

Melissa W. Haskell, Ph.D.

Postdoctoral Research Fellow

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she/her

EDUCATION

Harvard University, May 2019

Ph.D., Biophysics

Thesis Title: “Retrospective Motion Correction for Magnetic Resonance Imaging”

NSF Graduate Research Fellow, 2015

Bowdoin College, May 2013

B.A. Cum Laude, Physics major with High Honors, Computer Science minor

RESEARCH EXPERIENCE

University of Michigan Department of EECS and fMRI Laboratory, August 2019 – May 2022

Postdoctoral Fellow

Advisors: Dr. Jeffrey Fessler & Dr. Douglas Noll

- **NIH F32 Ruth L. Kirschstein NRSA Postdoctoral Fellow**, 2020-2022
- Development of acquisition & reconstruction methods for functional MRI (fMRI), specifically in the area of off-resonance artifact correction, using both model-based and machine learning approaches

A. A. Martinos Center for Biomedical Imaging, MGH, July 2014 – May 2019

Graduate Student Researcher

Advisors: Dr. Lawrence Wald & Dr. Stephen Cauley

- Developed methods for retrospective motion correction in MRI using a data consistency based joint optimization which included reduced modeling and convolutional neural networks
- Completed a rotation project on magnetic design optimization for a homogeneous field Halbach magnet with applications in portable MRI

Center for Advanced Medical Imaging Sciences (Gordon Center), MGH, November 2013 – April 2014

Graduate Student Rotation Researcher

Advisors: Dr. Georges El Fakhri & Dr. Arkadiusz Sitek

- Wrote a program to perform a 2D ray trace for SPECT/PET image reconstruction

Bowdoin College Department of Physics/HST of MIT and Harvard University, June 2012 – July 2013

Undergraduate Student Researcher

Advisors: Dr. Dale Syphers & Dr. Guillermo Tearney

- Developed methods for localization of an Optical Frequency Domain Imaging tethered capsule, under-graduate thesis title: “OFDI tethered capsule localization for unseeded gastrointestinal 3D imaging.”

Health Sciences and Technology of MIT and Harvard University, June 2011 – August 2011

Undergraduate Student Researcher

Advisor: Dr. Guillermo Tearney

- Prepared atherosclerotic plaque phantoms for spectroscopic Optical Frequency Domain Imaging (OFDI), and analyzed attenuation and backscattering properties of the phantoms

PUBLICATIONS

Melissa W. Haskell, Jon-Fredrik Nielsen, Douglas C. Noll. “Off-resonance artifact correction for magnetic resonance image: a review.” *NMR In Biomedicine* 2022, In Press.

Melissa W. Haskell, Stephen F. Cauley, Berkin Bilgic, Julian Hossbach, Daniel N. Splitthoff, Josef Pfeuffer, Kawin Setsompop, Lawrence L. Wald. “Network Accelerated Motion Estimation and Reduction (NAMER): Convolutional neural network guided retrospective motion correction using a separable motion model.” *Magnetic Resonance in Medicine* 2019; 82(4); 1452-1461.

Melissa W. Haskell, Stephen F. Cauley, Lawrence L. Wald. “TArgeted Motion Estimation and Reduction (TAMER): Data Consistency Based Motion Mitigation for MRI using a Reduced Model Joint Optimization.” *IEEE Transactions on Medical Imaging* 2018; 37(5):1253-1265.

Fuyixue Wang, Berkin Bilgic, Zijing Dong, Mary Katherine Manhard, Ned Ohringer, Bo Zhao, **Melissa Haskell**, Stephen F. Cauley, Qiuyun Fan, Thomas Witzel, Elfar Adalsteinsson, Larry Wald, Kawin Setsompop. “Motion-robust sub-millimeter isotropic diffusion imaging through Motion Corrected Generalized Slice Dithered Enhanced Resolution (MC-gSlider) acquisition.” *Magnetic Resonance in Medicine* 2018; 80(5);1891-1906.

Clarissa Zimmerman Cooley, **Melissa W. Haskell**, Stephen F. Cauley, Charlotte Sappo, Cristen D. Lapierre, Christopher G. Ha, Jason P. Stockmann, and Lawrence L. Wald. “Design of Sparse Halbach Magnet Arrays for Portable MRI Using a Genetic Algorithm.” *IEEE Transactions on Magnetics* 2018; 37(5):1253-1265.

