

Mike Loecher

Curriculum Vitae
(716) 440-6549
michael.w.loecher@gmail.com

Education

- 2009-2015** **PhD in Medical Physics**
University of Wisconsin Madison
Supervised by Dr. Oliver Wieben
- 2005-2009** **BSc in Physics**
Johns Hopkins University

Experience

- 2015-present** **Postdoctoral Researcher** - University of California Los Angeles
Projects include:
- Designing a weighted and regularized non-convex optimization method for better recovering velocities from low-Venc data.
 - Using advanced convex optimization techniques to generate time optimal gradient waveforms to reduce the scan time of 4D-Flow acquisitions.
 - Using bootstrapping based methods to estimate velocity error in PC-MRI data.
 - Assessing hemodynamic changes in intracranial aneurysms that may lead to rupture.
- 2013** **Visiting Researcher** - ETH Zurich
Three month collaborative exchange working on TKE VIPR implementations and divergence constrained compressed sensing reconstructions.
- 2009-2015** **Research Assistant** - University of Wisconsin Madison
PhD Research:
- Creating an easy to use and effective automatic phase unwrapping algorithm for 4D datasets based on minimizing 4D Laplacian convolutions of the entire dataset.
 - Improving velocity to noise ratios and streamline quality by enforcing divergence-free constraints with post-processing methods and as a constraint in compressed sensing reconstructions.
 - Improving streamline quality by correcting for displacement based offsets accrued during measurement.
 - Extending probabilistic streamlines and the previously described algorithms to create 'virtual injections' from 4D MR Flow data to better track the expected path of blood through the vasculature.
- 2007-2009** **Summer Undergraduate Researcher** - Roswell Park Cancer Institute, Buffalo, NY
Preclinical MR cancer research on small animals, mainly DCE-MRI analysis to measure tumor response to chemotherapeutic agents.

Grants and Awards

- 2016, 2017** **SMRA Travel Award**
- 2014** **ISMRM Summa Cum Laude**
- 2013, 2016** **ISMRM Magna Cum Laude**
- 2012-2014** **AHA Predoctoral Fellowship**
"Novel hemodynamic parameters and correction methods for PC-MRI for aid in diagnosis of brain AVMs and aneurysms"
American Heart Association, 12PRE12080073
- 2011, '12, '13** **ISMRM Student Stipend**

Skills

- **Programming languages:**
Most experienced with Python, Matlab, C/C++
Some experience with HTML/css/javascript, CUDA, Qt, R, bash, Java
- Siemens (IDEA) and GE (EPIC) MR pulse programming
- Some small animal handling

Teaching

- 2016, 2017** **Guest Lecturer**
Taught classes on gradient echo imaging and phase contrast MRI in 'M219 Principles and Applications of Magnetic Resonance Imaging'
- 2014** **Guest Lecturer**
Taught classes on compressed sensing and constrained reconstructions in 'Med Phys / Biomedical Engineering 710 - Advances in MRI'

Professional Memberships

- 2012-present** **American Heart Association**
- 2010-present** **International Society for Magnetic Resonance in Medicine**

Publications

- 2016** **Loecher M**, Schrauben E, Johnson KM, Wieben O. *Phase Unwrapping in 4D Flow MR Flow with a 4 Dimensional Single Step Laplacian Algorithm*. J. Magn. Reson. Imaging, 2016. 43: 833–842. doi:10.1002/jmri.25045
- 2015** Santelli C, **Loecher M** [*joint first author], Busch J, Wieben O, Schaeffter T, Kozerke S. *Accelerating 4D Flow MRI by Exploiting Vector Field Divergence Regularization* Magn. Reson. Med. 2015, 75: 115–125. doi:10.1002/mrm.25563
- 2015** W Chang, Y Wu, K Johnson, **M Loecher**, O Wieben, M Edjlali, C Oppenheim, P Roca, J Hald, B Aagaard-Kienitz, D Niemann, C Mistretta, P Turski *Fast Contrast-Enhanced 4D MRA and 4D Flow MRI Using Constrained Reconstruction (HYPRFlow): Potential Applications for Brain Arteriovenous Malformations* AJNR Am J Neuroradiol 2015 36: 1049-1055
- 2012** Chang W, **Loecher M**, Wu Y, Niemann DB, Ciske B, Aagaard-Kienitz B, et al. *Hemodynamic changes in patients with arteriovenous malformations assessed using high-resolution 3D radial phase-contrast MR angiography*. AJNR Am J Neuroradiol. 2012 Sep;33(8):1565–72.
- 2008** Turowski SG, Seshadri M, **Loecher M**, Podniesinski E, Spornyak JA, Mazurchuk R V. *Performance of a novel piezoelectric motor at 4.7 T: applications and initial tests*. Magn Reson Imaging. 2008 Apr;26(3):426–32.

