

TIANAO LI

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📍 Department of Computer Science, McCormick School of Engineering, Northwestern University, Evanston, IL 60208

EDUCATION

Northwestern University

Ph.D. Candidate in Computer Science

GPA: 3.97/4.0

Research advisor: Emma Alexander

Evanston, IL

Sept. 2023 - Present

Tsinghua University

B.Eng. in Electronic Engineering, Magna Cum Laude

Curricular Certificate in Astronomy

GPA: 3.85/4.0 (top 15%)

Research advisor: Cheng Ma, Lu Fang

Beijing, P.R. China

Aug. 2019 - Jun. 2023

Beijing No.4 High School

High School Diploma

Beijing, P.R. China

Sept. 2016 - Jun. 2019

HONORS & AWARDS

- Best Poster Honorable Mention, Midwest Machine Learning Symposium 2025 *Jun. 2025*
- Outstanding Graduate, Tsinghua University (top 10%) *Jun. 2023*
- Scholarship of Comprehensive Excellence, Tsinghua University (top 10%) *Oct. 2022*
- Scholarship of Comprehensive Excellence, Tsinghua University (top 10%) *Oct. 2021*
- Scholarship of Social Work, Tsinghua University *Oct. 2020*

RESEARCH INTERESTS

My research interest is in the field of computational imaging, which lies at the intersection of optics, signal processing, computer vision, and machine learning. Specifically, I am interested in developing physics-based and uncertainty-aware methods to solve inverse problems in computational photography, medical imaging, and astronomical imaging.

PUBLICATIONS

- [1] **Tianao Li**, Manxiu Cui, Cheng Ma, Emma Alexander. “**Coordinate-based Speed of Sound Recovery for Aberration-Corrected Photoacoustic Computed Tomography**”. *IEEE/CVF International Conference on Computer Vision (ICCV)*, 2025.
- [2] **Tianao Li**, Emma Alexander. “**Galaxy Image Deconvolution for Weak Gravitational Lensing with Unrolled Plug-and-Play ADMM**”. *Monthly Notices of the Royal Astronomical Society: Letters*, 2023.

RESEARCH EXPERIENCE

Bio-Inspired Vision Lab, Northwestern University

Graduate Research Assistant

Advisor: **Prof. Emma Alexander**

Sept. 2023 - Present

- Inverse problems in scientific and medical imaging.
- Machine learning for astronomical imaging.
- Depth from differential defocus (DfDD).

Biophotonics Lab, Tsinghua University*Undergraduate Researcher**Oct. 2022 - Jun. 2023*Advisor: **Prof. Cheng Ma**, **Prof. Emma Alexander**

- Applied physics-informed machine learning to image reconstruction in photoacoustic computed tomography (PACT), where image qualities are usually degraded by unknown variations in the speed of sound through tissues.
- Network was trained and evaluated on simulated data.

Bio-Inspired Vision Lab, Northwestern University*Research Intern (remote)**Apr. 2022 - Feb. 2023*Advisor: **Prof. Emma Alexander**

- Applied physics-inspired machine learning to the PSF deconvolution problem in galaxy images in ground-based sky surveys, significantly reducing systematic error in weak gravitational lensing shear measurements. Adopted an end-to-end optimized unrolled network to learn the priors with Plug-and-Play ADMM.
- The proposed method outperformed previous algorithms in the shape error of recovered galaxies.
- Paper published in *Monthly Notices of the Royal Astronomical Society* (MNRAS).

SIGMA Lab, Tsinghua University*Research Assistant**Sept. 2021 - Feb. 2022*Advisor: **Prof. Lu Fang**

- Collaborated with a Ph.D. student on a Deep Diffractive Neural Network (D²NN) implementation of NeRF.
- Implemented a Point Cloud classification network with D²NN.

INVITED TALKS

Galaxy Image Deconvolution for Weak Gravitational Lensing with Unrolled Plug-and-Play ADMM

ECE Seminar, Department of Electrical & Computer Engineering, Boston University

Jul. 2024

Center for Interdisciplinary Exploration and Research in Astrophysics, Northwestern University

Jan. 2024

PKU Computational Scientific Imaging Group, Peking University

Dec. 2023

Astro Imaging Workshop 2023, Northwestern University

*Jul. 2023***SKILLS**

- **Coding:** Python, PyTorch, TensorFlow, Matlab, C/C++, JavaScript, Git, \LaTeX
- **Language:** English (Fluent), Mandarin (Native)

EXTRACURRICULAR

- Volunteer at Tsinghua Q&A Workshop with a total service hour of 180h. *Apr. 2021 - Jun. 2023*
- Vice president of Tsinghua Astronomy Society. *Sept. 2021 - Jun. 2022*
- Head of school observatory. *Sept. 2021 - Jun. 2022*
- Organized astronomy summer camp for junior high students in Guizhou, China. *Aug. 2021*