

# Kaibo Tang

☎ 631-235-5125   ✉ tangkaibo@gmail.com   🌐 github.com/kvttt   🔗 linkedin.com/in/kaibotang

## EDUCATION

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### Boston University

Boston, MA

Ph.D. in Electrical Engineering

September 2025 – Present

- **GPA (cumulative):** 4.0/4.0
- **Selected Courses:** Digital Signal Processing, Optimization Theory and Methods, Digital Image Processing and Communication, Image Reconstruction and Restoration.
- **Honors and Awards:**
  - Distinguished Electrical Engineering Fellowship
  - College of Engineering Convergent Fellowship

### University of North Carolina at Chapel Hill

Chapel Hill, NC

B.S.P.H. in Biostatistics, B.S. in Mathematics, and minor in Chemistry

August 2021 – May 2025

- **GPA (cumulative):** 3.929/4.0
- **Selected Biostatistics Courses:** Principles of Epidemiology, Principles of Experimental Analysis, Probability and Statistical Inference, Sample Survey Methodology, Design of Public Health Studies
- **Selected Mathematics Courses:** Differential Equations, Linear Algebra, Advanced Calculus, Introductory Analysis, Introductory Functional Analysis
- **Pre-Med Courses:** Molecular Biology and Genetics, Cell and Developmental Biology, Anatomy and Physiology (Lab), General Chemistry, Analytical Chemistry (Lab), Organic Chemistry (Lab), Biological Chemistry
- **Additional Electives:** Image Processing and Analysis
- **Honors and Awards:**
  - Phi Beta Kappa, 2023
  - Honors Carolina
  - Summer Undergraduate Research Fellowship, 2022
  - Accelerated Research Program

## PUBLICATIONS AND MANUSCRIPTS

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- **Kaibo Tang**, Zijing Dong, Lawrence L. Wald, Fuyixue Wang. Rapid multi-shell mesoscale dMRI using accelerated Romer-EPTI with joint (x, q)-attention network constrained reconstruction. *Under review at Magnetic Resonance in Medicine*.
- Yanyao Du, Dan Hu, Zhengwang Wu, Ya Wang, Jiahe Wang, Jiale Cheng, Xinrui Yuan, **Kaibo Tang**, Jun Liu, Karen Grewen, Gang Li. Elevated Perivascular Space Burden in Infants with Prenatal Substance Exposure. *Under review*.
- **Kaibo Tang**, Zijing Dong, Lawrence L. Wald, Fuyixue Wang. Rapid multi-shell mesoscale dMRI using accelerated Romer-EPTI with joint x-q attention network constrained reconstruction. *ISMRM 2026 (oral)*.
- Rong Lu, **Kaibo Tang**, Run Pan, Shangxuan Shi, Xiao'ao Xue, Tingfang Hwang, Yang Song, Weijun Tang, Yue Yu, He Wang, Yao Lu, Ting Lin. The Biological Association Between Programmed Cell Death Function and OA Using Multi-Omic Mendelian Randomization. *Biomedical Technology*. 2025.
- **Kaibo Tang**, Xiuyu Dong, Zhengwang Wu, Laifa Ma, Sheng-Che Hung, He Zhang, Weili Lin, Gang Li. Surface-Guided Construction of 4D Volumetric Atlases of Fetal Brains. *MICCAI 2025 (MLMI workshop)*.
- Kai Zhang, Dan Hu, **Kaibo Tang**, Xiuyu Dong, Shijie Huang, Sheng-Che Hung, He Zhang, Zhengwang Wu, Weili Lin, Dinggang Shen, Gang Li. Continuous Spatio-Temporal Representation with Implicit Neural Networks for Fetal Brain MRI Atlas Construction. *MICCAI 2025 (PIPPi workshop)*.

- **Kaibo Tang**. A Selection of Distributions and Their Fourier Transforms with Applications in Magnetic Resonance Imaging. *arXiv*. 2025.
- Xiuyu Dong, **Kaibo Tang**, Zhengwang Wu, Dan Hu, Weili Lin, Gang Li. Lifespan Cortical Surface Reconstruction from Thick-Slice Clinical MRI. *MICCAI 2025*.
- Rong Lu, Tingfang Hwang, **Kaibo Tang**, Qing Li, Caixia Fu, Ying-Hua Chu, Shangxuan Shi, Tobias Kober, Tom Hibert, Bin Lu, Yiming Li, Yao Lu, Weijun Tang, Lijin Ji. A noninvasive accelerated quantitative MR technique to distinguish drug resistance in prolactinomas: Early results. *Biomedical Technology*. 2025.
- Jiaqi Zhang, Yanyao Du, . . . , **Kaibo Tang**, . . . , Tianzi Jiang. Stage-dependent Neural Mechanisms in Human Methamphetamine Abstinence: Insights from the Digital Twin Brain Model. *Biological Psychiatry*. 2025.
- Ruike Chen, Mingyang Li, . . . , **Kaibo Tang**, . . . , Dan Wu. Advances in Magnetic Resonance Imaging of the Developing Brain and its Application in Pediatrics. *World Journal of Pediatrics*. 2025.
- **Kaibo Tang**, Zijing Dong, Lawrence L. Wald, Fuyixue Wang. Accelerated Romer-EPTI using physics-driven joint x-q attention-network regularized reconstruction for fast mesoscale diffusion MRI. *ISMRM 2025 (power pitch)*.
- Rong Lu, **Kaibo Tang**, Weijun Tang. Editorial for “Improving Accuracy and Repeatability of Cartilage  $T_2$  Mapping in the OAI Dataset through Extended Phase Graph Modeling”. *Journal of Magnetic Resonance Imaging*. 2025.
- Xiuyu Dong, Zhengwang Wu, Laifa Ma, Ya Wang, **Kaibo Tang**, He Zhang, Weili Lin, Gang Li. Cycle-consistent Learning for Fetal Cortical Surface Reconstruction. *MICCAI 2024 (early acceptance)*.
- **Kaibo Tang**, Liangjun Chen, Zhengwang Wu, Fenqiang Zhao, Ya Wang, Weili Lin, Li Wang, Gang Li. Generation of Anatomy-Realistic 4D Infant Brain Atlases with Tissue Maps Using Generative Adversarial Networks. *ISBI 2024 (oral)*.

