Mira M. Liu

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Education

University of Chicago **Oct. 2019 – Jun. 2023**
Ph.D. in Medical Physics (CAMPEP Accredited) *Chicago, IL*

University of Chicago **Oct. 2014 – Jun. 2018**
B.A. with General Honors, Honors Physics; Minor in Philosophy *Chicago, IL*

Research Experience

Icahn School of Medicine at Mount Sinai, BMEII **Aug. 2023 - Present**
Postdoctoral NIH NCATS TL1 Translational Science Fellow *Drs. Lewis, Bane, Taouli*
Abdominal Multiparametric MRI *New York, NY*

- Developed and applied multi-component approximation of flow using multi-b-value spectral diffusion MRI in kidney transplants (NIH TL1TR004420; Liu) .
- Developed and applied multi-b-value DWI including spectral diffusion, IVIM, tri-exponential fit, and ADC, as well as R2*, and ASL in detection of renal allograft fibrosis and function and Banff criteria due to sensitivity to early microstructural changes in parent R01 Clinical Trial (NIH R01DK129888, NCT05058170; Lewis/Bane).
- Developed, implemented, and analyzed multiparametric MRI post-processing and models of IVIM, ASL, DCE, BOLD/R2*, T1, DCE, and spectral diffusion in diagnosis and prediction of development chronic kidney disease in patients undergoing partial nephrectomy for solid renal masses in parent study funded by Research Grant from Bayer Healthcare (Lewis).
- Applied post-processing and analysis to multiparametric MRI for classification of RCCs against histopathological and immunohistochemical biomarkers in parent study funded by Research Grant from Bayer Healthcare (Lewis).
- Implemented multi b-value diffusion and diffusion tensor imaging of female pelvis in assessment of muscle and nerve damage in patients undergoing pelvic radiotherapy in collaboration with radiation oncology (NIH P30CA196521; Taouli/Marshall)

UMass Chan Medical School, Biomedical Imaging **Aug. 2024 - Present**
External Post-Doctoral Collaborator *Drs. Shazeeb, Gounis*
Perfusion Diffusion MRI of Stroke *Remote*

- Developed and applied post-processing and quantification of longitudinal perfusion and diffusion MRI of stroke therapeutics (NIH TL1TR004420; Liu, NIH R44NS076272) .
- Tested post-processing and quantification perfusion diffusion mismatch for prediction of future infarction and therapeutic response (NIH TL1TR004420; Liu, NIH R44NS076272) .

University of Chicago, Dept. of Medical Physics **Oct. 2019 - Jun. 2023**
Doctoral Candidate, National Science Foundation GRFP Fellow *Dr. Timothy Carroll*
Cerebrovascular MRI *Chicago, IL*

- Demonstrated and applied quantitative perfusion and diffusion MRI to capture collateral steal in novel stroke therapeutics in pre-clinical model under parent study (NIH R01-NS093908; Christoforidis/Carroll).
- Developed theory, simulation, and validation of water transport model with advanced multi b-value DWI, IVIM, compared to standard dynamic susceptibility contrast perfusion and neutron capture microsphere deposition through simulation and pre-clinical model (NSF DGE-1746045; Liu).

- Measured leptomeningeal pial collateral score and infarct growth rate *in vivo* with delay and dispersion corrected local-AIF dynamic susceptilibity contrast MRI (NIH R01-NS093908; (Christoforidis/Carroll)
- Validated the multi-b-value water transport model returning perfusion-diffusion mismatch measured with local perfusion using advanced multi b-value DWI compared to Local-AIF dynamic susceptilibity contrast MRI (NSF DGE-1746045; Liu).
- Compared local-AIF dynamic susceptilibity contrast MRI to Single-photon emission computed tomography perfusion in Intracranial Atherosclerotic disease.

University of Chicago, Dept. of Medical Physics — Sept. 2019 - Jan. 2020

Doctoral Student — *Dr. Patrick La Riviere*

High-resolution Muon Tomography of Pyramids of Giza — *Chicago, IL*

- Developed and wrote a simulation of geometric tracks of muon trajectories, simulated proposed two-place detector for one-sided muon tomography of the Pyramids of Giza.
- Provided method of calculating detector positions needed for high-resolution cosmic-ray tomographic reconstruction of Pyramids (Exploring the Great Pyramid (EGP) Mission collaboration between University of Chicago and Fermilab)

University of Chicago, Dept. of Radiology — Jun. 2018 - Oct. 2019

Research Specialist — *Dr. Timothy Carroll*

Cerebrovascular MRI — *Chicago, IL*

- Analyzed stroke models with quantitative dynamic susceptibility contrast for diagnosis and prognosis of novel therapeutics (NIH R01-NS093908; Carroll/Christoforidis).
- Post-processing MRI perfusion and diffusion for glioblastoma subtypes

University of Chicago, Dept. of Astrophysics — Sept. 2015 – Dec. 2020

Research Assistant, Honors Thesis — *Dr. Stephan Meyer*

Observational Cosmology and Astrophysics — *Chicago, IL*

- Derived and programmed data analysis to extract spectrum from output of lab-designed Compact Fourier Transform Spectrometer (FTS). Compiled and wrote code to run the instrument properly, store and retrieve data, and translated code to GUIs to be sent out with the FTS to the South Pole Telescope. (NSF PHY-1125897)
- Developed simulation to analyze the time constant modulating data using Markov Chain Monte Carlo and to execute Fourier analysis to extract the spectrum through deconvolution and demodulation.
- Wrote a ray tracing simulation designed to test the percentage of light that was lost in our designed compact Fourier transform spectrometer (FTS) due to scattering within the instrument, to address resolution and scattering effects observed from previous runs, and to provide statistical proof of results of data analysis.
- Extended simulation to be a full numerical model of FTS using ray tracing and semiclassical quantum statistics to be used to understand the interferograms and spectra produced by the physical FTS, as well as confirm instrumental limitations and data analysis.

New York University, Dept. of Physics — Jun. 2015 – Sept. 2015

Research Assistant — *Dr. Marc Gershow*

Soft Matter Physics — *New York, NY*

- Ran and recorded experiments on sensorimotor structure of drosophila larva phototaxis in study of the effects of genetic inactivation of photosensory neurons. Maintained the genetic strains of strains of drosophila.

