

TIANAO LI

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📍 Department of Computer Science, 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

- 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-informed 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. “**Self-Supervised Speed of Sound Recovery for Aberration-Corrected Photoacoustic Computed Tomography**”. *arXiv preprint*, 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

- Working on inverse problems in scientific computational imaging.

Biophotonics Lab, Tsinghua University

Undergraduate Researcher

Advisor: **Prof. Cheng Ma, Prof. Emma Alexander**

Oct. 2022 - Jun. 2023

- 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 shape error of recovered galaxies.
- Paper published on *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 ADMMECE 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, L^AT_EX
- **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*