Marcus E. Lower | Curriculum Vitae

✉ mlower@swin.edu.au • May 22, 2020

PhD candidate studying pulsars and how we can better understand them through the application Bayesian inference techniques. Research interests include pulsar timing, tests of general relativity, neutron star magnetospheres and astrophysical inference of gravitational-wave sources.

Personal information

Present position: Astrophysics PhD Candidate.
Centre for Astrophysics and Supercomputing, Swinburne University of Technology, PO Box 218, Hawthorn, VIC 3122, Australia.

Citizenship: Australia, Canada.

Personal webpage: `https://mlower.github.io`

Research experience

Swinburne University of Technology **Melbourne, Australia**
Ph.D. candidate, Centre for Astrophysics and Supercomputing *2018-present*

- *Support*: ARC Laureate Fellow PhD scholarship.
- *Supervisors*: Matthew Bailes and Ryan M. Shannon.
- *Thesis*: Application of astrophysical inference to next generation pulsar data sets.

Commonwealth Scientific and Industrial Research Organisation (CSIRO) **Sydney, Australia**
Ph.D. candidate, Astronomy and Space Science Division *2019-present*

- *Support*: CSIRO Astronomy and Space Science Studentship.
- *Supervisor*: Simon Johnston.

Swinburne University of Technology **Melbourne, Australia**
Research Intern, Centre for Astrophysics and Supercomputing *Mar-Jul 2018*

- *Responsibilities*: Vetting pulsars for the UTMOST timing program. Developing diagnostic tools for tracking telescope observation efficiency. Follow up parameter estimation on detected glitches.
- *Supervisors*: Matthew Bailes, Chris Flynn, Ryan M. Shannon and Adam Deller.

Education

Monash University **Melbourne, Australia**
Bachelor of Science with Honours (first class) in Astrophysics *2017*

- *Supervisors*: Eric Thrane, Paul D. Lasky and Rory J. E. Smith. Thesis resulted in a publication.
- *Thesis*: Detecting eccentricity in the orbits of merging binary black holes.

Monash University **Melbourne, Australia**
Bachelor of Science in Applied Mathematics and Astrophysics *2014-2016*

- *Thesis advisors*: Eric Thrane and Letizia Sammut.
- *Undergraduate thesis*: Can GW150914 reveal anything about dark matter?

Grants, scholarships and awards

CSIRO Astronomy and Space Science Studentship, CSRIO *2019-2022*

Faculty of Science Engineering & Technology Travel Grant, Swinburne University *2018-2022*

ARC Laureate Fellow PhD Scholarship, Swinburne University *2018-2022*

Observing proposals

Principal-investigator:

Parkes Telescope:

- PX057: Target of opportunity observations Swift J1818.0−1607. Granted 8 hrs. *2020*

Lead co-investigator

MeerKAT Telescope:

- Timing the invisible B Pulsar of the Double Pulsar system. *2019-2022*
- Probing the magnetosphere of PSR J0737−3039B. *2019-2022*

Co-investigator:

Parkes Telescope:

- P885: Understanding the remarkable behaviour of radio magnetars. Awarded 60 hrs. *2019-2020*
- P1032: Mass measurements of southern binary pulsar systems. Awarded 236 hrs. *2019-2020*

Publications

I am listed as an author on a number of LIGO Scientific Collaboration papers, including the first LIGO-Virgo gravitational-wave transient catalogue (GWTC-1).

h-index: 15 (from ADS) **Web links to list services**: ADS; INSPIRE; ARXIV; GOOGLESCHOLAR.
List of publications available below and at `astronomy.swin.edu.au/~mlower/pages/publications`.

Presentations

Counts: **1** invited talk, **4** talks at conferences, **2** posters at conferences.

Full list of presentations available below.

Teaching

Teaching assistant:

- Monash University, Earth to cosmos (ASP1010; 1st-year undergraduate class). *2018*
- Monash University, Life in the Universe (ASP1022; 1st-year undergraduate class). *2017*

Outreach and Service

Outreach activities

- Guinness World Record for the Most People Stargazing across Multiple Sites (Monash site). *2018*
- Monash University Open Day: science outreach and public engagement activities. *2017*
- Guinness World Record for the Most People Stargazing across Multiple Sites (Monash site). *2015*
- Monash University Open Day: first year physics lab demonstration. *2014*

Memberships

- MeerTime Collaboration
- UTMOST
- OzGrav: the ARC Centre for Excellence for Gravitational-Wave Discovery (affiliate)
- Astronomical Society of Australia
- LIGO Scientific Collaboration

Skills

Programming languages: (proficient) Python, MATLAB, Bash, C shell, (familiar) Mathematica, Fortran90, (basic) C/C++ .