Honors and Awards

- 2025 — Certificate of Merit Award for Scientific Poster from the Radiological Society of North America Science Council
- 2025 — 1st Place Oral Presentation at the Mount Sinai Radiology Retreat
- 2025 — 1st Place Kidney MRI Trainee Abstract at ISMRM 2025
- 2025 — International Society of Magnetic Resonance in Medicine Stipend ($475)
- 2025 — NIH TL1 Mount Sinai Postdoctoral Scholar Travel Award ($1000)
- 2025 — International Society of Magnetic Resonance in Medicine Body MRI Workshop Trainee Stipend Award ($238)
- 2024 — NIH TL1 Mount Sinai Postdoctoral Scholar Travel Award ($1000)
- 2024 — 2nd Place Oral Presentation at International Society for Magnetic Resonance in Medicine IVIM Workshop 2024
- 2024 - 2026 — **NIH TL1 Mount Sinai Postdoctoral Fellowship for Clinical and Translational Research Career Development ($120,000)**
- 2024 — Society of Abdominal Radiology Travel Scholarship Award for Trainees ($1000)
- 2024 — International Society of Magnetic Resonance in Medicine IVIM Workshop Trainee Stipend Award($865)
- 2024 — **University of Chicago Program Award for Outstanding Performance in the General Field of Medical Physics ($500)**
- 2024 — Department of Medical Physics Nominee for the University of Chicago Best PhD Dissertation (June 2024)
- 2023 — Graduate Program in Medical Physics Flash Talk Award
- 2023 — International Society of Magnetic Resonance in Medicine Stipend ($700)
- 2022 — **University of Chicago Harper Dissertation Award Finalist (One award per university division)**
- 2022 — Graduate Council Research Fund Award 2022 ($600)
- 2021 — International Society of Magnetic Resonance in Medicine Stipend ($700)
- 2019 - 2024 — **National Science Foundation Graduate Research Fellowship ($138,000)**
- 2018 — University of Chicago General Honors
- 2018 — University of Chicago Honors Bachelors Thesis in Physics
- 2017 — **Walter and Fay Selove Prize for Outstanding Undergraduate Research in Physics at the University of Chicago ($5,000)**
- 2014 - 2018 — Dean's List all years attended full time
- 2014 — Presidential Scholar Semifinalist for New York State

Peer-Reviewed Publications

P1. **MM. Liu**, O. Bane, X. Mu, et al. "Multiparametric MRI for predicting renal function deterioration and chronic kidney disease development in patients undergoing nephrectomy for renal masses: a pilot study." Journal of Magnetic Resonance Imaging, DOI: 10.1002/jmri.70213 *In Press.*

P2. P. van Houdt, L. Vaclavu, S. Sourbron, E. Shalom, C. Federau, M. Iima, **MM. Liu**, L. Knuttson, R. Wirestam, M. van Osch, M. Gunther, R. van der Heijden "ESR Essentials: Perfusion MRI—practice recommendations by the European Society for Magnetic Resonance in Medicine and Biology" European Radiology, *In Press.*

P3. **MM. Liu**, O. Bane, X. Mu, H. Al-Mubarak, G. Abboud, P. Kennedy, P. Robson, K. Meilika, L. Zuluaga, A. Horowitz, B. Kuhn, T.H. Thin PhD, M. Garcia-Barros, R. Brody, K. Badani, B. Taouli, S. Lewis "Immuno-Oncologic Profiling of Renal Masses using Multiparametric MRI: A Pilot Study". Journal for ImmunoTherapy of Cancer, 2025. DOI: 10.1136/jitc-2025-012833

P4. **MM. Liu**, J. Dyke, T. Gladytz, J. Jasse, I. Bolger, S. Calle, S. Pavuluri, T. Crews, A. Kimm-Drapeau, S. Seshan, S. Salvatore, I. Stillman, T. Muthukumar, B. Taouli, S. Farouk, S. Lewis and O. Bane "Detecting Early Kidney Allograft Fibrosis with Multi-b-value Diffusion MRI". Scientific Reports, 2025. PMID: 41266411, DOI: 10.1038/s41598-025-24701-5

P5. **MM. Liu**, T. Gladytz, J. Dyke, I. Bolger, J. Jasse, S. Calle, S. Seshan, S. Salvatore, I. Stillman, T. Muthukumar, B. Taouli, S. Farouk, S. Lewis and O. Bane "Estimation of Multi-Component Flow in the Kidney with Multi-b-value Spectral Diffusion", Magnetic Resonance in Medicine, 2025. PMID: 40720675, DOI: 10.1002/mrm.30644

P6. M. Tordjman, I. Bolger, M. Yuce, F. Restrepo, Z. Liu, L. Dercle, J. McGale, A. Meribout, **MM. Liu**, A. Beddok, H. Lee, S. Rohren, R. Yu, X. Mei, B. Taouli."Large Language Models in Cancer Imaging: Applications and Future Perspectives" Journal of Clinical Medicine, 2025. PMID: 40429281, DOI: 10.3390/jcm14103285.

P7. **MM. Liu**, N. Saadat, S. Roth, M. Niekrasz, M.S. Shazeeb, T. Carroll, G. Christoforidis. "*A Method for Imaging the Ischemic Penumbra with MRI using IVIM*" American Journal of NeuroRadiology, 2025. PMID: 39805668, DOI: 10.3174/ajnr.A8656

P8. **MM. Liu**, N. Saadat, S. Roth, M. Niekrasz, G. Christoforidis, T. Carroll. "*Quantification of Collateral Supply with Local-AIF Dynamic Susceptibility Contrast MRI Predicts Infarct Growth*" American Journal of NeuroRadiology, 2024. PMID: 39134367, DOI: 10.3174/ajnr.A8441

P9. C.S. Warioba, **MM. Liu**, Sagada Penano, T.J. Carroll, S. Foxley, G.A. Christoforidis. "*Efficacy Assessment of Cerebral Perfusion Augmentation Through Functional Connectivity in an Acute Canine Stroke Model*" American Journal of NeuroRadiology, 2024. PMID: 38684318, DOI: 10.3174/ajnr.A8320

P10. **MM. Liu**, N. Saadat, Y. Jeong, S. Roth, M. Niekrasz, G. Christoforidis, T. Carroll. "*Quantitative perfusion and water transport time model from multi b-value diffusion magnetic resonance imaging validated against neutron capture microspheres.*" Journal of Medical Imaging, 2023. PMID: 38090645, DOI: 10.1117/1.JMI.10.6.063501

