TR)
Apr 2016	*Comparing models of pulsar timing noise*, NewCompStar Annual Meeting (Budapest, HU)
Mar 2014	*Gravitational wave searches from noisy neutron stars*, BritGrav (Cambridge, GB).

Teaching Experience

- I am the assistant lecture for Monash University's first-year physics units PHS1011 and PHS1022, with more than ~ 300 students enrolled in each unit. These units implement the new "studio physics" model of teaching; an evidence-based approach to pedagogy.
- My personal Student Evaluation of Teaching Units (SETU) scores for all subjects average 4.6 out of 5.0. I am working towards achieving the 4.8 and above considered "outstanding" by the University.
- I have developed teaching materials, including traditional lectures along with YouTube videos introducing and reviewing concepts and examples aimed at first-year students.

Public engagement

Aug 2019	Featured in the national Australian newspaper The Age: Patient astronomers crack the code of super-dense spinning stars along with follow-up online articles in PhysicsWorld CNET, The Register, and other sites.
Aug 2019	Behind the paper article, *Understanding the rotational evolution of the Vela pulsar during the 2016 glitch* written for Nature Astronomy Community blog.
2018-2019	Helped run Monash University's School of Physics and Astronomy open day.
2013-2019	Top 5% contributer on StackOverflow.
Oct 2017	Visit to Ferndown Upper School to discuss Physics and Astronomy.
Oct 2016	*The dawn of gravitational wave astronomy*, presentation to the Cheltenham Skeptics Society (repeated in November to the Bournemouth Skeptics Society).
2012-2016	Developed and helped run the General Relativity & Astrophysics contibutions to the University of Southmpton's Big Bang Science fair.
Feb 2015	Invited article in the Institute of Physics Gravitational Physics Group 2015 newsletter: *The effect of timing noise on continuous gravitational wave searches*.

Grants and Awards

- Astronomy Data and Computing Services (ADACS) Software Support program for the 2019A semester. Awarded 6 weeks of support time to Dr Paul Lasky and myself for the development of a user interface for Bilby (valued at ∼AUD $18,000$).
- ADACS Software Support program for the 2018B semester: Awarded 6 weeks of support time to Dr Paul Lasky and myself for the development of a user interface for Bilby (valued at ∼AUD $18,000$).
- OzGrav Early Carear Research/Associate Investigator travel grant (AUD $3000) June 2019.
- OzGrav Early Carear Research/Associate Investigator travel grant (AUD $3000) March 2018.
- Best student talk prize at the 2016 NewCompStar Annual Meeting (Istanbul, TR).
- Runner-up student talk prize at the 2014 BritGrav annual meeting (Cambridge, GB).

Community involvement

2019-	Co-Chair of the LIGO/Virgo Bilby development group.
2018-2019	Coordinated and contributed to the Bilby LIGO/Virgo review for the O3 observing run.
2019-	Member of the OzGrav Equity and Diversity Committee.
2019-	Member of the Paper Writing Team for GW190425, the second binary neutron star merger observed by LIGO & Virgo.
2018-2019	Chair of the OzGrav-OzStar computing task force.
2018-	Chair of the OzGrav Inference Program.
2018-	Member of OzGrav, the ARC centre of excellence for gravitational wave discovery.
2013-	Member of the LIGO Scientific Collaboration.

Conference/Meeting Organisation

Feb 2019	LIGO/Virgo Parameter Estimation face-to-face meeting(local organising committee).
Nov 2019	OzGrav inference workshop: *Towards O3* (organiser).
Jun 2019	OzGrav 1-week inference workshop: *Introduction to Inference* (organiser).
2013-2015	University of Southampton Relativistic Astrophysics PhD seminar (organiser).
2013-2015	University of Southampton Python User's Group (organiser).