Other scientific tools: PSRCHIVE, DSPSR, LIGO LALSuite, LaTeX, GIT, SLURM, HTCondor.

Hobbies

Photography, particularly astrophotography and near-infrared. I own an 8" Schmidt-Cassegrain telescope. Science-fiction television, books and movies. Also interested in fencing (sabre), swimming and hiking.

Select publications

Submitted papers:

2. *Spectropolarimetric properties of Swift J1818.0−1607: a 1.4 s radio magnetar*
M. E. Lower, R. M. Shannon, S. Johnston & M. Bailes.
Submitted to The Astrophysical Journal Letters. arXiv:2004.11522 [astro-ph.HE].

1. *The MeerKAT Telescope as a Pulsar Facility: System verification and early science results from MeerTime*
The MeerTime collaboration.
Submitted to Publications of the Astronomical Society of Australia.

Publications in peer-reviewed journals:

8. *The Parkes Pulsar Timing Array Project: Second data release*
M. Kerr, D. J. Reardon, G. Hobbs, R. M. Shannon, R. N. Manchester, S. Dai, C. J. Russell, S.-B. Zhang, W. van Straten, S. Osłowski, A. Parthasarathy, R. Spiewak, M. Bailes, N. D. R. Bhat, A. D. Cameron, W. A. Coles, J. Dempsey, X. Deng, B. Goncharov, J. F Kaczmarek, M. J. Keith, P. D. Lasky, **M. E. Lower**, B. Preisig, J. M. Sarkissian, L. Toomey, H. Wang, J. Wang, L. Zhang, X. Zhu.
Accepted to Publications of the Astronomical Society of Australia. arXiv:2003.09780 [astro-ph.IM].

7. *The UTMOST pulsar timing programme II: Timing noise across the pulsar population*
M. E. Lower, M. Bailes, R. M. Shannon, S. Johnston, C. Flynn, S. Osłowski, V. Gupta, W. Farah, T. Bateman, A. J. Green, R. Hunstead, A. Jameson, F. Jankowski, A. Parthasarathy, D. C. Price, A. Sutherland, D. Temby & V. Venkatraman Krishnan.
Monthly Notices of the Royal Astronomical Society (2020) **494** 228. arXiv:2002.12481 [astro-ph.HE].
- Covered by press release.

6. *The UTMOST Survey for Magnetars, Intermittent pulsars, RRATs and FRBs I: System description and overview*
V. Venkatraman Krishnan, C. Flynn, W. Farah, A. Jameson, M. Bailes, S. Osłowski, T. Bateman, V. Gupta, W. van Straten, E. F. Keane, E. D. Barr, S. Bhandari, M. Caleb, D. Campbell-Wilson, C. K. Day, A. Deller, A. J. Green, R. Hunstead, F. Jankowski, **M. E. Lower**, A. Parthasarathy, K. Plant, D. C. Price, P. A. Rosado & D. Temby.
Monthly Notices of the Royal Astronomical Society (2020) **492** 4752. arXiv:1905.02415 [astro-ph.IM]

5. *Five new real-time detections of Fast Radio Bursts with UTMOST*
W. Farah, C. Flynn, M. Bailes, A. Jameson, T. Bateman, D. Campbell-Wilson, C. K. Day, A. T. Deller, A. J. Green, V. Gupta, R. Hunstead, **M. E. Lower**, S. Osłowski, A. Parthasarathy, D. C. Price, V. Ravi, R. M. Shannon, A. Sutherland, D. Temby, V. Venkatraman Krishnan, M. Caleb, S.-W. Chang, M. Cruces, J. Roy, V. Morello, C. A. Onken, B. W. Stappers & C. Wolf.
Monthly Notices of the Royal Astronomical Society (2019) **488** 2989. arXiv:1905.022293 [astro-ph.HE].
- Covered by press release.

4. *The 2018 X-ray and Radio Outburst of Magnetar XTE J1810−197*
E. V. Gotthelf, J. P. Halpern, J. A. J. Alford, T. Mihara, H. Negoro, N. Kawai, S. Dai, **M. E. Lower**, S. Johnston, M. Bailes, S. Osłowski, F. Camilo, H. Miyasaka & K. K. Madsen.
The Astrophysical Journal Letters (2019) **874** L25. arXiv:1902.08358 [astro-ph.HE].