P11. **MM. Liu**, N. Saadat, Y. Jeong, S. Roth, M. Niekrasz, G. Christoforidis, T. Carroll. "*Augmentation of Perfusion with Simultaneous Vasodilator and Inotropic Agents in Experimental Acute Middle Cerebral Artery Occlusion: A Pilot Study*". Journal of NeuroInterventional Surgery, 2022. PMID: 35803730 DOI: 10.1136/jnis-2022-018990

P12. A. Bross, E.C. Dukes, R. Ehrlich, E. Fernandez, S. Dukes, M. Gobashy, I. Jamieson, P. La Riviere, **MM. Liu**, G. Marouard, N. Moeller, A. Pla-Dalmau, P. Rubinov, O. Shohoud, P. Vargas, T. Welch. "*Tomographic Muon Imaging of the Great Pyramid of Giza*". Journal for Advanced Instrumentation in Science, 2022. OSTI ID: 1844785, DOI: 10.31526/jais.2022.280

P13. G. Christoforidis, N. Saadat, **MM. Liu**, Y. Jeong, S. Roth, M. Niekrasz, T. Carroll. "*Effect of Early SANGUINATE® (PEGylated carboxyhemoglobin bovine) Infusion on Cerebral Blood Flow to the Ischemic Core in Experimental Middle Cerebral Artery Occlusion.*" Journal of NeuroInterventional Surgery, 2021. PMID: 34907008 DOI: 10.1136/neurintsurg-2021-018239

P14. A. Dimov, G. Christoforidis, N. Saadat, **MM. Liu**, Y. Jeong, S. Roth, M. Niekrasz, T. Carroll. "*QSM in canine model of acute cerebral ischemia: A pilot study*". Mag. Reson. Med, 2020. PMID: 33034078 DOI: 10.1002/mrm.28498

P15. N. Saadat, G. Christoforidis, Y. Jeong, **MM. Liu**, A. Dimov, S. Roth, M. Niekrasz, S. Ansari, T. Carroll. "*Influence of simultaneous pressor and vasodilatory agents on the evolution of infarct growth in experimental acute middle cerebral artery occlusion.*" Journal of NeuroInterventional Surgery, 2020.PMID: 32900906 DOI: 10.1136/neurintsurg-2020-016539

P16. **MM. Liu**, Z. Pan, R. Basu Thakur, H. Goksu, S.Meyer, B.Benson. N.A. "*Simulation and Calibration of a Compact Fourier Transform Spectrometer*". Optical Society of America, Applied Optics, 2020. PMID: 32902475 DOI: 10.1364/AO.397312

P17. Z. Pan, **MM. Liu**, R. Basu Thakur, H. Goksu, E. Rath, D. Fixsen, S. Meyer, N.A. "A Compact Millimeter-Wavelength Fourier-Transform Spectrometer". Optical Society of America, Applied Optics, 2019. PMID: 31503767 DOI: 10.1364/AO.58.006257

Contribution to Reviews In Progress ————————-

P18. S. Rauh, E. Sigmund, C. Federau, D. Hernando, M. Iima, O. Jalnefjord, J. Jansen, J. Jasse, NP. Jerome, M. Kaandorp, S. Kurugol, FB. Laun, **MM. Liu**, A. Ljimani, T. Niendorf, DA. Reiter, MS. Shazeeb, A. Shukla-Dave, J. Stabinska, A. Wetscherek, PT. While, D. Wu, D. Le Bihan, O. Gurney-Champion "Towards Clinical Translation of Intravoxel Incoherent Motion MRI: Acquisition and Analysis Guidelines" Journal of Magnetic Resonance Imaging (Accepted with Pending Revision)

P19. C. Federau, **MM. Liu** "Intravoxel Incoherent Motion: From Theory to Practice" M. Iima, S. Huang, D. Le Bihan (Ed.), "Diffusion MRI: A window to biological tissue architecture and to medical applications" Springer Nature. (In Progress).

P20. B. Taouli, A. Meribout, M. Yuce, **MM. Liu** "Applications of Diffusion MRI in Liver and Pancreatic Disease" M. Iima, S. Huang, D. Le Bihan (Ed.), "Diffusion MRI: A window to biological tissue architecture and to medical applications" Springer Nature. (In Progress).

PhD Dissertation

MM. Liu. "Use, Optimization, and Expansion of Quantitative Magnetic Resonance Perfusion Imaging in Cerebrovascular Disease." PhD Dissertation, University of Chicago, 2023. doi: 10.6082/uchicago.7506
Advisor: Timothy J. Carroll, PhD. Chair: Patrick La Riviere, PhD. Committee members: Zheng Feng Lu, MD, Sean Foxley, PhD, Michael Hurley, MD, External member: Gregory Christoforidis, MD.

Conference Presentations

———— Postdoctoral Fellow Year 3 (2025-2026)

C1. **MM. Liu**, J. Dyke, I. Bolger, S. Calle, S. Pavuluri, S. Seshan, S. Salvatore, I. Stillman, T. Muthukumar, B. Taouli, S. Farouk, S. Lewis and O. Bane. "Noninvasive Banff Classification of Renal Transplants with Multiparametric MRI" Society of Abdominal Radiology 2025 (Poster Presentation)

C2. **MM. Liu**, J. Dyke, I. Bolger, S. Calle, S. Pavuluri, S. Seshan, S. Salvatore, I. Stillman, T. Muthukumar, B. Taouli, S. Farouk, S. Lewis and O. Bane. "Functional multiparametric MRI for noninvasive Banff Classification of Kidney Allografts" Mount Sinai Radiology Annual Retreat 2025 (Oral Presentation)

C3. V. Anthony, D. Xia, **MM. Liu**, S. Farouk, O. Bane, S. Lewis, L. Feng, X. Xu. "Chemical Exchange Saturation Transfer (CEST) MRI for Non-invasive Molecular Imaging in Renal Transplant Recipients". Mount Sinai Radiology Annual Retreat 2025 (Poster Presentation)

