Rui LUO

Email: rui.luo@csiro.au ◇ Tel: +61 2-93724434 ◇ Web: https://ruiluoastro.github.io/
Postal Address: PO Box 76, Epping, NSW 1710, Australia

EDUCATION

Peking University *Sep 2013 – Jul 2019*
Department of Astronomy, School of Physics
Doctor of Philosophy, Astrophysics
Dissertation: *Measurement of the luminosity function of Fast Radio Bursts*
Advisor: Prof. K.J. Lee (KIAA-PKU)

Huazhong University of Science and Technology *Sep 2009 – Jun 2013*
School of Physics
Bachelor of Science, Applied Physics

EMPLOYMENT

CSIRO Space and Astronomy *Aug 2019 – present*
Australia Telescope National Facility
Research Plus Postdoctoral Fellow
Supervisor: Dr. George Hobbs (CSIRO-ATNF)

RESEARCH INTERESTS

Radio Astronomy: Fast Radio Bursts (FRBs), Pulsars, Radio Frequency Interference (RFI), the unknown unknowns
Statistics: Bayesian inference, Markov Chain Monte Carlo (MCMC)
Machine Learning: Convolutional Neural Network (CNN), Out-of-Distribution (OOD) detection

AWARDS AND HONOURS

Ranking No.1, Top 10 Research Progresses, Chinese Astronomy (Team Award)	2020
Vela Prize for oral presentations, FAST/Future Pulsar Symposium 8	2019
Kwang-Hua Scholarship, Peking University	2016
Second Prize of Chen Hu-Xiong Scholarship, Peking University	2015
Annual Scholarship, National Astronomical Observatories, Chinese Academy of Sciences	2013

OBSERVING EXPERIENCE

Five-hundred-meter Aperture Spherical radio Telescope

PI: *Searching for fast radio transients from short gamma-ray bursts*, 15 hours	2021 – 2022
Co-I: *Searching for Fast Radio Bursts from pulsing ULXs*, 10 hours	2021 – 2022
Co-I: *Observing the low-luminosity Fast Radio Bursts in the FAST sky*, 8 hours	2020 – 2021
Co-I: *Observing the radio transients from superluminous supernovae*, 5 hours	2020 – 2021
Co-I: *FAST observations of CU Virginis*, 13.5 hours	2020 – 2021
PI: *Monitoring the repeating FRB candidates*, 12 hours	2019
Instrumentation: *Configuring ROACH2 and monitoring the real-time bandpass*	Apr 2016

Parkes 64-m radio telescope (Murriyang)

PI: *Searching for fast radio bursts from short gamma-ray bursts*, 22 hours	2021OCTS
Co-I: *Searching for Fast Radio Bursts from pulsing ULXs*, 12 hours	2021OCTS
Co-I: *Establishing the broadband properties in a sample of repeating FRBs*, 43.5 hours	2021OCTS

Co-I: *Monitoring the repeating FRB 180301*, 32.5 hours 2021APRS
Co-I: *A wide-band study of CU Virginis*, 7 hours 2021APRS
PI: *Observing the repeating FRB 180301 with the Parkes UWL*, 32.5 hours 2020OCTS
PI: *Monitoring the repeating FRB candidates in the Southern Sky*, 16 hours 2020APRS
Contributions: Parkes Pulsar Timing Array, 90+ hours 2020 – present

Australia Telescope Compact Array
Co-I: Brown Dwarfs: Studying A New Class of Stellar Lighthouse, 14 hours 2021APRS
PI: *Observing CU Virginis at 16cm wavelength using the Green Time*, 9 hours 2019OCTS

Kunming 40-m radio telescope
Instrumentation: *Installing the FRB backend and configuring its searching software* Aug 2017
Instrumentation: *Calibration for two polarization channels from the feed* Oct 2014

Miyun 50-m radio telescope
Instrumentation: *Testing ROACH2 and observing pulsars* Aug 2015

