Beichen Xu

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Education

2023–2024 **MRes Machine Learning and Big Data in the Physical Sciences**, *Imperial College London*, Department of Physics
Skills and Modules: Statistical Methods for Experimental Physics, Cosmology, Machine Learning, Time Series Analysis, Accelerated Data Processing, Field-Programmable Gate Arrays (FPGA)

2020–2023 **B.Sc. Physics**, *University of Birmingham*, School of Physics and Astronomy, First Class Honours
Skills and Modules: Statistics, Complex Analysis, Cosmology, Lagrangian and Hamiltonian Mechanics, Eigen Physics, Linear Algebra, Relativity, Quantum Mechenics

Work Experience

Internships

2022 **Summer Intern**, Kavli Institute of Cosmology Cambridge, Univerisity of Cambridge, Cambridge

- Conducted research on machine learning-enhanced Bayesian inference, utilizing nested sampling to train cosmology data and masked aggressive flow for posterior generation of different parameters. Developed and trained machine learning models to enhance data analysis accuracy, and created visualizations results to illustrate AI training processes.
- Contributed to the "margarine" Python package on GitHub.
- Collaborated closely with collegues, engaging in regular discussions to refine research approaches, resulting in improved methodology and outcomes. Participated in an academic club, enhancing technical knowledge and communication skills by reading and discussing cutting-edge research papers with colleagues.

2021 **Summer Intern**, Purple Mountain Observatory, Nanjing

- Conducted a comprehensive literature review on GRB phenomena. Analyzed Gamma Ray Burst (GRB) data to investigate their causes and mechanisms, utilizing Python for data fitting and analysis with a focus on Swift GRB data.
- Applied statistical methods to improve the accuracy of GRB parameter estimation, gaining proficiency in the iminuit library for minimization and error analysis.

Full Time

2025 **AI Algorithm Reseacher**, Science42.tech, Beijing

- Conducted research on applying advanced AI architectures (Transformers, Diffusion models, GNNs) to scientific domains including fluid dynamics, biomedicine, and energy systems.
- Maintained close academic collaborations with researchers at Tsinghua University, Westlake University, and IMEC(Belgium), engaging in joint studies exchange.
- Bridged theoretical research and practical implementation by developing physics-informed AI models and contributing to high-quality publications. Submitted research findings to journals like Physics of Fluids.
- Collaborated with interdisciplinary teams on code development for research pipelines; guided interns in scientific research tasks and technical projects.

2025 **AI Algorithm Engineer**, MapTech, Beijing

- Developed vision–language (VL) and multimodal learning pipelines for large-scale GIS and remote sensing tasks, including road network extraction, trajectory modeling, and satellite image understanding.
- Led experiments on both full-parameter fine-tuning and LoRA-based lightweight adaptation of large VL models (e.g., Qwen-VL), improving task efficiency across heterogeneous geospatial datasets.
- Designed geospatial feature tokenization and fusion strategies (image patches, trajectory embeddings, hint maps), enabling downstream segmentation and reasoning tasks in urban mobility and mapping scenarios.
- Built reproducible training and evaluation workflows for multi-GPU environments; optimized dataset curation, annotation alignment, and benchmarking across regions and modalities.
- Collaborated with product and engineering teams to translate research prototypes into deployable components in the MapTech production pipeline.

Project Experience

2024 **MRes Project**, Imperial College London, London

- Simulated multi-source gravitational wave time-series data, and developed and trained WGAN models to reconstruct parameters from original simulated signals.
- Utilized Imperial College London's HPC for model training and data visualization, employing tools such as PyTorch, PyTorch Lightning for development, training, and analysis.
- Participated in weekly group meetings with my supervisor and a PhD colleague to discuss project progress and troubleshoot challenges, fostering collaborative problem-solving and improving project outcomes.

Computer Skills

Programming Python, C++, Mathematica, PyTorch, TensorFlow, SQL

Computing Linux, Unix, Bash, vim, git, LaTeX, docker

Awards

2018 18th Award Program for Future Scientists – Silver medal

2019 Physics Olympiad in Jiangsu Province, China – First prize

2020 Nantong Mayor's Award for Science and Technology Innovation

Languages

Chinese Native

English Fluent *Conversational and written fluency*

Japanese Intermediate *N3 level*

Publications

1 Xu, Beichen, Jun Su, and Weiguo Wang. "An expanding balloon: a small universe." *Physics Education* 53.6 (2018): 065005.

2 Beichen Xu, Yuhao Ma, Biyue Pan, Hao Zheng, Zhibo Dai, Chunyang Wang, Hui Xiang, Dixia Fan "AeroDiT: Diffusion Transformers for Reynolds-Averaged Navier-Stokes Simulations of Airfoil Flows"