C4. F. Restrepo, E. Bhuiyan, O. Bane, E. Ozkaya, D. Hamdan, M. Liu, P. Kennedy, M. Shareef, A. Geahchan, M. Buckstein, P. Hamon, M. Buckup, S. Gnjatic, L. Brennan, S. Hectors, H. Cheung, E. Miller, M. Fiel, S. Ward, M. Schwartz, T. Marron, M. Merad, B. Taouli. "Multiparametric MRI predicts HCC response to neoadjuvant immunotherapy with/without radiotherapy". Mount Sinai Radiology Annual Retreat 2025 (Poster Presentation)

C5. **MM. Liu**, J. Dyke, I. Bolger, S. Calle, S. Pavuluri, S. Seshan, S. Salvatore, I. Stillman, T. Muthukumar, B. Taouli, S. Farouk, S. Lewis and O. Bane. "Multiparametric MRI for Banff Classification of Renal Transplant Pathology" International Renal MRI Meeting 2025 (Power Pitch)

C6. **MM. Liu**, O. Bane, X, Mu, H. Al-Mubarak, I. Bolger, G. Abboud, P. Kennedy, P. Robson, J. Cuevas, K. Meilika, L. Zuluaga, A. Horowitz, B. Kuhn, M. Garcia-Barros, R. Brody, K. Badani, B. Taouli, S. Lewis. 'Immuno-Oncologic Profiling and Subtype Characterization of Renal Masses Using Multiparametric MRI: a pilot study" International Renal MRI Meeting 2025 (Power Pitch)

C7. **MM. Liu**, J. Dyke, S. Seshan, S. Salvatore, I. Stillman, T. Muthukumar, B. Taouli, S. Farouk, S. Lewis and O. Bane. "Multi-B-Value Diffusion MRI Predicts The Banff Classification Of Renal Transplant Biopsies" Radiological Society of North America 2025 (Poster Presentation)

C8. O. Bane, X. Ding, L. Feng, **MM. Liu**, J. Dyke, S. Seshan, S. Salvatore, I. Stillman, T. Muthukumar, B. Taouli, S. Farouk, S. Lewis and O. Bane. "Diagnosis of Fibrosis with Magnetization-Prepared Parallel (MP-GRASP) T1 mapping in Renal Allografts" Radiological Society of North America 2025 (Poster Presentation)

C9. **MM. Liu**, J. Dyke, T. Gladytz, J. Jasse, S. Calle, S. Seshan, S. Salvatore, I. Stillman, T. Muthukumar, B. Taouli, S. Farouk, S. Lewis and O. Bane. "Banff Classification of Renal Allografts with Multi-b-value Diffusion MRI" Society of Advanced Body Imaging 2025 (Poster Presentation)

———— Postdoctoral Fellow Year 2 (2024-2025)

C10. **MM. Liu**, J. Dyke, T. Gladytz, J. Jasse, S. Calle, S. Seshan, S. Salvatore, I. Stillman, T. Muthukumar, B. Taouli, S. Farouk, S. Lewis and O. Bane. "Spectral diffusion MRI detects early fibrosis in renal allografts in a pilot clinical translational study" International Society of Magnetic Resonance in Medicine 2025 (Oral Presentation)

C11. **MM. Liu**, M. S. Shazeeb, N. Saadat, S. Roth, M. Niekrasz, M.S. Shazeeb, T. Carroll, G. Christoforidis. "A Method for Imaging the Ischemic Penumbra with MRI using IVIM" International Society of Magnetic Resonance in Medicine 2025 (Oral Presentation)

C12. **MM. Liu**, O. Bane, X, Mu, H. Al-Mubarak, G. Abboud, P. Kennedy, P. Robson, J. Cuevas, K. Meilika, L. Zuluaga, A. Horowitz, B. Kuhn, M. Garcia-Barros, R. Brody, K. Badani, B. Taouli, S. Lewis. "Classification of subtype and immuno-oncologic markers of solid renal masses with functional MRI and clear cell likelihood score" Biomedical Engineering and Imaging Institute Symposium 2025 (Poster Presentation)

C13. **X. Mu**, A. Williams, M. Liu, M. Downes, O. Bane, D. Marshall "DCE-MRI markers of radiation-induced damaged erectile tissues" Biomedical Engineering and Imaging Institute Symposium 2025. (Oral Presentation)

C14. **MM. Liu**, O. Bane, X. Mu, H. Al-Mubarak, A. Reddy, P. Kennedy, P. Robson, J. Cuevas, K. Meilika, A. Horowitz, B. Kuhn, K. Badani, B. Taouli, S. Lewis. "Functional MRI and clear cell likelihood score for classification of subtype and immuno-oncologic markers of solid renal masses" American Urological Association 2025 (Poster Presentation)

C15. X. Mu, **MM. Liu**, H. Al-Mubarak, P. Kennedy, P. Robson, J. Cuevas, B. Kuhn, K. Badani, B. Taouli, S. Lewis, O. Bane "Modeled and Model-Free DCE-MRI Parameters to Identify Solid Renal Mass Subtype in Patients Undergoing Surgical Management" International Society of Magnetic Resonance in Medicine 2025 (Poster Presentation)

C16. X. Mu, **MM. Liu**, J. Zhang, H. Al-Mubarak, P. Kennedy, P. Robson, J. Cuevas, B. Kuhn, K. Badani, B. Taouli, S. Lewis, O. Bane "Glomerular Filtration Rate and Renal Plasma Flow Measurement from DCE-MRI with Population- Arterial Input Function and a One-Compartment Model" International Society of Magnetic Resonance in Medicine 2025 (Poster Presentation)

C17. **MM. Liu**, O. Bane, S. Lewis "Clinical Translation of Advanced Multi-b-value Diffusion MRI in Kidney Disease: Detection of Early Fibrosis, Prediction of Chronic Kidney Disease Progression, and Characterization of Renal Mass and Immuno-Oncologic Pathology" Clinical and Translational Science Award External Advisory Board Meeting (Invited Oral Presentation)

C18. **MM. Liu**, O. Bane, M. Garcia-Barros, T. Thin, X. Mu, H. Al-Mubarak, A. Reddy, R. Brody, P. Kennedy, P. Robson, J. Cuevas, K. Meilika, A. Horowitz, B. Kuhn, K. Badani, B. Taouli, S. Lewis "Subtype and Immuno-Oncologic Markers of Solid Renal Masses with Functional MRI and Clear Cell Likelihood Score" ISMRM Workshop on Body MRI 2025 (Poster Presentation)

