TIANAO LI

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Department of Computer Science, Northwestern University, Evanston, IL 60208

EDUCATION

Northwestern University — Evanston, IL
Ph.D. candidate in Computer Science — *Sept. 2023 - Present*
Research advisor: Emma Alexander

Tsinghua University — Beijing, P.R. China
B.Eng. in Electronic Engineering, Magna Cum Laude — *Aug. 2019 - Jun. 2023*
Curricular Certificate in Astronomy
GPA: 3.85/4.0 (top 15%)
Research advisor: Cheng Ma, Lu Fang

Beijing No.4 High School — Beijing, P.R. China
High School Diploma — *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 — *Sept. 2023 - Present*
Advisor: **Prof. Emma Alexander**
- Working on inverse problems in scientific computational imaging.

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 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 (D^2NN) implemention of NeRF.
• Implemented a Point Cloud classification network with D^2NN.

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, 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*