

# Peirong Liu

Postdoctoral Researcher  
Athinoula A. Martinos Center for Biomedical Imaging  
Harvard Medical School & Massachusetts General Hospital  
Boston, MA, US

♀ she/her  
🏠 Homepage  
🎓 Google Scholar  
✉️ pliu17@mgh.harvard.edu

Summary	My research interest lies in <b>AI for Healthcare</b> , at an intersection of machine learning, computer vision, and medical image computing. My recent research topics include	
	<ul style="list-style-type: none"><li>▪ Physics-driven learning for time-varying dynamic systems</li><li>▪ Modality-agnostic foundation models for medical imaging data</li><li>▪ Image registration, synthesis, and segmentation with potential pathologies</li><li>▪ Clinical applications: CT/MR imaging, brain perfusion, stroke detection and diagnosis</li></ul>	
Education	<b>University of North Carolina at Chapel Hill</b>	Chapel Hill, U.S
	<i>Ph.D. in Computer Science</i>	Aug 2018 – Jun 2023
	<ul style="list-style-type: none"><li>▪ Advisor: Dr. M. Niethammer</li><li>▪ Thesis Committee: Dr. Yueh Z. Lee, Dr. Stephen Aylward, Dr. Colin Raffel, Dr. Gedas Bertasius</li></ul>	
	<b>Shanghai University</b>	Shanghai, China
	<i>B.S. in Mathematics and Applied Mathematics</i>	Sep 2014 – Jun 2018
	<ul style="list-style-type: none"><li>▪ GPA: 3.95/4.00 (Rank: 1/305); Presidential Scholarship; National Scholarship</li></ul>	
Awards	<b>Rising Stars in Data Science, UCSD &amp; UChicago &amp; Stanford</b>	2024
	<b>Rising Stars in EECS, MIT</b>	2024
	MICCAI NIH Award, Marrakesh	2024
	MICCAI Travel Award, Lima	2020
	IPMI Scholarship, Hong Kong	2019
	<b>Presidential Scholarship, Shanghai University (Highest Honor, Top 10)</b>	2018
	<b>National Scholarship, Ministry of Education of China (Top 1%)</b>	2018
	Outstanding Graduate, Ministry of Education of China	2018
	Baogang National Scholarship, Shanghai (Top 4)	2017
	<b>Finalist Winner, U.S. Mathematical Contest In Modeling (MCM) (Team leader, Top 0.4%, 36/8843)</b>	2017
	Third Prize, Shanghai Mathematics Competitions (Math Major)	2016
	Top Grade Scholarship, Shanghai University (Top 3%)	2015-2017
	Outstanding Student Award, Shanghai University	2015-2017
	Public Service Award, Shanghai University	2015-2016
Experience	<b>Harvard Medical School &amp; Massachusetts General Hospital</b>	Boston, U.S
	<i>Postdoctoral researcher (Host: Dr. Juan Eugenio Iglesias)</i>	Aug 2023 – present
	<ul style="list-style-type: none"><li>▪ Modality-agnostic foundation models for medical imaging</li><li>▪ Pathology representation and anomaly detection, low-field MRI analysis</li></ul>	
	<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>	Jan 2019 – Aug 2023
	<ul style="list-style-type: none"><li>▪ Partial differential equations, physics-driven learning for time-varying dynamic systems</li><li>▪ Perfusion image analysis, image and point cloud registration</li><li>▪ Stroke detection and diagnosis</li></ul>	
	<b>Computer Vision (Generative AI), Meta AI</b>	New York, U.S
	<i>Research Intern: open-world 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>	Aug 2018 – Dec 2018
	<ul style="list-style-type: none"><li>▪ Geometric deep learning for mesh-structured and longitudinal data</li></ul>	

## Selected Publications

### Journal

**P. Liu**, Y. Z. Lee, S. Aylward, and M. Niethammer, “Perfusion Imaging: An Advection Diffusion Approach,” *IEEE Transactions on Medical Imaging (IEEE TMI)*, 2021. [paper] [code]

### Refereed Conference

**P. Liu**, O. Puonti, X. Hu, D. C. Alexander, and J. E. Iglesias, “Brain-ID: Learning Contrast-agnostic Anatomical Representations for Brain Imaging,” *ECCV*, 2024. [paper] [code]

**P. Liu**, O. Puonti, A. Sorby-Adams, W. T. Kimberly, and J. E. Iglesias, “PEPSI: Pathology-Enhanced and Pulse-Sequence-Invariant Representations for Brain MRI,” *MICCAI*, 2024. [paper] [code]

**P. Liu**, Y. Z. Lee, S. Aylward, and M. Niethammer, “Deep Decomposition for Stochastic Normal-Abnormal Transport,” *CVPR*, 2022. (Oral - 4.0%) [paper] [code]

**P. Liu**, L. Tian, Y. Zhang, S. Aylward, Y. Z. Lee, and M. Niethammer, “Discovering Hidden Physics Behind Transport Dynamics,” *CVPR*, 2021. (Oral - 3.7%) [paper] [code]

Z. Shen, J. Feydy, **P. Liu**, A. H. Curiale, R. San José Estépar, and M. Niethammer, “Accurate Point Cloud Registration with Robust Optimal Transport,” *NeurIPS*, 2021. [paper] [code]

Z. Ding, X. Han, **P. Liu**, and M. Niethammer, “Local Temperature Scaling for Probability Calibration,” *ICCV*, 2021. [paper] [code]

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

L. Tian, C. Puett, **P. Liu**, Z. Shen, S. Aylward, Y. Z. Lee, and M. Niethammer, “Fluid registration between lung CT and stationary chest tomosynthesis images,” *MICCAI*, 2020. [paper] [code]

**P. Liu**, Z. Wu, G. Li, P.-T. Yap, and D. Shen, “Deep Modeling of Growth Trajectories for Longitudinal Prediction of Missing Infant Cortical Surfaces,” *IPMI*, 2019. (Oral - 10.0%) [paper] [code]

## Under Review

**P. Liu**, O. Puonti, X. Hu, K. Gopinath, A. Sorby-Adams, W. T. Kimberly, and J. E. Iglesias, “A Modality-agnostic Multi-task Vision Foundation Model for Brain Imaging,” *In Submission to IEEE Transactions on Medical Imaging (IEEE TMI)*, 2024.

**P. Liu**, Y. Z. Lee, S. Aylward, and M. Niethammer, “HARP: Hemisphere-normalized Atlas Representing Perfusion,” *In Submission to Radiology*, 2024.

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

## Invited Talks

### Linking Theory and Practice: Robust and Interpretable Learning for Modern Healthcare

*Rising Stars in Data Science, UCSD & UChicago & Stanford, San Diego, US* Nov 2024

*Rising Stars in EECS, MIT, Cambridge, US* Oct 2024

### Towards Modality-Agnostic Foundation Models For Brain Imaging

*Boston Medical Image Analysis Workshop, MIT, Cambridge, US* Oct 2024

### 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

## 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)  
Volunteer 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, AISTATS, 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