C19. **MM. Liu**, J. Dyke, T. Gladytz, J. Jasse, S. Calle, I. Bolger, S. Seshan, S. Salvatore, I. Stillman, T. Muthukumar, B. Taouli, S. Farouk, S. Lewis and O. Bane. "Spectral Diffusion MRI Detects Early Fibrosis in Renal Allografts in a Pilot Clinical Translational Study" ISMRM Workshop on Body MRI 2025 (Power Pitch)

C20. X. Mu, J. Zhang, **MM. Liu**, H. Al-Mubarak, P. Kennedy, P. Robson, J. Cuevas, B. Kuhn, K. Badani, B. Taouli, S. Lewis, O. Bane. "A Rapid and Simplified Fitting Method for Calculating DCE-MRI Based GFR" Society of Abdominal Radiology 2025. (Poster Presentation)

C21. **MM. Liu**, O. Bane, X. Mu, H. Al-Mubarak, A. Reddy, P. Kennedy, P. Robson, J. Cuevas, K. Meilika, A. Horowitz, B. Kuhn, K. Badani, B. Taouli, S. Lewis. "Functional multiparametric MRI correlates with immuno-oncologic pathologic markers of clear cell renal cell carcinoma." Society of Abdominal Radiology 2025. (Poster Presentation)

C22. **MM. Liu**, O. Bane, X. Mu, H. Al-Mubarak, A. Reddy, P. Kennedy, P. Robson, J. Cuevas, K. Meilika, A. Horowitz, B. Kuhn, K. Badani, B. Taouli, S. Lewis. "Solid renal mass subtyping with functional MRI and clear cell likelihood score in patients undergoing surgical management of solid renal masses." Society of Abdominal Radiology 2025. (Oral Presentation)

C23. **MM. Liu**, O. Bane, H. Al-Mubarak, A. Reddy, P. Kennedy, P. Robson, J. Cuevas, K. Meilika, A. Horowitz, B. Kuhn, K. Badani, B. Taouli, S. Lewis. "Assessment And prediction of chronic kidney disease with non-contrast functional MRI in patients undergoing surgical management of solid renal masses." Radiological Society of North America 2025. (Oral Presentation)

C24. **MM. Liu**, J. Dyke, T. Gladytz, J. Jasse, S. Calle, S. Seshan, S. Salvatore, I. Stillman, T. Muthukumar, B. Taouli, S. Farouk, S. Lewis and O. Bane "Multi-compartment spectral diffusion MRI detects early fibrosis in renal allografts" Mount Sinai Radiology Annual Meet 2024 (Poster Presentation)

———— Postdoctoral Fellow Year 1 (2023-2024)

C25. **MM. Liu**, J. Dyke, S. Calle, S. Seshan, S. Salvatore, I. Stillman, T. Muthukumar, B. Taouli, S. Farouk, S. Lewis and O. Bane. "Application of Advanced Diffusion and Multiparametric MRI in Nephrology" Translational Science Research Day by the Mount Sinai Clinical and Translational Science Award 2024 (Invited Oral Presentation).

C26. **MM. Liu**, O. Bane, H. Al-Mubarak, A. Reddy, P. Kennedy, P. Robson, J. Cuevas, K. Meilika, A. Horowitz, B. Kuhn, K. Badani, B. Taouli, S. Lewis. "Characterization of Solid Renal Masses with Functional Non-Contrast MRI in Patients Undergoing Surgical Management" Biomedical Engineering and Imaging Institute Symposium 2024. (Poster Presentation)

C27. **MM. Liu**, J. Dyke, S. Calle, S. Seshan, S. Salvatore, I. Stillman, T. Muthukumar, B. Taouli, S. Farouk, S. Lewis and O. Bane "Advanced diffusion weighted MRI methods detect fibrosis in renal allografts: A preliminary experience" Biomedical Engineering and Imaging Institute Symposium 2024. (Oral Presentation)

C28. **MM. Liu**, O. Bane, H. Al-Mubarak, A. Reddy, P. Kennedy, P. Robson, J. Cuevas, K. Meilika, A. Horowitz, B. Kuhn, K. Badani, B. Taouli, S. Lewis. "Assessment & Prediction of Renal Function with Non-Contrast MRI in Patients Undergoing Surgical Management of Solid Renal Masses." International Society for Magnetic Resonance in Medicine Workshop on IVIM 2024. (Oral Presentation)

C29. **MM. Liu**, O. Bane, H. Al-Mubarak, A. Reddy, P. Kennedy, P. Robson, J. Cuevas, K. Meilika, A. Horowitz, B. Kuhn, K. Badani, B. Taouli, S. Lewis. "Characterization of Solid Renal Masses with Functional Non-Contrast MRI in Patients Undergoing Surgical Management" International Society for Magnetic Resonance in Medicine Workshop on IVIM 2024. (Poster Presentation)

C30. **MM. Liu**, O. Bane, H. Al-Mubarak, A. Reddy, P. Kennedy, P. Robson, J. Cuevas, K. Meilika, A. Horowitz, B. Kuhn, K. Badani, B. Taouli, S. Lewis. "Characterization of solid renal masses with functional MRI in patients undergoing surgical management." Society of Abdominal Radiology 2024. (Oral Presentation)

C31. **MM. Liu**, O. Bane, H. Al-Mubarak, A. Reddy, P. Kennedy, P. Robson, J. Cuevas, K. Meilika, A. Horowitz, B. Kuhn, K. Badani, B. Taouli, S. Lewis. "Functional MRI for chronic kidney disease classification and 12month prediction in patients with solid renal masses undergoing surgery: a comparison between advanced diffusion-weighted MRI, ASL perfusion, and R2* BOLD" Mount Sinai Radiology Annual Meet 2023. (Poster Presentation)

C32. **MM. Liu**, O. Bane, H. Al-Mubarak, A. Reddy, P. Kennedy, P. Robson, J. Cuevas, K. Meilika, A. Horowitz, B. Kuhn, K. Badani, B. Taouli, S. Lewis. "Functional MRI for solid renal mass characterization: a comparison between advanced diffusion-weighted MRI, ASL perfusion, and R2* BOLD" Mount Sinai Radiology Annual Meeting 2023. (Poster Presentation)

———— PhD Year 4 (2022-2023)

C33. **MM. Liu**, C. Warioba, J. Bertini, N. Saadat, T. Carroll, G. Christoforidis. "Validation and Machine Learning of a New Method for Quantifying CBF with IVIM". Annual Meeting of the American Society of Neuroradiology, 2023. (Oral Presentation)