INVITED TALKS IN COLLOQUIA AND SEMINARS

MQ AAAstroseminar, Macquarie University, Sydney, Australia May 2021
In-person talk: *Diverse polarization angle swings from a repeating fast radio burst source*
ASKAP-CRAFT Group Meeting, ATNF-Swinburne-Curtin, Australia Mar 2021
Remote talk: *Current FRB Science Outcomes with FAST*
Pulsar Group Meeting, MPIfR, Bonn, Germany Feb 2021
Remote talk: *Diverse polarization angle swings from a repeating fast radio burst source*
Colloquium, Curtin Institute of Radio Astronomy, Perth, Australia Jan 2021
Remote talk: *Diverse polarization angle swings from a repeating fast radio burst source*
Colloquium, Department of Astrophysics, University of Radboud, Netherlands Dec 2020
Remote talk: *Diverse polarization angle swings from a repeating fast radio burst source*
Lunch Talk, Kavli IPMU, University of Tokyo, Japan Dec 2020
Remote talk: *Diverse polarization angle swings from a repeating fast radio burst source*
CSIRO-ATNF Co-learnium, Marsfield, NSW, Australia Dec 2020
Remote talk: *Life changes of the local residents around the FAST site*
CHIME/FRB Journal Club, Canada Dec 2020
Remote talk: *Diverse polarization angle swings from a repeating fast radio burst source*
AUS-NZ-PSR Group Meeting, Australasia Nov 2020
Remote talk: *Diverse polarization angle swings from a repeating fast radio burst source*
CSIRO-ATNF Co-learnium, Marsfield, NSW, Australia Dec 2019
In-person talk: *A beginner's guide to Bayesian inference*
CSIRO-ATNF Colloquium, Marsfield, NSW, Australia Sep 2019
In-person talk: *Measurement of the luminosity function of Fast Radio Bursts*
Cosmology Group Meeting, NAOC, Beijing, China Mar 2019
In-person talk: *Measurements on the FRB luminosity function*
KIAA Graduate Dinner Talk, Peking University, Beijing, China Dec 2018
In-person talk: *An Overview on Fast Radio Bursts and FRB luminosity function*
NAOC Graduate Student Seminar, NAOC, Beijing, China Apr 2018
In-person talk: *A Review of Fast Radio Bursts and FRB luminosity function*

CONTRIBUTED TALKS IN CONFERENCES AND WORKSHOPS

ACAMAR 7: Australia-China Workshop on Astrophysics, Zoom Nov 2021
Session talk: *simulateSearch – A software package for simulating high time-resolution radio data*
ACAMAR Fast Radio Bursts Virtual Workshop, Zoom Oct 2021

Plenary talk: *Diverse polarization angle swings from a repeating fast radio burst source*

FRB 2021 International Meeting, Zoom Webinar — Jul – Aug 2021
Plenary talk: *Diverse polarization angle swings from a repeating fast radio burst source*
Video recordings: [Plenary 3A] and [Plenary 3B]

C3DIS 2021 Conference, Virtual, Australia — Jul 2021
Session talk: *simulateSearch – A package for simulating high time-resolution radio data*

FRB 2020 International Meeting, Zoom Webinar — Jul 2020
Pleanry talk: *Measurement of the luminosity function of Fast Radio Bursts*

ATNF Bolton Symposium, Kensington, Perth, Australia — Mar 2020
Plenary talk: *A new repeating FRB discovered by the FAST telescope*

FAST/Future Pulsar Symposium 8, Xi'an, China — Jun 2019
Plenary talk: *Measurement of the luminosity function of Fast Radio Bursts*

Radio Astronomy Forum 2017, Pingtang, China — Sep 2017
Poster talk: *Simulating DM of host galaxies to derive FRB luminosity function*

Chinese Astronomical Society Annual Meeting 2016, Wuhan, China — Nov 2016
Session talk: *Simulating the Dispersion Measure of FRB host galaxies*

Jing-Guang-Xia Astrophysics Meeting, Xiamen, China — Jul 2016
Plenary talk: *Simulating the Dispersion Measure of FRB host galaxies*

QTT Colloquium Series 2016, Zunyi, China — Jul 2016
Plenary talk: *Simulating the Dispersion Measure of FRB host galaxies*

PKU-XAO Bilateral Meeting, Urumqi, China — Jun 2016
Plenary talk: *Simulating the Dispersion Measure of FRB host galaxies*

Chinese Astronomical Society Annual Meeting 2015, Beijing, China — Oct 2015
Session talk: *Consideration of Research on FRBs*

QTT Colloquium Series 2015, Ming'antu, China — Jul 2015
Plenary talk: *Consideration of Research on FRBs*

