Xiaozhi Liu

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Education

Beihang University, Beijing, China, Ph.D. in Applied Mathematics — Sept. 2022 – Present

- School of Mathematical Sciences & **Shen Yuan Honors College** (selected among only **35** students university-wide)
- **Supervisor**: Prof. Yong Xia
- **GPA**: 91.45/100 (Rank: 4/27)

Northwestern Polytechnical University, Xi'an, China, BS in Information and Computing Science — Sept. 2018 – Jul. 2022

- School of Mathematics and Statistics
- **Supervisor**: Prof. Jianchao Bai
- **GPA**: 88.01/100 (Rank: 4/43)

  During my junior year, I achieved a GPA of **97.89/100**, ranking first in the entire college (**1/104**).

Université catholique de Louvain, Louvain-la-Neuve, Belgium, Visiting Ph.D. in Applied Mathematics — Oct. 2025 – Oct. 2026

- Institute of Information and Communication Technologies, Electronics and Applied Mathematics (**INMA/ICTEAM**)
- **Supervisor**: Prof. Geovani N. Grapiglia
- **Funding**: Supported by the **China Scholarship Council (CSC)**

Research Interests

- My research interests lie in optimization theory and algorithms, with a focus on their applications in signal processing and wireless communications.

Publications & Preprints

A Unified Algorithmic Framework for Dynamic Compressive Sensing 2025

Xiaozhi Liu, Yong Xia, Signal Processing: 232, 109926. (github)

Cubic NK-SVD: An Algorithm for Designing Parametric Dictionary in Frequency Estimation 2025

Xiaozhi Liu, Yong Xia, Signal Processing: 235, 110029. (github)

Split-Merge: A Difference-based Approach for Dominant Eigenvalue Problem 2025

Xiaozhi Liu, Yong Xia, arXiv: 2501.15131.

Split-Merge Revisited: A Scalable Approach to Generalized Eigenvalue Problems 2025

Xiaozhi Liu, Yong Xia, arXiv: 2507.02389.

Revisiting Atomic Norm Minimization: A Sequential Approach for Atom Identification and Refinement 2024

Xiaozhi Liu*, Jinjiang Wei*, Yong Xia, arXiv: 2411.08459.

Research Experience

Super-Resolution Parameter Estimation and Completion in 5.5G Massive MIMO Communication Systems Sep. 2022 – Present

- National Key Research and Development Program of China.
- **Role**: Core Technical Member.
- **Research Focus**: Addressing issues related to the estimation of wireless channel state information (CSI) and the optimization of hybrid beamforming (HBF) algorithms in 5.5G Massive MIMO systems.

Application of the BERT Model in Cloze Tests for Natural Language Processing (NLP) Nov. 2020 – Jan. 2021

- ASC International Student Supercomputer Challenge, **Second Prize**.
- **Role**: Project Leader.
- **Research Focus**: Tackling cloze tests in NLP. Starting from scratch, I independently studied the BERT model under the PyTorch framework. My key tasks included:
  1. Implementing the training and testing of the CLOTH dataset using Python programming.
  2. Leveraging a high-performance computing platform (Linux environment) for GPU parallel computing to enhance the model's computational efficiency.

Work Experience

Research Assistant Aug. 2025 – Sep. 2025

- Hong Kong Baptist University, Hong Kong, China.
- **Supervisors**: Prof. Michael K. Ng (SIAM Fellow) and Prof. Guangning Xu.
- **Research Focus**: Improvement of LoRA-based parameter-efficient fine-tuning (PEFT) strategies for large language models (LLMs).

Presentations

A Unified Algorithmic Framework for Dynamic Compressive Sensing October 12-15, 2023

- 21st Annual Meeting of CSIAM, Kunming, Yunnan.

Cubic NK-SVD: An Algorithm for Designing Parametric Dictionary in Frequency Estimation September 13-15, 2024

- 1st ORSC conference on Data Science and Operations Research Intelligence, Beijing.

Honors & Awards

National Scholarship for Doctoral Students (**Top 0.2% nationwide**) 2025
National Scholarship for Undergraduate Students (**Top 0.2% nationwide**) 2021
Ph.D. Freshman Scholarship (**awarded to only 3 students in the college**) 2022
Outstanding Graduate (link) 2022
First Prize, National Undergraduate Mathematics Competition, Shaanxi Province 2020
First Prize, China Undergraduate Mathematical Contest in Modelling (CUMCM), Shaanxi Province 2020

Skills

Programming Languages: Python, Matlab, C, Julia, LaTeX

Machine Learning: PyTorch, TensorFlow

High Performance Computing: Linux

Languages: English: Fluent (CET-4: 593, CET-6: 523, Certificate of PETS Level 5); Mandarin: Native Speaker