C34. **MM. Liu**, S. Prabhakaran, J. Bertini, C. Warioba, S. Ansari, Y. Pu, A. Al-Smadi, T. Carroll. "Local-AIF DSC Perfusion in Intracranial Atherosclerotic Disease". 61st Annual Meeting of the American Society of Neuroradiology, 2023. (Oral Presentation)

C35. J. Bertini, **MM. Liu**, C. Warioba, YF. Chen, T. Carroll. "Cardiac-Gated Rosette Pulse Sequence Development for Off-Resonance Frequency Imaging. 31st Annual International Society for Magnetic Resonance in Medicine conference, 2023 (Poster Presentation)

C36. **MM. Liu**, N. Saadat, C. Warioba, T. Carroll. G. Christoforidis "IVIM quantified in ml/100g/min with pseudo-diffusion mean transit time validated against neutron capture

microspheres." 31st Annual International Society for Magnetic Resonance in Medicine Conference, 2023 (Poster Presentation)

C37. **MM. Liu**, J. Bertini, C. Warioba, N. Saadat, D. Gorre, T. Carroll, G. Christoforidis. "Machine Learning for Quantitative IVIM (qIVIM) Cerebral Perfusion Imaging" 31st Annual International Society for Magnetic Resonance in Medicine conference, 2023 (Poster Presentation)

C38. C.S. Warioba, **MM. Liu**, S. Foxley, G.A. Christoforidis, T.J. Carroll. "Flow augmentation after occlusion maintains functional connectivity, mean T2* signal intensity, and mean diffusivity", 31st Annual International Society for Magnetic Resonance in Medicine conference, 2023 (Poster Presentation)

C39. C. Warioba, **MM. Liu**, S. Foxley, G. Christoforidis,T. Carroll. "Flow Augmentation after occlusion maintains functional connectivity and mean diffusivity" Mayo Clinic Scientific Innovation Through Diverse Perspectives 2023 (Poster Presentation)

C40. **MM. Liu**, C. Warioba, J. Bertini, N. Saadat, T. Carroll, G. Christoforidis. "Non-contrast Perfusion MRI from the point of view of Medicine and Physics" Graduate Program in Medical Physics Retreat 2023 (Flash talk)

C41. C. Warioba, **MM. Liu**, S. Foxley, G. Christoforidis,T. Carroll. "Flow Augmentation and Functional Connectivity" Graduate Program in Medical Physics Retreat 2023 (Flash talk)

———— PhD Year 3 (2021-2022)

C42. **MM. Liu**, N. Saadat, Y. Jeong, S. Roth, M. Niekrasz, G. Christoforidis, T. Carroll. "Augmented Perfusion Quantified by MRI Depends on Collateral Recruitment in Middle Cerebral Artery Occlusion: A Pilot Study". 30th Annual International Society for Magnetic Resonance in Medicine conference, 2022. (Power Pitch)

C43. **MM. Liu**, N. Saadat, Y. Jeong, S. Roth, M. Niekrasz, G. Christoforidis, T. Carroll. "Augmentation of Perfusion with Simultaneous Vasodilator and Inotropic Agents in Experimental Acute Middle Cerebral Artery Occlusion." International Society for Magnetic Resonance in Medicine Perfusion Workshop, 2022. (Poster Presentation)

C44. **MM. Liu**, N. Saadat, Y. Jeong, S. Roth, M. Niekrasz, G. Christoforidis, T. Carroll. "Quantitative IVIM Perfusion at Normocapnia, Hypercapnia, Acute Stroke and Stroke Treatment Predicts Neutron Capture Microspheres." International Society for Magnetic Resonance in Medicine Perfusion Conference, 2022. (Oral Presentation)

———— PhD Year 2 (2020-2021)

C45. **MM. Liu**, Y. Jeong, N. Saadat, S. Roth, M. Niekrasz, G. Christoforidis, T. Carroll. "Quantitative CBF and DWI Volume from Single MRI Scan in Stroke", 59th Annual Meeting of the American Society of Neuroradiology, 2021. (Poster Presentation)

C46. **MM. Liu**, Y. Jeong, N. Saadat, G. Christoforidis, T. Carroll. "Accuracy of Intravoxel Incoherent Motion (IVIM) for quantification of perfusion-diffusion mismatch in Acute Stroke." 29th Annual International Society for Magnetic Resonance in Medicine Conference, 2021. (Poster Presentation)

C47. A. Bross, E.C. Dukes, R. Ehrlich, E. Fernandez, S. Dukes, M. Gobashy, I. Jamieson, P. La Riviere, **MM. Liu**, G. Marouard, N. Moeller, A. Pla-Dalmau, P. Rubinov, O. Shohoud, P. Vargas, T. Welch. "Tomographic Imaging of the Great Pyramid of Giza with the Exploring the Great Pyramid Mission." Exploring the Great Pyramid of Giza Workshop, 2020 (Talk).

———— PhD Year 1 (2019-2020)

C48. Z. Pan, **MM. Liu**, R. Basu Thakur, B. Benson, D. Fixsen, H. Goksu, E. Rath, S. Meyer. "A Compact Millimeter-Wavelength Fourier-Transform Spectrometer". Cosmic Microwave Background systematics and calibration workshop, 2020.

C49. **MM. Liu**, Y. Jeong, N. Saadat, S. Roth, M. Niekrasz, G. Christoforidis, T. Carroll. "IVIM Perfusion Correlates with Quantitative CBF at Baseline, Hypercapnia, and Infarct." 58th Annual Meeting of the American Society of Neuroradiology, 2020. (Oral Presentation)

C50. G Christoforidis, N Saadat, Y Jeong, **M. Liu**, M Niekrasz, T Carroll. "Prediction of Leptomeningeal Collateral Recruitment in Experimental Ischemic Stroke by Cerebrovascular Reactivity to Carbon Dioxide." Poster Presentation, International Stroke Conference 2020. (Poster Presentation)

C51. **MM. Liu**. "Muon tomography simulation of sinogram space". Fermilab Pyramids of Giza Teleconference, 2019 (Oral Presentation)

C52. N. Saadat, Y. Jeong, **MM. Liu**, S. Roth, M. Niekrasz, T. Carroll, G. Christoforidis. "Susceptibility-Weighted Imaging in Hyperacute Phase of Ischemic Stroke" Radiological Society of North America conference, 2019. (Oral Presentation)

