

# Peirong Liu

Postdoctoral Researcher  
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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>	Aug 2018 – Jun 2023
	<b>Shanghai University</b>	Shanghai, China
	▪ <i>B.S. in Mathematics and Applied Mathematics</i>	Sep 2014 – Jun 2018
	▪ GPA: 3.95/4.00 (Rank: 1/305); President’s List; National Scholarship	

**Summary** My research interest lies in **AI for Health**, at an intersection of machine learning, computer vision, and medical imaging. My recent research topics include

- Partial differential equations, physics-driven deep learning
- Multi-modality, contrast-agnostic learning for brain imaging
- Perfusion imaging, MR imaging
- Stroke, white matter hyperintensities

<b>Experience</b>	<b>Athinoula A. Martinos Center for Biomedical Imaging, Harvard Medical School &amp; MGH</b>	Boston, U.S
	<i>Postdoctoral researcher (Host: Dr. Juan Eugenio Iglesias)</i>	Aug 2023 – present
	▪ Research on multi-modality and contrast-agnostic foundation models for brain imaging	
	▪ Research on pathology representations and detection	
	<b>Department of Computer Science, University of North Carolina at Chapel Hill</b>	Chapel Hill, U.S
	<i>Research assistant (Supervisor: Dr. Marc Niethammer)</i>	Jan 2019 – Aug 2023
	▪ Research on PDE/Physics-informed deep learning for perfusion imaging analysis	
	▪ Research on regularized optimal mass transport (rOMT) and non-rigid fluid-based image registration	
	<b>Computer Vision (Content Understanding), Meta AI</b>	New York, U.S
	<i>Research Intern (Host: Dr. Rui Wang)</i>	May 2022 – Nov 2022
	▪ Research on open-vocabulary image and video object detection, multi-object tracking	
	<b>Computer Vision (AI Integrity), Facebook AI</b>	New York, U.S
	<i>Research Intern (Host: Dr. Rui Wang)</i>	May 2021 – Nov 2021
	▪ Research on self-supervised, neural-ODE-based general framework for multi-view motion transfer	
	<b>Biomedical Research Imaging Center, University of North Carolina at Chapel Hill</b>	Chapel Hill, U.S
	<i>Research assistant (Supervisors: Dr. Dinggang Shen and Dr. Pew-Thian Yap)</i>	Aug 2018 – Dec 2018
	▪ Research on geometric deep learning for mesh-structured data. Proposed a spatio-temporal-aware graph convolution neural network (GCNN) for longitudinal prediction of infant cortical growth	

**Publications** **Peirong Liu**, Oula Puonti, Annabel Sorby-Adams, William T. Kimberly, Juan E. Iglesias. “Pathology-Enhanced and Pulse-Sequence-Invariant Representations for Brain MRI”. *In Submission*, 2024. [paper] [code]

**Peirong Liu**, Oula Puonti, Xiaoling Hu, Daniel C. Alexander, Juan E. Iglesias. “Brain-ID: Learning Robust Feature Representations for Brain Imaging”. *In Submission*, 2023. [paper] [code]

Pablo Laso, Stefano Cerri, Annabel Sorby-Adams, Jennifer Guo, Farrah Matteen, Philipp Goebel, Jiaming Wu, **Peirong Liu**, Hongwei Li, Sean I. Young, Benjamin Billot, Oula Puonti, Gordon Sze, Sam Payabvash, Adam Dehavenon, Kevin N. Sheth, Matthew S. Rosen, John Kirsch, Nicola Strisciuglio, Jelder M. Wolterink, Arman Eshaghi, Frederik Barkhof, William T. Kimberly, Juan E. Iglesias. “Quantifying White Matter Hyperintensity and Brain Volumes in Heterogeneous Clinical and Low-Field Portable MRI”. *International Symposium on Biomedical Imaging (ISBI)*, 2024. [paper] [FreeSurfer Toolbox]

**Peirong Liu**, Yueh Z. Lee, Stephen Aylward, Marc Niethammer. “HARP: Hemisphere-normalized Atlas Representing Perfusion”. *In Submission*, 2023.

**Peirong Liu**, Yueh Z. Lee, Stephen Aylward, Marc Niethammer. “D<sup>2</sup>-SONATA+: Deep Decompositions for Stochastic Normal-Abnormal Transport”. *Under Review*, 2023.

**Peirong Liu**, Rui Wang, Pengchuan Zhang, Omid Poursaeed, Yipin Zhou, Xuefei Cao, Sreya Dutta Roy, Ashish Shah, Ser-Nam Lim. “Unifying Tracking and Image-Video Object Detection”. *arXiv*, 2022. [paper]

**Peirong Liu**, Yueh Z. Lee, Stephen Aylward, Marc Niethammer. “Deep Decomposition for Stochastic Normal-Abnormal Transport”. *IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, 2022. (Oral - 4.0%) [paper] [code]

Maxime Oquab, Daniel Haziza, Ludovic Schwartz, Katayoun Zand, Tao Xu, **Peirong Liu**, Rui Wang, Camille Couprie. “Efficient Conditioned Face Animation Using Frontally-viewed Embedding”. *arXiv*, 2022. [paper]