PATENTS AND PATENT APPLICATIONS

Stephen Cauley, **Melissa Haskell**, Lawrence L Wald. Retrospective Motion Correction Using a Combined Neural Network and Model-based Image Reconstruction of Magnetic Resonance Data. US Patent Application. 17/442,962. 2020.

Stephen Cauley, **Melissa Haskell**, Lawrence L Wald. Systems and methods for joint image reconstruction and motion estimation in magnetic resonance imaging. US Patent. 10,909,732, 2021.

Daniel Nicolas Splitthoff, Julian Hossbach, Josef Pfeuffer, Stephen Farman Cauley, **Melissa Haskell**. Computer implemented method and system for magnetic resonance imaging. US Patent. 11,187,769, 2021.

FELLOWSHIPS & AWARDS

- **NIH Ruth L. Kirschstein National Research Service Award Fellowship (F32), 2020**
- 2nd Place Poster Award, ISMRM Workshop on Data Acquisition & Image Reconstruction, Sedona, Jan. 2020
- Magna Cum Laude Award, 27th Meeting of the ISMRM, Montreal, May 2019
- Academy of Radiology Research, CECI² Early Career Investigator, April 2019
- **National Science Foundation, Graduate Research Fellowship Program, 2015**
- A. A. Martinos Center, Advanced Multimodal Neuroimaging Training Program, 2015
- National Science Foundation, Honorable Mention Graduate Research Fellowship Program, 2014
- Harvard University, James Mills Peirce Fellowship, 2013
- Maine Space Grant Consortium & Research for Women in the Physical Sciences (formerly the Clare Boothe Luce Research Fellowship), September 2012 – May 2013
- Noel C. Little Prize in Experimental Physics, May 2013

INVITED TALKS

“Incorporating machine learning into iterative model-based motion and off-resonance correction.” ISMRM Motion Correction Study Group Seminar Series. Virtual. February 2021.

“Machine learning and optimization-based techniques for artifact correction in Magnetic Resonance Imaging.” Notre Dame Department of Electrical Engineering. Virtual/South Bend, IN. January 2021.

“Introduction to MATLAB.” Athinoula A. Martinos Center for Biomedical Imaging Why-N-How Lecture Series. Boston, MA. February 2019.

“Retrospective correction of patient motion in magnetic resonance imaging using TAMER reduced modeling and convolutional neural networks.” EECS Special Seminar at the University of Michigan. Ann Arbor, MI. September 2018.

“Retrospective correction of patient motion in magnetic resonance imaging using reduced modeling and convolutional neural networks.” Special Seminar at Friedrich-Alexander University Pattern Recognition Lab. Erlangen, Germany. July 2018.

“Introduction to MATLAB.” Athinoula A. Martinos Center for Biomedical Imaging Why-N-How Lecture Series. Boston, MA. January 2018.

“Software-based Motion Correction for Magnetic Resonance Imaging Using TAMER.” Harvard Biophysics Program Annual Retreat. York, ME. October 2017.

LEADERSHIP EXPERIENCE

Gordon Research Seminar on In Vivo Magnetic Resonance, July 2022/July 2020

Chair/co-chair

- Chair for 2022 program: continued fundraising from 2020, recruited new co-chair, organized programming committee, created final GRS program with co-chair, and worked closely with Gordon Research Conference (GRC) chair and co-chair to plan a complementary trainee meeting to the GRC
- Co-chair for 2020 program: early stage organizing responsibilities included planning a mentorship panel, fundraising from academic and industry partners, and advertising the meeting (2020 GRS was withdrawn due to COVID-19)

Association for Women in Science (AWIS) at University of Michigan, September 2019 – April 2020

Mentoring Circle Leader

- Organized bi-weekly mentoring circle meetings for a group of female graduate students and postdocs

Harvard WISTEM Mentoring Program, October 2016 - May 2019

Mentor

- Mentor for the Harvard College Women’s Center WISTEM (Women in STEM) mentoring program for female undergraduates in science and engineering

TEACHING EXPERIENCE

Health Sciences and Technology of MIT and Harvard University, January ’16, ’17, ’18 & ’19

Teaching Assistant, HST.165: Principles of Biomedical Imaging

- Served as the teaching assistant for the first three iterations of the class, and worked with the course directors to develop material for the class, including tabletop MRI laboratory exercises

Massachusetts Institute of Technology, Fall 2015

Teaching Assistant, 6.556: Data Acquisition & Image Reconstruction in MRI

- Instructed laboratory sessions using tabletop MRI systems, held weekly office hours, graded weekly homework sets

