

# RUI LUO

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Postal Address: PO Box 76, Epping, NSW 1710, Australia

## EDUCATION

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### 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

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### CSIRO Space and Astronomy

Aug 2019 – present

Australia Telescope National Facility

*Research Plus Postdoctoral Fellow*

Supervisor: Dr. George Hobbs (CSIRO-ATNF)

## RESEARCH INTERESTS

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**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

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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

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### Five-hundred-meter Aperture Spherical radio Telescope

PI: *Monitoring the repeating FRB candidates*, 12 hours

Jul – Oct 2019

Engineering: *Helped configure ROACH2 and monitor the real-time bandpass*

Apr 2016

### Parkes 64-m radio telescope

Co-I: *Monitoring the repeating FRB 180301*, 32.5 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, 70+ hours

Nov 2020 – present

### Australia Telescope Compact Array

PI: *Observing CU Virginis at 16cm wavelength using the Green Time*, 9 hours

2019OCTS

## Kunming 40-m radio telescope

Engineering: *Installed FRB backend and configured the FRB real-time searching software* Aug 2017

Engineering: *Assisted calibration for two polarization channels of the digital backend* Oct 2014

## Miyun 50-m radio telescope

Engineering: *Tested ROACH2 to observe bright pulsars* Aug 2015

## STUDENTS CO-ADVISED

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**Lunhua Shang:** Joint-PhD student at NJUST and CSIRO 2020 – present

*Research projects: Studies on the pulsed variable stars with radio observations*

**Weiyang Wang:** PhD at UCAS-NAOC, graduated in the end of 2020 2017 – 2020

*Research projects: Theoretical studies on Fast Radio Bursts*

## TEACHING AND OUTREACH

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**PULSE@Parkes:** Remote sessions of pulsar observing for the high-school students in Australia 2020

TA: GENERAL PHYSICS, School of Earth and Space Sciences, Peking University 2017

TA: ATOMIC PHYSICS, School of Physics, Peking University 2015

## SUPPORTS AND SERVICES

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**The CSIRO-ATNF Co-learnia:** One of main organisers 2019 – present

Duties: Seeking the voluntary speakers, scheduling the weekly talks, sending email reminders, hosting the speakers and maintaining the resources on the website

The ATCA **Duty Astronomer** 2019 – present

Duties: Assisting the observers to calibrate and configure the observations, reporting and solving possible observing issues.

Updates on the **ATNF-PSRCAT** 2020 – present

Duties: Collecting the new parameters for known and new pulsars in the literature, making and compiling the update files.

## TALKS IN CONFERENCES OR SEMINARS

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**FRB 2021 International Meeting**, Zoom Webinar Jul-Aug 2021

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

Video recordings: [\[Session 3A\]](#) and [\[Session 3B\]](#)

**C3DIS 2021 Conference**, Virtual, Australia Jul 2021

Contributed oral presentation: *simulateSearch – A package for simulating high time-resolution data in radio astronomy*

**MQ AAASeminar**, Macquarie University, Sydney, Australia May 2021

Invited in-person talk: *Diverse polarization angle swings from a repeating fast radio burst source*