**Peirong Liu**, Rui Wang, Xuefei Cao, Yipin Zhou, Ashish Shah, Maxime Oquab, Camille Couprie, Ser-Nam Lim. “Differential Motion Evolution for Fine-Grained Motion Deformation in Unsupervised Image Animation”. *arXiv*, 2022. [paper]

**Peirong Liu**, Lin Tian, Yubo Zhang, Stephen Aylward, Yueh Z. Lee, Marc Niethammer. “Discovering Hidden Physics Behind Transport Dynamics”. *IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, 2021. (Oral - 3.7%) [paper] [code]

Zhengyang Shen\*, Jean Feydy\*, **Peirong Liu**, Ariel Hernán Curiale, Ruben San José Estépar, Raúl San José Estépar, Marc Niethammer. “Accurate Point Cloud Registration with Robust Optimal Transport”. *Conference on Neural Information Processing Systems (NeurIPS)*, 2021. [paper] [code]

Zhipeng Ding, Xu Han, **Peirong Liu**, Marc Niethammer. “Local Temperature Scaling for Probability Calibration”. *IEEE/CVF International Conference on Computer Vision (ICCV)*, 2021. [paper] [code]

**Peirong Liu**, Yueh Z. Lee, Stephen Aylward, Marc Niethammer. “Perfusion Imaging: An Advection Diffusion Approach”. *IEEE Transactions on Medical Imaging (TMI)*, 2021. [paper] [code]

**Peirong Liu**, Yueh Z. Lee, Stephen Aylward, Marc Niethammer. “PIANO: Perfusion Imaging via Advection-diffusion”. *Medical Image Computing and Computer Assisted Intervention (MICCAI)*, 2020. (Oral - 5%, student travel award) [paper] [code]

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

**Peirong Liu**, Zhengwang Wu, Gang Li, Pew-Thian Yap, Dinggang Shen. “Deep Modeling of Growth Trajectories for Longitudinal Prediction of Missing Infant Cortical Surfaces”. *Information Processing in Medical Imaging (IPMI)*, 2019. (Oral - 10%, IPMI scholarship) [paper] [code]

## Talks

### Perfusion Imaging via Advection-diffusion

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

Boston Children’s Hospital, Harvard Medical School, Boston, US Feb 2023

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

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

Medical Image Computing and Computer Assisted Intervention (MICCAI), Virtual Oct 2020

### Deep Decomposition for Stochastic Normal-Abnormal Transport

IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), New Orleans, US Jun 2022

### Discovering Hidden Physics Behind Transport Dynamics

IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), Virtual Jun 2021

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

Information Processing in Medical Imaging (IPMI), Hong Kong, China Jun 2019

<b>Honors</b>	MICCAI Student Travel Award, <i>Lima</i>	2020
	IPMI Scholarship, <i>Hong Kong</i>	2019
	President's List, <i>Shanghai University (the Highest honor, Top 10 university-wise)</i>	2018
	Shanghai Outstanding Graduate, <i>Shanghai</i>	2018
	Baogang Outstanding Student Award, <i>Shanghai (Top 4 university-wise)</i>	2017
	National Scholarship, <i>Shanghai University (Top 1%)</i>	2017
	Finalist Winner, <i>U.S. Mathematical Contest In Modeling (MCM) (Team leader, 36 out of 8843 teams)</i>	2017
	Third Prize, <i>Shanghai Mathematics Competitions (Math Major)</i>	2016
	Top Grade Scholarship, <i>Shanghai University (Top 3 in Department)</i>	2017
	Top Grade Scholarship, <i>Shanghai University (Top 3 in Department)</i>	2016
	Top Grade Scholarship, <i>Shanghai University (Top 3 in Department)</i>	2015
	Outstanding Student Award, <i>Shanghai University</i>	2017
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	Outstanding Student Award, <i>Shanghai University</i>	2015
	Academic Innovation Award, <i>Shanghai University</i>	2016
	Academic Innovation Award, <i>Shanghai University</i>	2015
	Leadership Award, <i>Shanghai University</i>	2015
	Public Service Award, <i>Shanghai University</i>	2015

<b>Services</b>	Editorial board of Artificial Intelligence in Radiology
	Review editor of Frontiers in Radiology
	Reviewer of NeurIPS, ICLR, CVPR, ICCV, ECCV, MICCAI, IPMI, ISBI

<b>Skills</b>	<b>Computer:</b> Python, MATLAB, C/C++, $\LaTeX$ , HTML, JAVA, R, MS Office
	<b>Libraries &amp; OS:</b> PyTorch, TensorFlow, ITK, FreeSurfer; Linux (Ubuntu), Mac OSX
	<b>Languages:</b>
	<ul style="list-style-type: none"> <li>▪ Mandarin (Native Proficiency)</li> <li>▪ English (Full Professional Proficiency) <ul style="list-style-type: none"> <li>• TOEFL: 116 (R-30, L-30, S-27, W-29)</li> <li>• Shanghai Advanced-level Interpretation Certificate</li> </ul> </li> </ul>
	<b>Misc:</b> Guzheng (Professional Level-10 with Distinction); Piano; Drums; Rock Climbing