———— Gap Year (2018-2019)

C53. A. Dimov, G. Christoforidis. N. Saadat, **MM. Liu**, Y. Jeong, S.Roth, M. Niekrasz, T. Carroll. "Quantitative Susceptibility Mapping in acute ischemic stroke: comparison with perfusion, infarct growth rate and FMISO-PET". 27th Annual International Society for Magnetic Resonance in Medicine Conference, 2019. (Poster Presentation)

C54. **MM. Liu**, Y. Jeong, N. Saadat, G. Christoforidis, T. Carroll. "IVIM-based Cerebral perfusion values at rest, hypercapnia, and ischemia in an MCA occlusion model" 27th International Society for Magnetic Resonance in Medicine conference, 2019. (Poster Presentation)

C55. Z. Pan, **MM. Liu**, R. Basu Thakur, H. Goksu, E. Rath, D. Fixsen, B. Benson, S. Meyer. "A Compact Fourier-Transform Spectrometer". March 2019. Presented at CMB-S4 Collaboration, Fermilab.

———— Undergraduate

C56. Z.Pan, R. Basu Thakur, **M. Liu-Sarkar**, H. Goksu, S. Meyer. "A compact millimeter-wavelength Fourier-transform spectrometer" June 18, 2018. New Perspectives 2018, Fermilab. (Oral Presentation)

C57. R. Basu Thakur, H. Goksu, **M. Liu-Sarkar**, R.Mbarek, Z.Pan S.Meyer, B.Benson. "A Compact Fourier Transform Spectrometer". August 28, 2017. Cosmology with CMB-S4 at Harvard University.(Oral Presentation)

C58. Z.Pan, R. Basu Thakur, **M. Liu-Sarkar**. "CMB Summer School – FTS test". August 9, 2017. CMB Detectors and Instrumentation at the University of Chicago Summer School.(Oral Presentation)

Professional Leadership and Activities

Invited Moderator **May 2026**

- Invited Moderator at International Society for Magnetic Resonance Conference, Session "Body MRI Techniques: How Do I Do It?: A Tour from the Experts"

ISMRM Renal MRI Study Group Trainee Representative **May 2025 - May 2026**

- Nominated and elected as a trainee member of the Renal MRI study group to continue to grow and promote fellow junior members in renal MRI and involvement in the ISMRM

Ad-hoc Peer-Reviewer **2024 - Present**

- European Radiology, Journal of Magnetic Resonance Imaging, Kidney International Reports, NMR in Biomedicine, Nature Scientific Reports, Quantitative Imaging in Medicine and Surgery, BMC Cardiovascular Disorders, International Society of Magnetic Resonance in Medicine Annual Meeting

Invited Moderator **May 2025**

- Invited Moderator at International Society for Magnetic Resonance Conference, Session "Body Diffusion MRI: Modeling, Microstructure & Analysis"

Invited BMEII Symposium Poster judge **Mar. 2024**

- Invited judge at Biomedical Engineering and Imaging Institute Symposium in NYC

Invited Moderator **Mar. 2024**

- Invited co-moderator at International Society for Magnetic Resonance in Medicine IVIM Workshop, Session "Acquisition Settings"

Mount Sinai Science Policy Group **Aug. 2023 - Present**

- **Director of Content and Communications** working to keep members of the Mount Sinai graduate school and post doctoral community up to date on Science Policy events, fellowships, and courses available through a newsletter co-written with the President of MSSPG.

Graduate Program in Medical Physics **Oct. 2019 - Jun. 2023**

- **Co-President of Student Body** of Medical Physics PhD program. Responsibilities include being main facilitator between students and faculty, faculty meetings, bi-weekly journal club, chair and department meetings, the mock oral exam, program-wide events, career development talks, program retreat, and student awards.
- **Graduate Student Representative** of the UChicago graduate program in medical physics for all external contact regarding medical physics, the graduate or certificate program, or specifically admissions.
- **UChicago PhD Student Panel Organizer and Moderator** for interview weekend DEI and students-only Q&A as well as interview weekend mentor coordinator for current students connecting to interviewees.
- **One-on-one peer mentor** to incoming Medical Physics PhD students for their first year.
- **Graduate student member of the advisory committee** focused on interview weekend of the UChicago Medical physics PhD program.

Biological Sciences Division Dean's Council **Sept. 2020 - Oct. 2022**

- **Representative of Medical Physics** in the graduate student organization, Dean's Council, run by student representatives from each graduate program.

- **Community Service Chair**. First elected Chair of a new position of division-wide community service, starting service at the Greater Chicago Food Depository, Food Pantry volunteering, and outreach events on the South Side of Chicago.
- **Student Interviewer on Dean Selection Committee**. Interviewed potential Deans of Graduate Affairs as student representative on the search committee.

Graduate Recruitment Initiative Team **Sept. 2020 - Oct. 2022**

- **Joined as general member** of a grassroots student organization committed to supporting students in STEM graduate programs.
- **UChicago GRIT representative** invited to attend Annual Biomedical Research Conference for Minority Students (ABRCMS) for recruitment and outreach of University of Chicago PhD programs.
- **Webmaster**. Elected to reorganize and restructure the website to improve publicity, outreach and community service.
- **Team Lead** elected to serve as a team lead focused on recruitment and retention of graduate students at UChicago.

Medical Physics Outreach Committee **Oct. 2020 - June. 2023**

- **Outreach organizer and speaker** with Chicago Public Schools on curriculum development for senior physics courses introducing medical physics to high schools.
- **Science on the Quad Student Organizer**. Organizing for outreach to the surrounding south side of Chicago and exposure to scientific research through South Side Science Festival and lab tours.
- **Graduate Student Lab Guide** for MRI Research organized Chicago Public Schools Professional Development Day for physics teachers
- **Workshop Leader.** Invited to lead a program wide discussion on the history of STEM

Vice President of University of Chicago Women in Science **Jun. 2016 - Jun 2018**

- **Vice President** of Women in Science Undergraduate student organization at UChicago dedicated to fostering a community of women in STEM fields

Outreach Director of the Society of Women in Physics **Jun. 2016 - Jan. 2017**

- **Outreach Director** of the Society of Women in Physics dedicated to forming a support group for undergraduates pursuing a degree in physics.

