

He Wang

hewang@ucas.ac.cn

International Centre for Theoretical Physics Asia-Pacific
University of Chinese Academy of Sciences

No.55, Zhongguancun East St.,
Haidian Dist,
Beijing 100190, P.R.China.
Tel.: (+86) 18811557200

WORK EXPERIENCE

International Centre for Theoretical Physics Asia-Pacific — 2022-Present

Haidian, Beijing

Postdoctoral Fellow.

- Research on theoretical modeling and the application of AI-based machine learning techniques to gravitational wave data analysis.
- Main interests including data processing methods and the development of algorithms for ground-based and space-based gravitational wave detection.

Peng Cheng Laboratory — 2021-2022

Shenzhen, Guangzhou

Visiting scholar.

- Analyzing denoising techniques on GW observational data.
- Modeling transformer-based model (BERT).
- Deploying large-scale pre-trained AI model.

Institute of Theoretical Physics, Chinese Academy of Sciences — 2020-2020

Haidian, Beijing

Postdoctoral Fellow.

- Research on rapid detection and inference on gravitational wave signals with deep learning.

EDUCATION

Beijing Normal University — 2015-2020

Ph.D., Theoretical Physics

- Dissertation: *Research on Data Analysis of Deep Learning in Gravitational Wave Detection*
Advisor: Prof. Zhoujian Cao, Prof. Jianyang Zhu
- Research on influence of convolutional neural network's structure on performance of gravitational wave signal recognition.
- Research on interpretability of deep neural networks in gravitational wave detection.
- Stability analysis for analytic hairy black hole in higher dimensions with a minimally coupled scalar field.

China West Normal University — 2012-2015

M.S., Theoretical Physics

- Thesis: *Theoretical analysis on a new metric ansatz for Kaluza-Klein supergravity theory black holes*
Advisor: Prof. Shuangqing Wu
- Perturbations and stability of static black holes in higher dimensions.
- Generalization for general rotating charged Kaluza-Klein-AdS black hole solutions by introducing one or two arbitrary constants.

- Program: *Intelligent Vision-based Landing System of Unmanned Aerial Vehicle (UAV)*.

PRESENTATIONS

- *Machine Learning in Gravitational Wave Data Analysis*. Oral presentation delivered at Taiji Seminar, ICTP-AP, UCAS, October 31th, 2022.
- *Exploring Gravitational-Wave Detection & Parameter Inference using Deep Learning*. Oral presentation delivered at the 23rd International Conference on General Relativity and Gravitation (GR23) (domestic session), July 4th, 2022.
- *Exploring Gravitational-Wave Detection and Parameter Inference using Deep Learning*. Oral presentation delivered at the 8th KAGRA International Workshop, July 9th, 2021.
- *Deep Learning Networks & Matched-filtering Techniques*. Oral presentation delivered at the 23rd KAGRA face-to-face meeting, Toyama, Japan, August, 2019.
- *Deep Learning Networks & Gravitational Wave Signal Recognition*. Oral presentation delivered for minisymposia: “Topological data analysis and deep learning: theory and signal applications - Part 4” at the 9th International Congress on Industrial and Applied Mathematics (ICIAM), Valencia, Spain, July, 2019.
- *Perturbative Analysis of Rotating Charged Kaluza-Klein AdS Black Holes*. Oral presentation delivered at The First International Conference on the Fundamental Laws of the Universe, Chengdu, China, March 2014.

SKILLS & TECHNIQUES

Programming:

- Proficient with popular deep learning frameworks using Python:
PyTorch, MXNet, TensorFlow.
- Red Hat Certified Systems Administrator (RHCSA)
certification ID: 180-271-041
- GitHub: <https://github.com/iphysresearch>

Language:

- Chinese: Native.
- English: Fluent; IELTS test - overall 6.5 (2017.04)

