

# Peirong Liu

Postdoctoral Researcher  
Athinoula A. Martinos Center for Biomedical Imaging  
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<b>Education</b>	<b>University of North Carolina at Chapel Hill</b>	Chapel Hill, U.S
	<i>Ph.D. in Computer Science</i> <ul style="list-style-type: none"><li>▪ Advisor: Dr. Marc Niethammer</li><li>▪ Thesis committee: Dr. Yueh Z. Lee, Dr. Stephen Aylward, Dr. Colin Raffel, Dr. Gedas Bertasius</li></ul>	Aug 2018 – Jun 2023
	<b>Shanghai University</b>	Shanghai, China
	<i>B.S. in Mathematics and Applied Mathematics</i> <ul style="list-style-type: none"><li>▪ GPA: 3.95/4.00 (Rank: 1/305)</li><li>▪ President's List; National Scholarship</li></ul>	Sep 2014 – Jun 2018

<b>Summary</b>	My research interest lies in <b>AI for Healthcare</b> , at an intersection of machine learning, computer vision, and medical imaging. My recent research topics include	
	<ul style="list-style-type: none"><li>▪ Partial differential equations, optimal transport, physics-driven deep learning</li><li>▪ Generative models, modality-agnostic medical imaging foundation models</li><li>▪ Clinical applications: CT/MR perfusion imaging, low-field MR imaging, stroke diagnosis</li></ul>	

<b>Experience</b>	<b>Harvard Medical School &amp; Massachusetts General Hospital</b>	Boston, U.S
	<i>Postdoctoral researcher (Host: Dr. Juan Eugenio Iglesias)</i> <ul style="list-style-type: none"><li>▪ Modality-agnostic foundation models for medical imaging</li><li>▪ Pathology representation and detection</li></ul>	Aug 2023 – present
	<b>Department of Computer Science, University of North Carolina at Chapel Hill</b>	Chapel Hill, U.S
	<i>Research assistant (Advisor: Dr. Marc Niethammer)</i> <ul style="list-style-type: none"><li>▪ Partial differential equations, Physics-driven deep learning for perfusion imaging</li><li>▪ Regularized optimal mass transport (rOMT) and non-rigid fluid-based image registration</li></ul>	Jan 2019 – Aug 2023
	<b>Computer Vision (Generative AI), Meta AI</b>	New York, U.S
	<i>Research Intern: open-vocabulary object detection, multi-object tracking</i>	May 2022 – Nov 2022
	<b>Computer Vision (Content Understanding), Facebook AI</b>	New York, U.S
	<i>Research Intern: unsupervised image synthesis, motion transfer</i>	May 2021 – Nov 2021
	<b>Biomedical Research Imaging Center, University of North Carolina at Chapel Hill</b>	Chapel Hill, U.S
	<i>Research assistant (Advisors: Dr. Dinggang Shen and Dr. Pew-Thian Yap)</i> <ul style="list-style-type: none"><li>▪ Geometric deep learning for mesh-structured data</li></ul>	Aug 2018 – Dec 2018

<b>Selected Publications</b>	<b>Journal</b>	
	<b>Peirong Liu</b> , Yueh Z. Lee, Stephen Aylward, and Marc Niethammer, “Perfusion Imaging: An Advection Diffusion Approach,” <i>IEEE Transactions on Medical Imaging (TMI)</i> , 2021. [paper] [code]	
	<b>Refereed Conference</b>	
	<b>Peirong Liu</b> , Oula Puonti, Xiaoling Hu, Daniel C. Alexander, and Juan E. Iglesias, “Brain-ID: Learning Contrast-agnostic Anatomical Representations for Brain Imaging,” <i>ECCV</i> , 2024. [paper] [code]	
	<b>Peirong Liu</b> , Oula Puonti, Annabel Sorby-Adams, William T. Kimberly, and Juan E. Iglesias, “PEPSI: Pathology-Enhanced and Pulse-Sequence-Invariant Representations for Brain MRI,” <i>MICCAI</i> , 2024. [paper] [code]	
	<b>Peirong Liu</b> , Yueh Z. Lee, Stephen Aylward, and Marc Niethammer, “Deep Decomposition for Stochastic Normal-Abnormal Transport,” <i>CVPR</i> , 2022. (Oral - 4.0%) [paper] [code]	
	<b>Peirong Liu</b> , Lin Tian, Yubo Zhang, Stephen Aylward, Yueh Z. Lee, and Marc Niethammer, “Discovering Hidden Physics Behind Transport Dynamics,” <i>CVPR</i> , 2021. (Oral - 3.7%) [paper] [code]	

Zhengyang Shen, Jean Feydy, **Peirong Liu**, Ariel Hernán Curiale, Ruben San José Estépar, and Marc Niethammer, “Accurate Point Cloud Registration with Robust Optimal Transport,” *NeurIPS*, 2021. [paper] [code]