Teaching Experience

Dissertation Proposal Workshop **Mar. 2023**

- As a fourth year, younger students asked and I organized and ran a talk and workshop on writing a dissertation proposal and proposal defense for the second and third years. Focused on going through rigorous and concise academic writing, grant submissions, and proposal defense with a workshop.

Teachers Assistant in Particle Interactions **Oct. 2022 - Dec. 2022**

- T.A. to Particle Interactions course of graduate program of Medical Physics at the University of Chicago, Autumn quarter of 2021. Led one discussion per week, four hours of office hours per week, and graded.
- Led full lecture on neutron interactions.

Lead Facilitator of University of Chicago Undergraduate Orientation **Oct. 2021**

- Led a 60-person workshop 'Hearing One Another' for incoming undergraduates focusing on improv, social individuation, communication, and recognition of biases and steps to work on them.
- Led a talk about 'Engage Chicago' focusing on civic engagement with the University on the South Side of Chicago as well as ways to get more involved.

Medical Physics Mock Qualifying Exam Organizer **Sept. 2021, Sept. 2022**

- Organized and led a mock oral qualifying exam for the first years of the program. Planned rooms, timing, rotation, and other volunteering underclassmen to help them prepare for the Ph.D. qualifying exam.

Teachers Assistant in Practicum of Physics of Radiation Therapy Jan. 2021 - Mar. 2021

- T.A. to Practicum of Physics of Radiation Therapy course winter quarter 2021. Assisted faculty with adjustments for remote nature due to Covid-19, led two discussions per week, graded all lab reports, introduced basic coding, EGnrc, uncertainty, operation of linear accelerators, dosimeters, Monte Carlos, and film.
- Created virtual presentations of in person practicums from previous notes and student photos.
- Led full lecture on thermoluminescent detectors.

University of Chicago Society of Women in Engineering Girls' Day in STEM May 2019

- Co-Led a workshop on efficiency, durability, and practicality of Lego car designs on a Girls' Day in STEM dedicated to teaching middle school and high school girls from the south side of Chicago about college, careers, and experiments in STEM.

University of Chicago Women in Science and Math LaTeX Workshop Nov. 2018

- Invited to lead an Intro to Latex workshop for undergraduate students focused on introducing them to basic LaTeX equations, environments, figures, and formatting to be used in research papers.

University of Chicago Cosmic Microwave Background Summer School lab Aug. 2017

- Co-led a Cosmic Microwave Background lab for Kavli Institute of Cosmological Physics Graduate school focused on an introduction to cosmological spectrometry with our lab's FTS, and the mathematics behind the analysis.
- Wrote the programs used in the lab and led the explanation of the FTS' functioning, the working of the code, and one way to use it to find optical efficiency.

Professional Associations

- 2025 – present Trainee member, American Association of Physicists in Medicine New York City Chapter
- 2025 – present Associate member, American Association for Cancer Research (AACR)
- 2018 – present Trainee member, International Society for Magnetic Resonance in Medicine (ISMRM)
- 2023 – 2025 Trainee member, American Society for Neuroradiology (ASNR)
- 2019 – 2023 Trainee member, American Association of Physicists in Medicine Midwest Chapter
- 2019 – 2023 Trainee member, American Association of Physicists in Medicine (AAPM)
- 2019 – 2023 Trainee member, Radiological Society of North America (RSNA)

Service and Outreach

Charity Auction Art Show Leader Mar. 2024

- Led collection and organization of the charity auction of scientists' art at the 2024 BMEII Symposium in NYC

Hyde Park Union Church Food Pantry Jan. 2022 - Jul. 2023

- As Community Service Chair I went weekly for any graduate students interested in joining to help pre-pack, unload, and distribute food for the food pantry within the church. I continued after stepping down to volunteer weekly with colleagues.

Greater Chicago Food Depository Nov. 2020 - Dec. 2021

- Led community service groups of graduate students to travel to the GCFD to re-pack bulk products into family-sized portions, sort, and categorize donated food items at the depository, helping with the distribution process.

Chicago Public Schools Outreach Organizer and Speaker **Jul. 2020 - Jan. 2023**

- Outreach organizer and speaker with CPS on curriculum development for senior physics courses introducing medical physics to high schools. Specifically planning to lead a lab tour and talk about MRI research in January 2023.

South Side Science Fair Exhibitor **Sept. 2022**

- Wrote simulations and led workshop showing connection between the sound of a guitar chord and its fourier decomposition to how MRI data is acquired through pulse sequences and gradients.

Physics with a Bang **Dec. 2019**

- Volunteered for the Medical Physics table for a public interactive physics program for people of all ages with a workshop involving ultrasound, Geiger counters, and x-ray projection demonstrations.

Soapbox Science **Jul. 2019**

- Soapbox Science is a public outreach platform to promote science to the public. I volunteered at the second ever Soapbox Science in Chicago helping run the event, survey the public, answer questions, guide visitors, and assist speakers at Navy Pier.

Open Books **May 2019 - Mar. 2020**

- Open Books is a non-profit dedicated to promoting literacy through literacy workshops, sale of donated books, volunteer tutors, and book grants delivering books to schools, non-profits, and kids in Chicago. Weekly volunteer organizing and stacking shelves until Covid stopped volunteers

Relevant Advanced Coursework

- Physics of Medical Imaging Didactic I (mammography, CT, CAD, radiography, MR, angiography)
- Physics of Medical Imaging Practicum I
- Physics of Medical Imaging Didactic II (gamma cameras, SPECT, PET, ultrasound, scintillator and gas detectors)
- Physics of Medical Imaging Practicum II
- Physics of Radiation Therapy Didactic
- Physics of Radiation Therapy Practicum
- Mathematics for Medical Physics
- Interactions of Ionizing Radiation with Matter
- Anatomy and Physiology
- Cancer and Radiation Biology
- Health Physics
- Biomedical Ethics for Medical Physicists
- Statistical Methods and Applications
- Computational Physics
- Responsible, Rigorous, and Reproducible Conduct of Research
- Inverse Problems in Imaging
- Introduction to AI/Deep Learning in Biomedical Research and the Clinic (Audit)
- Mathematical Foundations of Machine Learning (Audit)

Skills

Analytics: Python, MATLAB, SPM12, R, FSL, HTML, NifTi
Communications: Microsoft Office, LaTeX, GitHub, Overleaf, Slack, Wordpress