KIAA-SHAO Bilateral Workshop, Beijing, China — May 2015
Plenary talk: *Consideration of FRB searching*

STUDENT MENTORING

Tommy Marshman: Co-advised, PhD student at Macquarie University — 2021 – present
Research projects: Searching for Fast Radio Bursts in the Parkes Baades' Window Survey

Lunhua Shang: Co-advised, Joint-PhD student at NJUST and CSIRO — 2020 – present
Research projects: Studies on the pulsed variable stars with radio observations

Weiyang Wang: Co-advised, PhD at UCAS-NAOC, graduated in the end of 2020 — 2017 – 2020
Research projects: Theoretical studies on Fast Radio Bursts

TEACHING AND OUTREACH

Seeking the secret of nature: A public Chinese science documentary series — 2022
Narrative in Episode 4 Season 2: *What are Fast Radio Bursts?*

Mr. Science · Astronomy: A Chinese special column for public sciences — Nov 2020
Article: *Hunting for fast radio bursts with the FAST telescope* (Chinese)

PULSE@Parkes: An educational program for high-school students to use the CSIRO Parkes radio telescope to observe pulsars — 2019 – present

TA: General Physics, School of Earth and Space Sciences, Peking University — 2017
TA: Atomic Physics, School of Physics, Peking University — 2015

PROFESSIONAL SERVICE

Journal Referee

Monthly Notices of the Royal Astronomical Society 2021 – present
The Astrophysical Journal 2021 – present

Proposal Reviewer

Call for FAST Science Observing Proposals 2021

DUTIES AND SUPPORT

ACAMAR Fast Radio Bursts Virtual Workshop: Served as SOC member Oct 2021
Commissioning the Parkes Cryogenic PAF Receiver: Data benchmark 2021 – present
Updates on the ATNF-PSRCAT 2020 – present
The CSIRO-ATNF Co-learnia: Main chair 2019 – 2021
The ATCA Duty Astronomer: On duty for every semester 2019 – present
The 1st Chinese Pulsar Timing Array Meeting: Served as LOC member May 2017

TECHNICAL SKILLS

Programming	Python (Proficient), C, C++, Unix
Softwares	Matlab, Mathematica, presto, tempo2, psrchive, MultiNest
Tools	Git, LaTeX, Wiki, HTML

CODES DEVELOPMENT

- simulateSearch (in developing): A software for simulating the high time-resolution radio data.
- BayesWeib: A Python package for calculating the repeating burst rate under the Weibull distribution.
- frblferd: A Bayesian code for inferring the event rate density of FRB luminosity function.
- frbnormlf: An FRB mock data simulator and a Bayesian code to measure the normalized FRB luminosity function.
- dmhost: A package for Monte Carlo simulations on the dispersion measure of FRB host galaxies in the nearby universe.

LANGUAGES

Chinese	Native
English	Fluent
Japanese	Elementary

REFERENCES

George Hobbs
Research Scientist & Group Leader
CSIRO Space and Astronomy, Australia National Telescope Facility
PO Box 76, Epping, NSW 1710, Australia
Tel: +61 2-9372-4652
Email: george.hobbs@csiro.au

Kejia Lee
Associate Professor
Kavli Institute for Astronomy and Astrophysics, Peking University
No.5 YiHeYuan Rd, Haidian District, Beijing 100871, China
Tel: +86 10-62766380
Email: kjlee@pku.edu.cn

Duncan Lorimer
Professor & Associate Dean for Research
Department of Physics and Astronomy, West Virginia University
White Hall, PO Box 6315, Morgantown, WV 26506, USA
Tel: +1 304-293-4867
Email: duncan.lorimer@mail.wvu.edu

Richard N. Manchester
CSIRO Fellow & Fellow of the Australian Academy of Science
CSIRO Space and Astronomy, Australia National Telescope Facility
PO Box 76, Epping, NSW 1710, Australia
Tel: +61 2-9372-4313
Email: dick.manchester@csiro.au

Bing Zhang
Distinguished Professor & Associate Dean for Research
Department of Physics and Astronomy, University of Nevada, Las Vegas
MPE-A 129, UNLV, Las Vegas, NV 89154, USA
Tel: +1 702-895-3170
Email: zhang@physics.unlv.edu

PUBLICATIONS

Summary: 21 papers in total, including **one 1st-author article published in Nature**. Citations: 381 (158 for 1st-author papers); H-index: 10 (by Jan 2022).