PUBLICATIONS

- Wang, Bo-Rui, Jin Li, and **He Wang**. "Probing the gravitational wave background from cosmic strings with Alternative LISA-TAIJI network." e-Print: [arXiv:2211.10617](https://arxiv.org/abs/2211.10617) [gr-qc]
- Marlin B. Schäfer, Ondřej Zelenka, Alexander H. Nitz, **He Wang**, Shichao Wu, Zong-Kuan Guo, Zhoujian Cao, Zhixiang Ren, Paraskevi Nousi, Nikolaos Stergioulas, Panagiotis Iosif, Alexandra E. Koloniari, Anastasios Tefas, Nikolaos Passalis, Francesco Salemi, Gabriele Vedovato, Sergey Klimenko, Tanmaya Mishra, Bernd Brügmann, Elena Cuoco, E. A. Huerta, Chris Messenger, Frank Ohme. "MLGWSC-1: The first Machine Learning Gravitational-Wave Search Mock Data Challenge." e-Print: [arXiv:2209.11146](https://arxiv.org/abs/2209.11146) [astro-ph.IM]

- Tianyu Zhao, Ruoxi Lyu, Zhixiang Ren, **He Wang**, Zhoujian Cao. "Space-based gravitational wave signal detection and extraction with deep neural network." e-Print: [arXiv:2207.07414](https://arxiv.org/abs/2207.07414) [gr-qc]
- CunLiang Ma, Wei Wang, **He Wang**, Zhoujian Cao. "Ensemble of deep convolutional neural networks for real-time gravitational wave signal recognition." Physical Review D 105.8 (2022): 083013. e-Print: [arXiv:2204.12058](https://arxiv.org/abs/2204.12058) [astro-ph.IM]
- Wen-Hong Ruan, **He Wang**, Chang Liu, Zong-Kuan Guo. "Rapid search for massive black hole binary coalescences using deep learning." arXiv preprint arXiv:2111.14546 (2021). e-Print: [arXiv:2111.14546](https://arxiv.org/abs/2111.14546) [astro-ph.IM]
- **He Wang**, Zhoujian Cao, Yue Zhou, Zong-Kuan Guo, Zhixiang Ren. "Sampling with prior knowledge for high-dimensional gravitational wave data analysis." Big Data Mining and Analytics 5.1 (2021): 53-63.
- **He Wang**, Shi-Chao Wu, Zhoujian Cao, Xiao-Lin Liu, Jian-Yang Zhu, "Gravitational-wave signal recognition of LIGO data by deep learning". Phys.Rev. D101 (2020) 10, 104003, e-Print: [arXiv:1909.13442](https://arxiv.org/abs/1909.13442) [gr-qc]
- Xi-Bin Li, Shi-Wei Yan, **He Wang**, Jian-Yang Zhu, "Warm inflation with a generalized Langevin equation scenario", e-Print: [arXiv:1808.07679](https://arxiv.org/abs/1808.07679) [gr-qc]
- Xi-Bin Li, Yang-Yang Wang, **He Wang**, Jian-Yang Zhu, "Dynamic analysis of noncanonical warm inflation" Phys.Rev. D98 (2018) no.4, 043510, e-Print: [arXiv:1804.05360](https://arxiv.org/abs/1804.05360) [gr-qc]
- Xi-Bin Li, **He Wang**, Jian-Yang Zhu, "Gravitational waves from warm inflation", Phys.Rev. D97 (2018) no.6, 063516, e-Print: [arXiv:1803.10074](https://arxiv.org/abs/1803.10074) [gr-qc]
- Zhou-jian Cao, **He Wang**, Jian-Yang Zhu, "Initial study on the application of deep learning to the Gravitational Wave data analysis", Journal of Henan Normal University(Natural Science Edition), 2(2018):26-39. DOI: 10.16366/j.cnki.1000-2367.2018.02.005
- Shuang-Qing Wu, **He Wang**, "Approach of background metric expansion to a new metric ansatz for gauged and ungauged Kaluza-Klein supergravity black holes" Phys.Rev. D91 (2015) no.10, 104031, e-Print: [arXiv:1503.08930](https://arxiv.org/abs/1503.08930) [hep-th]

REFERENCES

Prof. Zhoujian Cao

Department of astronomy
Beijing Normal University
Beijing 100875, P.R.China
zjcao@bnu.edu.cn

Prof. Zong-Kuan Guo

CAS Key Laboratory of Theoretical Physics
Institute of Theoretical Physics
Chinese Academy of Sciences
Beijing 100190, P.R.China
guozkg@itp.ac.cn

Prof. Jibo He

School of Physics
University of Chinese Academy of Sciences
Beijing 100049, P.R.China
jibo.he@ucas.ac.cn