In Review/Preparation

- 2016** **Loecher M**, Ennis D. *Improving velocity accuracy of high moment phase contrast acquisitions with a weighted and constrained nonconvex optimization*. In Review, Magnetic Resonance in Medicine, September 2017.
- 2016** **Loecher M**, Johnson KM, Turski P, Wieben O. *Correction efficiencies and improved methods for streamline visualizations with 4D Flow MRI*. In preparation, expected submission September 2017.

Book Chapters

- 2015** **Loecher M**, Wieben O. "k-space", in *Basic Principles of Cardiovascular Magnetic Resonance Imaging: Physics and Imaging Techniques*. Editors: Syed M, Raman S, Simonetti O. Springer. 2015:13-23. doi:10.1007/978-3-319-22141-0_2.

Proceedings

Oral Presentations

- 2017** Loecher M, Magrath P, Aliotta E, Ennis DB. *Optimizing TE and TR of 4D-Flow Acquisitions for Reduced Scan Times*. SMRA Annual Meeting. Stellenbosch South Africa, 2017.
- 2017** Loecher M, Ennis DB. *Pushing the Boundaries of Low-Venc PC-MRI Acquisition Strategies with a Weighted, Regularized Optimization Reconstruction*. ISMRM Annual Meeting. Honolulu, HI, 2017
- 2016** Loecher M, Ennis DB. *Improving Velocity Accuracy for Low-Venc Phase Contrast Acquisitions with a Constrained Optimization Reconstruction*. ISMRM Workshop on Quantitative MR Flow. San Francisco, CA, 2016.
- 2016** Loecher M, Ennis DB. *More accurate velocimetry for high-moment phase contrast using weighted non-convex optimization*. SMRA Annual Meeting. Chicago, IL, 2016.
- 2014** Loecher M, Johnson KM, Turski P, Wieben O. *Improved "virtual injections" with 4D MR flow*. MR Angiography Club. Rome, Italy, 2014.
- 2014** Loecher M, Johnson K, Turski P, Wieben O. *Robust Whole-Brain Blood Tracking from 4D Flow Using Displacement Corrected Probabilistic Streamlines*. ISMRM Annual Meeting. Milan, Italy, 2014.
- 2013** Loecher M, Wieben O, Johnson KM. *4 Dimensional, Single Step Laplacian Algorithm for Phase Unwrapping in 4D MR Flow*. ISMRM Annual Meeting. Salt Lake City, UT, 2013.

Poster Presentations

- 2017** Loecher M, Ennis DB. *Bootstrapped Estimates of Velocity Uncertainty for 4D Flow PC-MRI*. ISMRM. 2017.
- 2016** Loecher M, Hu P, Ennis DB. *Temporal Dynamics and Sampling Rate Effects for Background Phase Estimates in 4D Flow MRI*. ISMRM. 2016.
- 2015** Loecher M, Johnson K, Turski P, Wieben O. *Radial displacement errors and correction efficiency for streamline visualization in 4D-Flow MRI*. ISMRM. 2015.
- 2013** Loecher M, Santelli C, Wieben O, Kozerke S. *L1-SPIRITPhase for Separate Magnitude and Phase Reconstruction with a Divergence Penalty for 3D Phase-Contrast Flow Measurements*. ISMRM Scientific Workshop: Data Sampling and Image Reconstruction. 2013.
- 2013** Loecher M, Santelli C, Wieben O, Kozerke S. *Improved L1-SPIRiT Reconstruction with a Phase Divergence Penalty for 3D Phase-Contrast Flow Measurements*. ISMRM. 2013.
- 2012** Loecher M, Kecskemeti S, Turski P, Wieben O. *Comparison of divergence-free algorithms for 3D MRI with three-directional velocity encoding*. ISMRM Flow and Motion Workshop. 2012.
- 2012** Loecher M, Kecskemeti S, Johnson KM, Turski P, Wieben O. *Evaluation of divergence-free correction algorithms in high resolution 4-D flow images of cranial vasculature*. ISMRM. 2012.
- 2011** Loecher M, Johnson KM, Landgraf B, Wieben O. *4D Gradient Based Phase Unwrapping for PC-MR Flow Data*. ISMRM. 2011.
- 2010** Loecher M, Johnson KM, Francois CJ, Wieben O. *Peak Angiogram Calculations from 4D Flow Imaging*. ISMRM. 2010.
- 2010** Loecher M, Francois CJ, Johnson KM, Lum D, Wieben O. *Benefits and Pitfalls in the Use of Contrast Agents in 4D Flow Imaging*. ISMRM. 2010.