First-author papers:

4. **Luo, R.**, Hobbs, G., Yong, S. Y., Tommey, L., Wang, C., Zic, A., Dai, S., Wang, S. Q., Zhang, S. B., et al., *Simulating high time-resolution radio-telescope observations*, 2022, MNRAS, to be submitted

3. **Luo, R.**, Wang, B. J., Men, Y. P., Zhang, C. F., Jiang, J. C., Xu, H., Wang, W. Y., Lee, K. J., Han, J. L., Zhang, B., et al., & Zhu, Y., *Diverse polarization angle swings from a repeating fast radio burst source*, 2020, Nature, 586, 693

2. **Luo, R.**, Men, Y. P., Lee, K. J., Wang, W. Y., Lorimer, D. R., & Zhang, B., *On the FRB luminosity function - II. Event rate density*, 2020, MNRAS, 494, 665

1. **Luo, R.**, Lee, K. J., Lorimer, D. R., & Zhang, B., *On the normalized FRB luminosity function*, 2018, MNRAS, 481, 2320

Second/Third-author papers:

7. Niu, C.-H., Li, D., **Luo, R.**, Wang, W.-Y., Yao, J., Zhang, B., Zhu, W.-W., Wang, P., Ye, H., Niu, J.-R., et al., *CRAFTS for Fast Radio Bursts – II. Extending the dispersion-fluence relation with new FRBs detected by FAST*, 2021, ApJ, 909, L8

6. Zhu, W., Li, D., **Luo, R.**, Miao, C., Zhang, B., Spitler, L., Lorimer, D.; Kramer, M., Champion, D., Yue, Y., Cameron, A., Cruces, M., Duan, R., Feng, Y., Han, J., Hobbs, G., Niu, C., et al., *A Fast Radio Burst discovered in FAST drift scan survey*, 2020, ApJ, 895, L6

5. Jiang, J. C., Wang, W. Y., **Luo, R.**, Du, S., Chen, X. L., Lee, K. J., & Xu, R. X., *FRB 171019: An event of binary neutron star merger?*, 2020, RAA, 20, 56

4. Men, Y. P., **Luo, R.**, Chen, M. Z., Hao, L. F., Lee K. J., Li, J., Li Z. X., Liu, Z. Y., Pei, X., Wen, Z. G., Wu, J. J., Xu, Y. H., Xu, R. X., Yuan, J. P., & Zhang, C. F., *Piggyback searching for fast radio bursts using Nanshan 26m and Kunming 40m radio telescopes – I. Observing and data analysis systems, discovery of a mysterious peryton*, 2019, MNRAS, 488, 3957

3. Yi, S.-X., Cheng, K. S., & **Luo, R.**, *Clumpy jets from black hole-massive star binaries as engines of Fast Radio Bursts*, 2019, MNRAS, 483, 4197

2. Wang, W. Y., **Luo R.**, Yue, H., Chen, X. L., Lee, K. J., & Xu, R. X., *FRB 121102: A Starquake-induced Repeater?*, 2018, ApJ, 852, 140

1. Yang, Y.-P., **Luo, R.**, Li, Z., & Zhang, B., *Large Host-galaxy Dispersion Measure of Fast Radio Bursts*, 2017, ApJ, 839, L25

Other co-author papers:

10. Xu, H., Niu, J. R., Chen, P., Lee, K. J., Zhu, W. W., Dong, S., Zhang, B., Jiang, J. C., Wang, B. J., Xu, J. W., Zhang, C. F., Fu, H., Filippenko, A. V., Peng, E. W., Zhou, D. J., Zhang, Y. K., Wang, P., Feng, Y., Li, Y., Brink, T. G., Li, D. Z., Lu, W., Yang, Y. P., Caballero, R. N., Cai, C., Chen, M. Z., Dai, Z. G., Djorgovski, S. G., Esamdin, A., Gan, H. Q., Guhathakurta, P., Han, J. L., Hao, L. F., Huang, Y. X., Jiang, P., Li, C. K., Li, D., Li, H., Li, X. Q., Li, Z. X., Liu, Z. Y., **Luo, R.**, et al., *A fast radio burst source at a complex magnetised site in a barred galaxy*, 2021, Nature, submitted