3. *Wideband polarized radio emission from the newly revived radio magnetar XTE J1810−197*
S. Dai, **M. E. Lower**, M. Bailes, F. Camilo, J. P. Halpern, S. Johnston, M. Kerr, J. Reynolds, J. Sarkissian & P. Scholz.
The Astrophysical Journal Letters (2019) **874** L14. arXiv:1902.04689 [astro-ph.HE].

2. *Bilby: A user-friendly Bayesian inference library for gravitational-wave astronomy*
G. Ashton, M. Huebner, P. D. Lasky, C. Talbot, K. Ackley, S. Biscoveanu, Q. Chu, A. Divarkala, P. J. Easter, B. Goncharov, F. Hernandez Vivanco, J. Harms, **M. E. Lower**, G. D. Meadors, D. Melchor, E. Payne, M. D. Pitkin, J. Powell, N. Sarin, R. J. E. Smith & E. Thrane
The Astrophysical Journal Supplementary Series (2019) **241** 27. arXiv:1811.02042 [astro-ph.IM].

1. *Measuring eccentricity in binary black hole inspirals with gravitational waves*
M. E. Lower, E. Thrane, P. D. Lasky & R. Smith.
Physical Review D (2018) **98**, 083028. arXiv:1806.05350 [astro-ph.HE].

Non-peer reviewed publications:

13. *No radio counterpart for IGR J18179−1621 detected during a serendipitous VLBA observation*
H. Ding, A. T. Deller, **M. E. Lower** & R. M. Shannon
The Astronomers Telegram #13737 (2020).

12. *FRB200508 found at UTMOST*
V. Gupta, M. Bailes, A. Jameson, C. Flynn, W. Farah, T. Bateman, D. Campbell-Wilson, C. Day, A. Deller, A. J. Green, R. W. Hunstead, A. Mandlik, **M. E. Lower**, S. Osłowski, A. Parthasarathy, D. C. Price, A. Sutherland, D. Temby, G. Torr, G. Urquhart & V. Venkatraman Krishnan.
The Astronomers Telegram #13715 (2020).

11. *Multi-band observations of Swift J1818.0−1607 with Parkes*
M. E. Lower & R. M. Shannon
The Astronomers Telegram #13587 (2020).

10. *MeerKAT observation of the radio magnetar candidate Swift J1818.0−1607*
M. E. Lower, S. Buchner, S. Johnston, A. Parthasarathy, M. Geyer & M. Bailes on behalf of the MeerTime collaboration.
The Astronomers Telegram #13562 (2020).

9. *FRB191223 found at UTMOST*
V. Gupta, M. Bailes, A. Jameson, C. Flynn, W. Farah, T. Bateman, D. Campbell-Wilson, C. Day, A. Deller, A. J. Green, R. W. Hunstead, A. Mandlik, **M. E. Lower**, S. Osłowski, A. Parthasarathy, D. C. Price, A. Sutherland, D. Temby, G. Torr, G. Urquhart & V. Venkatraman Krishnan.
The Astronomers Telegram #13363 (2019).

8. *Detection of a glitch in PSR J0908−4913 by UTMOST*
M. E. Lower, M. Bailes, R. M. Shannon, S. Johnston, C. Flynn, T. Bateman, D. Campbell-Wilson, C. K. Day, A. Deller, W. Farah, A. J. Green, V. Gupta, R. W. Hunstead, A. Jameson, S. Osłowski, A. Parthasarathy, D. C. Price, A. Sutherland, D. Temby, G. Torr & G. Urquhart, V. Venkatraman Krishnan.
Research Notes of the AAS (2019) **3** 192. arXiv:1912.10827 [astro-ph.HE]

7. *FRB191107 found at UTMOST*
V. Gupta, M. Bailes, A. Jameson, C. Flynn, W. Farah, T. Bateman, D. Campbell-Wilson, C. Day, A. Deller, A. J. Green, R. W. Hunstead, A. Mandlik, **M. E. Lower**, S. Osłowski, A. Parthasarathy, D. C. Price, A. Sutherland, D. Temby, G. Torr, G. Urquhart & V. Venkatraman Krishnan.
The Astronomers Telegram #13282 (2019).

6. *FRB190806 found at UTMOST*
V. Gupta, M. Bailes, A. Jameson, C. Flynn, W. Farah, T. Bateman, D. Campbell-Wilson, C. Day, A. Deller, A. J. Green, R. W. Hunstead, **M. E. Lower**, S. Osłowski, A. Parthasarathy, D. C. Price, A. Sutherland, D. Temby, G. Torr, G. Urquhart & V. Venkatraman Krishnan.
The Astronomers Telegram #12995 (2019).