## RESEARCH EXPERIENCE

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### Advanced MRI Acquisition Lab

March 2024 – Present

Advisors: Drs. Fuyixue Wang and Zijing Dong

A. A. Martinos Center for Biomedical Imaging, Massachusetts General Hospital, Harvard Medical School

- Explored Romer-EPTI, a novel MR sequence and reconstruction technique for in-vivo mesoscale dMRI. Studied Plug-and-Play Alternating Direction Method of Multiplier for medical image reconstruction.
- Proposed a physics-driven and deep-prior-regularized reconstruction algorithm, which affords four-fold accelerated Romer-EPTI with equivalent, if not better, image quality compared to fully sampled Romer-EPTI, achieving fast mesoscale dMRI at 500- $\mu\text{m}$  isotropic resolution within 20 minutes. The work is published in the Proceedings of the 33rd Annual Meeting of ISMRM (power pitch).

### UNC BRAIN Lab

September 2021 – May 2025

Advisor: Dr. Gang Li

Biomedical Research Imaging Center (BRIC), UNC Chapel Hill

- Conducted a preliminary study investigating the effect of leveraging auxiliary data to improve the accuracy of deep learning-based image registration for infant brain MR images. This work is supported in part by the Summer Undergraduate Research Fellowship award (\$4,000) offered by the UNC Office of Undergraduate Research.
- Explored the lab’s previous work on infant brain atlas construction. Studied the challenges of applying existing deep learning-based atlas construction frameworks to fetal and infant brain MR images due to low and dynamic tissue contrast.

- Proposed a deep learning-based framework for infant brain atlas construction that 1. exploits anatomical prior from tissue probability maps to generate anatomically more plausible atlases, 2. constructs tissue probability maps that are necessary for a number of downstream tasks, and 3. accurately captures both the morphological and volumetric changes during early brain development. The work is accepted by ISBI 2024 (oral).
- Extended the proposed framework to model fetal brain developmental trajectory by leveraging additional anatomical information from reconstructed pial and white matter surfaces. The work is accepted by the MLMI workshop of MICCAI 2025.

## Open Source Software Development

November 2023 – Present

- Made major contributions to MONAI, an open-source PyTorch-based deep learning framework for medical imaging maintained by NVIDIA. These contributions include a re-implementation of VoxelMorph, one of the most popular image registration frameworks, and Diffusion Loss, a popular regularizer for image registration. The added functionalities were released in MONAI 1.3.1.
- Contributed to MONAI Tutorials, including one tutorial on how to use the newly added VoxelMorph module to customize and train one's own image registration model.
- Contributed to DIPY, a library for the analysis of diffusion MRI data. The contribution includes a function that enables interpolation of tensor-valued spherical functions.

## ACADEMIC SERVICE

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- **Reviewer:** Medical Image Analysis (MedIA), IEEE Journal of Biomedical and Health Informatics (JBHI), MICCAI 2023, ISBI 2025, ISBI 2026, MICCAI 2026
- **Lab Assistant:** Fundamentals of Human Anatomy and Physiology Laboratory (UNC Chapel Hill, Spring 2023, Fall 2023, Spring 2024, Fall 2024)

## VOLUNTEERING

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- **Undergraduate Volunteer:** UNC Medical Center Emergency Department (January 2023 – December 2024)

## SKILLS

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- **Languages:** Python,  $\text{\LaTeX}$ , R, HTML, Markdown
- **Professional Softwares:** MATLAB, SAS, FreeSurfer, FSL, ANTs, ITK, Paraview
- **Others:** Git, Docker, PyTorch, TensorFlow, DIPY, MONAI

## SELECTED PROJECTS, VIDEOS, AND NOTES

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- **Selected projects:** See [kvttt.github.io/projects](https://kvttt.github.io/projects), also see [github.com/kvttt](https://github.com/kvttt).
- **Videos produced:** See [kvttt.github.io/videos](https://kvttt.github.io/videos).
- **Notes:** See [kvttt.github.io/notes](https://kvttt.github.io/notes).