9. Bhandari, S., Heintz, K. E., Aggarwal, K., Marnoch, L., Day, C. K, Sydnor, J., Burke-Spolaor, S., Law, C. J., Prochaska, J. X, Tejos, N., Bannister, K. W., Butler, B. J., Deller, A. T., Ekers, R. D.,

Flynn, C., Fong, W.-F., James, C. W., Lazio, T. J. W., **Luo, R.**, et al., *Characterizing the FRB host galaxy population and its connection to transients in the local and extragalactic Universe*, 2021, AJ, 163, 69

8. Niu, C.-H., Aggarwal, K., Li, D., Zhang, X., Chatterjee, S., Tsai, C.-W., Yu, W., Law, C. J., Burke-Spolaor, S., Cordes, J. M., Zhang, Y.-K., Ocker, S., Yao, J.-M., Wang, P., Feng, Y., Niino, Y., Bochenek, C., Cruces, M., Connor, L., Jiang, J.-A., Dai, S., **Luo, R.**, et al., *A highly active repeating fast radio burst in a complex local environment*, 2021, Nature, submitted

7. Yang, X., Zhang, S.-B., Wang, J.-S., Hobbs, G., Sun, T.-R., Manchester, R. N., Geng, J.-J., Russell, C. J., **Luo, R.**, Tang, Z.-F., Wang, C., Wei, J.-J., Staveley-Smith, L., Dai, S., Li, Y., Yang, Y.-Y., & Wu, X.-F., *81 New Candidate Fast Radio Bursts in Parkes Archive*, 2021, MNRAS, 507, 3238

6. Goncharov, B., Shannon, R. M., Reardon, D. J., Hobbs, G., Zic, A., Bailes, M., Curylo, M., Dai, S., Kerr, M., Lower, M. E., Machester, R. N., Mandow, R., Middleton, H., Miles, M. T., Parthasarathy, A., Thrane, E., Thyagarajan, N., Xue, X., Zhu, X.-J., Cameron, A. D., Feng, Y., **Luo, R.**, et al., *On the evidence for a common-spectrum process in the search for the nanohertz gravitational wave background with the Parkes Pulsar Timing Array*, 2021, ApJ, 917, L19

5. Zhang, C. F., Xu, J. W., Men, Y. P., Deng, X. H., Xu, H., Jiang, J. C., Wang, B. J., Lee, K. J., Li, J., Yuan, J. P., Liu, Z. Y., Huang, Y. X., Xu, Y. H., Li, Z. X., Hao, L. F., Luo, J. T., Dai, S., **Luo, R.**, Zakie, H., & Ma, Z. Y., *Fast radio burst detection in the presence of coloured noise*, 2021, MNRAS, 503, 5223

4. Dai, S., Lu, J. G., Wang, C., Wang, W. Y., Xu, R. X., Yang, Y.-P., Zhang, S.-B., Hobbs, G., Li, D., **Luo, R.**, Filipovic, M., & Jiang, J. C., *On the Circular Polarization of Repeating Fast Radio Bursts*, 2021, ApJ, 920, 46

3. Zhang, S.-B., Hobbs, G., Russell, C. J., Toomey, L., Dai, S., Dempsey, J., Manchester, R. N., Johnston, S., Staveley-Smith, L., Wu, X.-F., Li, D., Yang, Y.-Y., Wang, S.-Q., Qiu, H., **Luo, R.**, Wang, C., Zhang, C., Zhang, L., & Mandow, R., *Parkes transient events: I. Database of single pulses, initial results and missing FRBs*, 2020, ApJS, 249, 14

2. Men, Y. P., Aggarwal, K, Li, Y., Palaniswamy, D., Burke-Spolaor, S., Lee, K. J., **Luo, R.**, Demorest, P., Tendulkar, S., Agarwal, D., Young, O., & Zhang, B., *Non-detection of fast radio bursts from six gamma-ray burst remnants with a possible magnetar engine*, 2019, MNRAS, 489, 3643

1. Wang, W. Y., Lu, J. G., Zhang, S. B., Chen, X. L., **Luo, R.**, & Xu, R. X., *Pulsar giant pulse: coherent instability near light cylinder*, 2019, SCPMA, 62, 979511