5. *Detection of FRB190322 at the Molonglo Radio Telescope*
V. Gupta, M. Bailes, A. Jameson, C. Flynn, W. Farah, T. Bateman, E. D. Barr, S. Bhandari, M. Caleb, D. Campbell-Wilson, C. Day, A. Deller, A. J. Green, R. W. Hunstead, F. Jankowski, E. F. Keane, **M. E. Lower**, S. Osłowski, A. Parthasarathy, K. Plant, D. C. Price, V. Ravi, R. M. Shannon, A. Sutherland, D. Temby, G. Torr, G. Urquhart & V. Venkatraman Krishnan.
The Astronomers Telegram #12610 (2019).

4. *Detection of FRB181228 at the Molonglo Radio Telescope*
W. Farah, M. Bailes, A. Jameson, C. Flynn, V. Gupta, T. Bateman, E. D. Barr, S. Bhandari, M. Caleb, D. Campbell-Wilson, C. Day, A. Deller, A. J. Green, R. W. Hunstead, F. Jankowski, E. F. Keane, **M. E. Lower**, S. Osłowski, A. Parthasarathy, K. Plant, D. C. Price, V. Ravi, R. M. Shannon, A. Sutherland, D. Temby, G. Torr, G. Urquhart & V. Venkatraman Krishnan.
The Astronomers Telegram #12335 (2018).

3. *Detection of low-frequency radio emission from the magnetar XTE J1810−197*
M. E. Lower, M. Bailes, A. Jameson, W. Farah, C. Flynn, V. Gupta, T. Bateman, E. D. Barr, S. Bhandari, M. Caleb, D. Campbell-Wilson, C. Day, A. Deller, A. J. Green, R. W. Hunstead, F. Jankowski, E. F. Keane, S. Osłowski, A. Parthasarathy, K. Plant, D. C. Price, V. Ravi, R. M. Shannon, A. Sutherland, D. Temby, G. Torr, G. Urquhart, V. Venkatraman Krishnan & T. Venville.
The Astronomers Telegram #12288 (2018).

2. *Two new FRBs discovered by UTMOST*
W. Farah, M. Bailes, A. Jameson, C. Flynn, V. Gupta, T. Bateman, E. D. Barr, S. Bhandari, M. Caleb, D. Campbell-Wilson, C. Day, A. Deller, A. J. Green, R. W. Hunstead, F. Jankowski, E. F. Keane, **M. E. Lower**, S. Osłowski, A. Parthasarathy, K. Plant, D. C. Price, V. Ravi, R. M. Shannon, A. Sutherland, D. Temby, G. Torr, G. Urquhart & V. Venkatraman Krishnan.
The Astronomers Telegram #12124 (2018).

1. *Detection of a glitch in the pulsar J1709−4429*
M. E. Lower, C. Flynn, M. Bailes, E. D. Barr, T. Bateman, S. Bhandari, M. Caleb, D. Campbell-Wilson, C. Day, A. Deller, W. Farah, A. J. Green, V. Gupta, R. W. Hunstead, A. Jameson, F. Jankowski, E. F. Keane, V. Venkatraman Krishnan, S. Osłowski, A. Parthasarathy, K. Plant, D. C. Price, V. Ravi, R. M. Shannon, D. Temby, G. Torr & G. Urquhart.
Research Notes of the AAS (2018) **2** 139. arXiv:1808.02580 [astro-ph.HE].

Full presentation list

Invited talks:

1. *Massive scale pulsar timing with the Molonglo Observatory Synthesis Telescope*
ATNF Colloquium, CSIRO Marsfield, Sydney, NSW, Australia, Feb 2020.

Talks at conferences:

4. *The UTMOST pulsar timing programme.*
10^{th} IPTA scientific meeting, Pune, India, Jun 2019.

3. *Bayesian pulsar timing and noise analysis with TempoNest.*
10^{th} IPTA student workshop, NCRA, Pune, India, Jun 2019.

2. *Measuring rotational instabilities in pulsars with the Molonglo telescope.*
ANITA 2019 workshop, Swinburne University of Technology, Melbourne, VIC, Australia, Feb 2019.

1. *Distinguishing eccentricity in binary black hole mergers with aLIGO.*
ANITA 2018 workshop, ICRAR Curtin University, Perth, WA, Australia, Feb 2018.

Posters at conferences:

2. *Characterising rotational irregularities in the radio pulsar population with UTMOST.*
OzGrav Annual Retreat, Lorne, Australia, Nov 2019.

1. *Measuring eccentricity in binary black hole inspirals with gravitational waves.*
Astronomical Society of Australia Annual Science Meeting, Melbourne, Australia, Jul 2018.