MENTORED RESEARCH STUDENTS

- Mariama Salifu, University of Michigan BME Ph.D. Student, February 2020 – May 2022
- Alice Tracey, University of Michigan BME Undergraduate Student, January 2020 – September 2020

REVIEWER EXPERIENCE

- IEEE Transactions on Medical Imaging
- IEEE Transactions on Biomedical Engineering
- Magnetic Resonance in Medicine
- Neuroimage

PROFESSIONAL SOCIETIES & MEMBERSHIPS

The International Society for Magnetic Resonance in Medicine (ISMRM)
Association for Women in Science (AWIS)

CONFERENCE PROCEEDINGS

Melissa W. Haskell, Anish Lahiri, Jon-Fredrik Nielsen, Jeffrey A. Fessler, Doug C. Noll. FieldMapNet MRI: Learning-based mapping from single echo time BOLD fMRI data to fieldmaps with model-based reconstruction. 30th Annual Meeting of the ISMRM. May 2022. London, England. Oral Presentation.

Melissa W. Haskell, Amos A. Cao, Anish Lahiri, Jon-Fredrik Nielsen, Douglas C. Noll, Jeffrey A. Fessler. Deep learning field map estimation with model-based image reconstruction for off resonance correction of spiral fMRI data. Workshop on MRI Sampling and Image Reconstruction. September 2021. Virtual. Oral Presentation. <https://mriworkshop.mgh.harvard.edu/workshop-program/>

Melissa W. Haskell, Amos A. Cao, Doug C. Noll, Jeffrey A. Fessler. Deep learning field map estimation with model-based image reconstruction for off resonance correction of brain images using a spiral acquisition. ISMRM Workshop on Data Sampling and Image Reconstruction. January 2020. Sedona, AZ. Poster Presentation.

Melissa W. Haskell, Stephen F. Cauley, Berkin Bilgic, Julian Hossbach, Daniel N. Splitthoff, Josef Pfeuffer, Kawin Setsompop, Lawrence L. Wald. Network Accelerated Motion Estimation and Reduction (NAMER): Accelerating forward model based retrospective motion correction using a convolutional neural network. 27th Annual Meeting of the ISMRM. May 2019. Montreal, Canada. Oral Presentation.

Melissa W. Haskell, Stephen F. Cauley, Berkin Bilgic, Kawin Setsompop, Lawrence L. Wald. Efficient retrospective MRI motion correction through reduced modeling and CNN based optimization techniques. In Vivo Magnetic Resonance Gordon Research Conference. July 2018. Andover, NH. Poster Presentation.

Melissa W. Haskell, Stephen F. Cauley, Lawrence L. Wald. Comparing TAMER (Targeted Motion Estimation and Reduction) reduced modeling to alternating minimization for data consistency based motion mitigation. 26th Annual Meeting of the ISMRM. June 2018. Paris, France. Poster Presentation.

Melissa W. Haskell, Stephen F. Cauley, Lawrence L. Wald. Targeted Motion Estimation & Reduction (TAMER): Data Consistency Based Motion Mitigation of *In Vivo* MRI. ISMRM Workshop on Motion Correction in MRI & MRS. September 2017. Cape Town, South Africa. Oral Presentation.

Melissa W. Haskell, Stephen F. Cauley, Lawrence L. Wald. Retrospective motion correction of head rotations in 2D RARE brain images using TArgeted Motion Estimation and Reduction (TAMER). 25th Meeting of the ISMRM. April 2017. Honolulu, HI. Poster Presentation.

Melissa Haskell, Stephen Cauley, Lawrence Wald. TArgeted Motion Estimation and Reduction (TAMER): Data Consistency Based Motion Mitigation using a Reduced Model Joint Optimization. In Vivo Magnetic Resonance Gordon Research Conference. July 2016. Andover, NH. Poster Presentation.

Melissa Haskell, Stephen Cauley, Lawrence Wald. TArgeted Motion Estimation and Reduction (TAMER): Data Consistency Based Motion Mitigation using a Reduced Model Joint Optimization. 24th Meeting of the ISMRM. May 2016. Singapore. Poster Presentation.

Melissa W. Haskell, Michalina J. Gora, Robert W. Carruth, Martin Villiger, Guillermo J. Tearney. OFDI tethered capsule localization for unsedated gastrointestinal 3D imaging. SPIE Photonics West BIOS. February 2013. San Francisco, CA. Oral Presentation.