Zhipeng Ding, Xu Han, **Peirong Liu**, and Marc Niethammer, “Local Temperature Scaling for Probability Calibration,” *ICCV*, 2021. [paper] [code]

**Peirong Liu**, Yueh Z. Lee, Stephen Aylward, and Marc Niethammer, “PIANO: Perfusion Imaging via Advection-diffusion,” *MICCAI*, 2020. (Early accept; Oral - 5.0%) [paper] [code]

Lin Tian, Connor Puett, **Peirong Liu**, Zhengyang Shen, Stephen Aylward, Yueh Z. Lee, and Marc Niethammer, “Fluid registration between lung CT and stationary chest tomosynthesis images,” *MICCAI*, 2020. [paper] [code]

**Peirong Liu**, Zhengwang Wu, Gang Li, Pew-Thian Yap, and Dinggang Shen, “Deep Modeling of Growth Trajectories for Longitudinal Prediction of Missing Infant Cortical Surfaces,” *IPMI*, 2019. (Oral - 10.0%) [paper] [code]

## Under Review

**Peirong Liu**, Oula Puonti, Xiaoling Hu, Karthik Gopinath, Annabel Sorby-Adams, William T. Kimberly, and Juan E. Iglesias, “A Modality-agnostic Multi-task Vision Foundation Model for Brain Imaging,” *In Submission to IEEE Transactions on Medical Imaging (TMI)*, 2024.

**Peirong Liu**, Dina Zemlyanker, Karthik Gopinath, You Cheng, Yingnan He, David Izquierdo, *et al.*, “On the normalizing properties of the intracranial volume in human brain volumetry across sex and race,” *In Submission to Proceedings of the National Academy of Sciences (PNAS) Brief Reports*, 2024.

**Peirong Liu**, Yueh Z. Lee, Stephen Aylward, and Marc Niethammer, “HARP: Hemisphere-normalized Atlas Representing Perfusion,” *In Submission to Radiology*, 2024.

**Peirong Liu**, Yueh Z. Lee, Stephen Aylward, and Marc Niethammer, “D<sup>2</sup>-SONATA+: Deep Decompositions for Stochastic Normal-Abnormal Transport,” *In Submission to IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)*, 2023.

## Invited Talks

### Perfusion Imaging via Mass Transport

Athinoula A. Martinos Center for Biomedical Imaging, Harvard Medical School, Charlestown, US Mar 2023

Brigham and Women’s Hospital, Harvard Medical School, Boston, US Jan 2023

Weill Cornell Medicine, Cornell University, New York, US Dec 2022

### Deep Decomposition for Stochastic Normal-Abnormal Transport

CVPR’22, New Orleans, US Jun 2022

### Discovering Hidden Physics Behind Transport Dynamics

CVPR’21, Virtual Jun 2021

### Perfusion Imaging via Advection-diffusion

MICCAI’20, Virtual Oct 2020

### Deep Modeling of Growth Trajectories for Longitudinal Prediction of Missing Infant Cortical Surfaces

IPMI’19, Hong Kong, China Jun 2019

## Awards

Rising Stars in EECS, MIT 2024

MICCAI NIH Award, Marrakesh 2024

MICCAI Travel Award, Lima 2020

IPMI Scholarship, Hong Kong 2019

President’s List, Shanghai University (the Highest honor, Top 10) 2018

Shanghai Outstanding Graduate, Shanghai 2018

Baogang Outstanding Student Award, Shanghai (Top 4) 2017

National Scholarship, Shanghai University (Top 1%) 2017

Finalist Winner, U.S. Mathematical Contest In Modeling (MCM) (Team leader, 36/8843) 2017

Third Prize, Shanghai Mathematics Competitions (Math Major) 2016

Top Grade Scholarship, Shanghai University (Top 3 department-wise) 2015-2017

Outstanding Student Award, Shanghai University 2015-2017

Academic Innovation Award, Shanghai University 2015-2016

## DEI

Volunteer research mentor at Talaria Summer Institute, for students of underrepresented genders  
Member and guest speaker at UNC GWiCS (Graduate Women in Computer Science)  
Reviewer and invited presenter at WiCV WiCV (Women in Computer Vision)

## Services

**Journals:** Computer Graphics Forum, Frontiers in Radiology, PLOS ONE  
**Conferences:** NeurIPS, ICLR, CVPR, ICCV, ECCV, AAAI, WiCV, MICCAI, IPMI, ISBI

## Skills

**Computer:** Python, MATLAB, C/C++,  $\text{\LaTeX}$ , HTML, JAVA, R  
**Libraries & OS:** PyTorch, TensorFlow, ITK, FreeSurfer; Linux (Ubuntu), Mac OSX

### Languages:

- Mandarin (Native Proficiency)
- English (Full Professional Proficiency)
  - TOEFL: 116 (R-30, L-30, S-27, W-29)
  - Shanghai Advanced-level English Interpretation Certificate

**Misc:** Guzheng (Professional Level-10 with Distinction); Piano; Drums; Rock Climbing