**ASKAP-CRAFT Group Meeting**, ATNF-Swinburne-Curtin, Australia Mar 2021

Invited remote talk: *Current FRB Science Outcomes with FAST*

**Pulsar Group Meeting**, MPIfR, Bonn, Germany Feb 2021

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

**Colloquium**, Curtin Institute of Radio Astronomy, Perth, Australia Jan 2021

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

**Colloquium**, Department of Astrophysics, University of Radboud, Netherlands Dec 2020

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

<b>Lunch Talk, Kavli IPMU, University of Tokyo, Japan</b>	Dec 2020
Invited remote talk: <i>Diverse polarization angle swings from a repeating fast radio burst source</i>	
<b>CSIRO-ATNF Co-learnium, Marsfield, NSW, Australia</b>	Dec 2020
Contributed remote talk: <i>Life changes of the local residents around the FAST site</i>	
<b>CHIME/FRB Journal Club, Canada</b>	Dec 2020
Invited remote talk: <i>Diverse polarization angle swings from a repeating fast radio burst source</i>	
Video recording: <a href="#">[YouTube link]</a>	
<b>Seminar, AUS-NZ-PSR Group Meeting, Australasia</b>	Nov 2020
Contributed remote talk: <i>Diverse polarization angle swings from a repeating fast radio burst source</i>	
<b>FRB 2020 International Meeting, Zoom Webinar</b>	Jul 2020
Pleanry talk: <i>Measurement of the luminosity function of Fast Radio Bursts</i>	
Video recording: <a href="#">[Session 5]</a>	
<b>ATNF Bolton Symposium, Kensington, Perth, Australia</b>	Mar 2020
Contributed talk: <i>A new repeating FRB discovered by the FAST telescope</i>	
<b>CSIRO-ATNF Co-learnium, Marsfield, NSW, Australia</b>	Dec 2019
Contributed talk: <i>A beginner's guide to Bayesian inference</i>	
<b>CSIRO-ATNF Colloquium, Marsfield, NSW, Australia</b>	Sep 2019
Invited talk: <i>Measurement of the luminosity function of Fast Radio Bursts</i>	
<b>FAST/Future Pulsar Symposium 8, Xi'an, China</b>	Jun 2019
Contributed talk: <i>Measurement of the luminosity function of Fast Radio Bursts</i>	
<b>Cosmology Group Meeting, NAOC, Beijing, China</b>	Mar 2019
Invited talk: <i>Measurements on the FRB luminosity function</i>	
<b>KIAA Graduate Dinner Talk, Beijing, China</b>	Dec 2018
Invited talk: <i>An Overview on Fast Radio Bursts and FRB luminosity function</i>	
<b>NAOC Graduate Student Seminar, Beijing, China</b>	Apr 2018
Invited talk: <i>A Review of Fast Radio Bursts and FRB luminosity function</i>	
<b>Radio Astronomy Forum 2017, Pingtang, China</b>	Sep 2017
Poster talk: <i>Simulating DM of host galaxies to derive FRB luminosity function</i>	
<b>Chinese Astronomical Society Annual Meeting 2016, Wuhan, China</b>	Nov 2016
Contributed talk: <i>Simulating the dispersion measure of host galaxies</i>	
<b>Jing-Guang-Xia Astrophysics Meeting, Xiamen, China</b>	Jul 2016
Contributed talk: <i>Simulating the dispersion measure of host galaxies</i>	
<b>QTT Colloquium Series 2016, Zunyi, China</b>	Jul 2016
Contributed talk: <i>Simulating the dispersion measure of FRB host galaxies</i>	
<b>PKU-XAO Bilateral Meeting, Urumqi, China</b>	Jun 2016
Contributed talk: <i>Simulating the dispersion measure of FRB host galaxies</i>	
<b>Chinese Astronomical Society Annual Meeting 2015, Beijing, China</b>	Oct 2015
Contributed talk: <i>Consideration of Research on FRBs</i>	
<b>QTT Colloquium Series 2015, Ming'antu, China</b>	Jul 2015
Contributed talk: <i>Consideration of Research on FRBs</i>	
<b>KIAA-SHAO Bilateral Workshop, Beijing, China</b>	May 2015
Contributed talk: <i>Consideration of FRB searching</i>	

## TECHNICAL SKILLS

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

## LANGUAGES

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<b>Chinese</b>	Native
<b>English</b>	Fluent
<b>Japanese</b>	Elementary

## REFERENCES

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### **Kejia Lee**

*Associate Professor*

Kavli Institute for Astronomy and Astrophysics, Peking University

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### **George Hobbs**

*Research Scientist and Team Leader*

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### **Duncan Lorimer**

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### **R. N. Manchester**

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### **Bing Zhang**

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## PUBLICATIONS

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