

Rui LUO

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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), Bayesian Optimization

AWARDS AND PRIZES

Rank No.1, Top 10 Research Progresses, Chinese Astronomy (Team Award) 2020

Vela Prize for oral presentations, FAST/Future Pulsar Symposium 8 2019

Second Academic Scholarship, Peking University 2013 – 2018

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

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 Jul – Oct 2019

Instrumentation: *Configuring ROACH2 and monitoring the real-time bandpass* Apr 2016

Parkes 64-m radio telescope

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, 80+ hours

Nov 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 OR 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*

Video recording: [\[Co-learnium link\]](#)

CHIME/FRB Journal Club, Canada

Dec 2020

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

Video recording: [\[YouTube link\]](#)

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*

Video recording: [\[Co-learnium link\]](#)

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 OR WORKSHOPS

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: <i>simulateSearch</i> – A package for simulating high time-resolution data in radio astronomy	
FRB 2020 International Meeting , Zoom Webinar	Jul 2020
Plenary talk: <i>Measurement of the luminosity function of Fast Radio Bursts</i>	
Video recording: [Session 5]	
ATNF Bolton Symposium , Kensington, Perth, Australia	Mar 2020
Plenary talk: <i>A new repeating FRB discovered by the FAST telescope</i>	
FAST/Future Pulsar Symposium 8 , Xi'an, China	Jun 2019
Plenary talk: <i>Measurement of the luminosity function of Fast Radio Bursts</i>	
Radio Astronomy Forum 2017 , Pingtang, China	Sep 2017
Poster talk: <i>Simulating DM of host galaxies to derive FRB luminosity function</i>	
Chinese Astronomical Society Annual Meeting 2016 , Wuhan, China	Nov 2016
Session talk: <i>Simulating the Dispersion Measure of FRB host galaxies</i>	
Jing-Guang-Xia Astrophysics Meeting , Xiamen, China	Jul 2016
Plenary talk: <i>Simulating the Dispersion Measure of FRB host galaxies</i>	
QTT Colloquium Series 2016 , Zunyi, China	Jul 2016
Plenary talk: <i>Simulating the Dispersion Measure of FRB host galaxies</i>	
PKU-XAO Bilateral Meeting , Urumqi, China	Jun 2016
Plenary talk: <i>Simulating the Dispersion Measure of FRB host galaxies</i>	
Chinese Astronomical Society Annual Meeting 2015 , Beijing, China	Oct 2015
Session talk: <i>Consideration of Research on FRBs</i>	
QTT Colloquium Series 2015 , Ming'antu, China	Jul 2015
Plenary talk: <i>Consideration of Research on FRBs</i>	
KIAA-SHAO Bilateral Workshop , Beijing, China	May 2015
Plenary talk: <i>Consideration of FRB searching</i>	

STUDENT MENTORSHIP

Tommy Marshman : Co-advised, PhD student at Macquarie University	2021 – present
<i>Research projects: Searching for Fast Radio Bursts with the Parkes UWL</i>	
Lunhua Shang : Co-advised, Joint-PhD student at NJUST and CSIRO	2020 – present
<i>Research projects: Studies on the pulsed variable stars with radio observations</i>	
Weiyang Wang : Co-advised, PhD at UCAS-NAOC, graduated in the end of 2020	2017 – 2020
<i>Research projects: Theoretical studies on Fast Radio Bursts</i>	

TEACHING AND OUTREACH

PULSE@Parkes : An outreach on Parkes pulsar observing for high-school students	2019 – present
TA: GENERAL PHYSICS, School of Earth and Space Sciences, Peking University	2017
TA: ATOMIC PHYSICS, School of Physics, Peking University	2015

SUPPORTS AND SERVICES

SOC member for ACAMAR Fast Radio Bursts Virtual Workshop	Oct 2021
Reviewer for Monthly Notices of the Royal Astronomical Society (MNRAS)	Sep – Oct 2021
Reviewer for FAST Open Call 2021	Jun – Jul 2021
Updates on the ATNF-PSRCAT	2020 – present
The CSIRO-ATNF Co-learnia : One of main organisers	2019 – present
The ATCA Duty Astronomer : 4 weeks	2019 – present
LOC member for the first Chinese Pulsar Timing Array Meeting	May 2017

TECHNICAL SKILLS

Programming	PYTHON (Proficient), C, C++, UNIX
Softwares	MATLAB, MATHEMATICA, PRESTO, TEMPO2, MULTINEST
Tools	GIT, LATEX, WIKI, HTML

CODES DEVELOPED

- `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 & Team Leader

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PUBLICATIONS

(Summary: 19 publications in total, including one first-author paper in Nature. H-index: 8, – Oct 2021)

First-author papers:

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., Caballero, R. N., Chen, M. Z., Chen, X. L., Gan, H. Q., Guo, Y. J., Hao, L. F., Huang, Y. X., Jiang, P., Li, H., Li, J., Li, Z. X., Luo, J. T., Pan, J., Pei, X., Qian, L., Sun, J. H., Wang, M., Wang, N., Wen, Z. G., Xu, R. X., Xu, Y. H., Yan, J., Yan, W. M., Yu, D. J., Yuan, J. P., Zhang, S. B., & 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., 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**, 4, 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:

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.**, Mahony, E. K., Ryder, S. D., Sadler, E. M., Shannon, R. M., Han, J. L., Lee, K. J., & Zhang, B., *Characterizing the FRB host galaxy population and its connection to transients in the local and extragalactic Universe*, 2021, [ApJ](#), submitted
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.**, Li, G.-D., Miao, C.-C., Niu, J.-R., Anna-Thomas, R., Stern, D., Wang, W.-Y., Yuan, M., Yue, Y.-L., Zhou, D.-J.,

- Yan, Z., Zhu, W.-W., & Zhang, B., *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](#), [accepted](#)
 6. Goncharov, B., Shannon, R. M., Reardon, D. J., Hobbs, G., Zic, A., Bailes, M., Curylo, M., Dai, S., Kerr, M., Lower, M. E., Manchester, 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.**, Russell, C. J., Sarkissian, J., Spiewak, R., Wang, S., Wang, J. B., Zhang, L., & Zhang, S., *On the evidence for a common-spectrum process in the search for the nanohertz gravitational wave background with the Parkes Pulsar Timing Array*, 2021, [ApJL](#), [accepted](#)
 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 Non-detection of Circular Polarisation from Repeating Fast Radio Bursts*, 2020, [ApJ](#), [accepted](#)
 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(7)**, 979511