Mariama Salifu, **Melissa Haskell**, Doug Noll. Estimating B_0 changes in Oscillating Steady State Imaging (OSSI) using an Artificial Neural Network. 30th Annual Meeting of the ISMRM. May 2022. London, England. Poster Presentation.

Brian Nghiem, Zhe Wu, **Melissa Haskell**, Lars Kasper, Kâmil Uludag. Assessing the Role of Deep Learning in Joint Motion and Image Estimation. 30th Annual Meeting of the ISMRM. May 2022. London, England. Poster Presentation.

Naveen Murthy, Jon-Fredrik Nielsen, Steven T. Whitaker, **Melissa W. Haskell**, Scott D. Swanson, Nicole Seiberlich, Jeffrey A. Fessler. Quantifying myelin water exchange using optimized bSSFP sequences. 30th Annual Meeting of the ISMRM. May 2022. London, England. Poster Presentation.

Brian Nghiem, Zhe (Tim) Wu, **Melissa Haskell**, Lars Kasper, Kâmil Uludag. Assessing the Generalizability of Deep Learning-Assisted Joint Image and Motion Estimation. ISMRM Motion Correction & Detection Study Group Poster Session. August 2021. Virtual. Poster Presentation. https://www.ucl.ac.uk/medical-imaging/sites/medical_imaging/files/mocoprogram.pdf

Mariama Salifu, **Melissa Haskell**, Douglas Noll. 1D Convolutional Neural Network for Estimating BOLD Signal from Oscillating Steady State Signal. 29th Annual Meeting of the ISMRM. May 2021. Virtual/Vancouver, Canada. Poster Presentation.

Maxim Zaitsev, Thomas O'Reilly, Benjamin Menkuec, Marcus Prier, Joseba Alonso, Jason Stockmann, **Melissa Haskell**, Jon-Fredrik Nielsen. From 50mT to 7T: Pulseq Live Across Hardware Platforms and Field Strengths. 29th Annual Meeting of the ISMRM. May 2021. Virtual/Vancouver, Canada. Live Educational Demonstration.

Saige Rutherford & **Melissa Haskell**. Quantifying motion and temporal SNR in fetal functional MRI within a large cohort. 28th Annual Meeting of the ISMRM. August 2020. Virtual/Sydney, Australia. Poster Presentation.

Julian Hossbach, Daniel N Splithoff, **Melissa Haskell**, Stephen F Cauley, Heiko Meyer, Josef Pfeuffer, and Andreas Maier. Deep Neural Networks for Motion Estimation in k-space: Applications and Design. 27th Annual Meeting of the ISMRM. May 2019. Montreal, Canada. Poster Presentation.

Berkin Bilgic, Stephen F Cauley, Itthi Chatnuntaweche, Mary Kate Manhard, Fuyixue Wang, **Melissa Haskell**, Congyu Liao, Lawrence L Wald, and Kawin Setsompop. Combining MR Physics and Machine Learning to Tackle Intractable Problems. 26th Annual Meeting of the ISMRM. June 2018. Paris, France. Poster Presentation.

Fuyixue Wang, Berkin Bilgic, Zijing Dong, Mary Katherine Manhard, Ned Ohringer, Bo Zhao, **Melissa Haskell**, Stephen F. Cauley, Qiuyun Fan, Thomas Witzel, Elfar Adalsteinsson, Larry Wald, Kawin Setsompop. "Motion-robust sub-millimeter isotropic diffusion imaging through Motion Corrected Generalized Slice Dithered Enhanced Resolution (MC-gSlider) acquisition. 26th Annual Meeting of the ISMRM. June 2018. Paris, France. Oral Presentation.

Clarissa Zimmerman Cooley, **Melissa Haskell**, Jason P Stockmann, Cristen Lapierre, Chenoa Schatzki-McClain, Charlotte Sappo, Stephen F Cauley, Bastien Guerin, Matthew S Rosen, and Lawrence L Wald. Portable Magnet Design Optimization for Brain Imaging without Gradient Coils. 24th Meeting of the ISMRM. May 2016. Singapore. Electronic Poster Presentation.

Christine P. Fleming, Joseph A. Gardecki, Jocelyn Eckert, Atsushi Tanaka, **Melissa W. Haskell**, Giora Weiz, Brett E. Bouma, Guillermo J. Tearney M.D. Intravascular spectroscopic optical coherence tomography for automated detection of lipid. SPIE Photonics West BiOS. January 2012. San Francisco, CA. Oral Presentation.