

# CURRICULUM VITAE

Brian Robert Keating, Ph.D.

## EDUCATIONAL HISTORY

College of William & Mary, Williamsburg, Virginia

Major: Computational Fluid Physics

Degree: Ph.D., August 2007

Dissertation: "Stabilization Methods for High Reynolds Number Lattice Boltzmann Simulations"

College of William & Mary, Williamsburg, Virginia

Major: Physics

Degree: M.S., May 2005

Saint Mary's College of Maryland, Saint Mary's City, Maryland

Major: Physics

Degree: B.A., *magna cum laude*, May 2003

## ACADEMIC POSITIONS

**Assistant Researcher**, (5/11 – 5/14)

Department of Medicine, University of Hawaii at Manoa, Honolulu, Hawaii

Responsibilities: Developed methods for correcting intrascan head motion in anatomical MRI sequences. Implemented a motion-compensated diffusion-weighted imaging sequence in order to recover signal in the presence of head motion. Adapted existing motion-correction technology for use on a neonatal population.

Supervisor: Thomas Ernst, Ph.D.

**MR Research Specialist**, (5/08 – 05/11)

Department of Medicine, University of Hawaii at Manoa, Honolulu, Hawaii

Responsibilities: Developed a navigated scan sequence/image reconstruction program for prospective correction of patient motion for use in MR spectroscopy and MRI sequences. Created real-time dynamic shimming module to improve MR spectral quality in the presence of motion.

Supervisor: Thomas Ernst, Ph.D.

**Visiting Scholar**, (9/07 – 2/08)

Department of Ocean & Resources Engineering, University of Hawaii at Manoa,  
Honolulu, Hawaii

**Responsibilities**: Numerical investigation of marine hydrodynamical flows. Used the Lattice Boltzmann method to examine both depth-averaged shallow water flows and breaking waves. Simulations carried out on serial computers as well as on a Linux cluster. Tested the numerical stability and accuracy of several new wave run-up schemes.

**Supervisor**: Jannette Frandsen, Ph.D.

**Research Assistant**, (6/05 – 8/07)

Department of Physics, College of William & Mary, Williamsburg, Virginia

**Responsibilities**: Performed research involving the Lattice Boltzmann method (LBM) for high Reynolds number Navier-Stokes and magnetohydrodynamical flows. Ran Fortran 90 simulations on both serial and massively parallel machines. Specifically examined entropic stabilization, non-uniform grids, subgrid modeling, implicit methods and novel boundary condition implementation, all within the context of the LBM.

**Supervisor**: George Vahala, Ph.D.

**Research Assistant**, (6/04 -6/05)

Department of Physics, College of William & Mary, Williamsburg, Virginia

**Responsibilities**: Carried out research involving the structure of the nucleon. Examined the anomalous magnetic moment of the nucleon in effective field theory via the Gerasimov-Drell-Hearn sum rule.

**Supervisor**: Marc Vanderhaeghen, Ph.D.

**Teaching Assistant**, (1/04 -5/04)

Department of Physics, College of William & Mary, Williamsburg, Virginia

**Responsibilities**: Ran three laboratory sections of undergraduate general physics. Responsibilities included preparing experimental setups, teaching the theoretical background to non-majors, performing demonstrations, and grading. Revised the laboratory manual.

**Supervisor**: Robert Welsh, Ph.D.

**Research Assistant**, (5/01 -8/01)

Department of Physics, Saint Mary's College of Maryland, Saint Mary's City, Maryland

Responsibilities: Performed optical experiments relating to total internal reflection rainbows that are produced when a light source is located inside a water droplet. Examined the caustic with users to develop data visualizations, provide training on visualization software, and develop customized data-visualization tools. To inquire about visualization consulting services, plots formed by light refraction through a meniscus via experiment and ray tracing simulations.

Supervisor: Charles Adler, Ph.D.

## PROFESSIONAL SOCIETIES

Treasurer-Elect of the Motion Correction Study Group of the International Society for Magnetic Resonance in Medicine (2014-present)

Member, International Society for Magnetic Resonance in Medicine (9/11-present)

Student Member, International Society for Magnetic Resonance in Medicine (4/09-9/11)

Member, American Physical Society (4/06-4/10)

## GRANT SUPPORT

Principle investigator, "Development of a Motion-Corrected MRI Sequence for Quantitative Imaging of Methamphetamine-Exposed Neonates," NIH grants 5G12 RR003061-26 and 8G12 MD007601-26, \$50,000, 4/1/2012-7/31/2012

## PUBLICATIONS

Reverse Retrospective Motion Correction. Benjamin Zahneisen, **Brian Keating**, Aditya Singh, Michael Herbst and Thomas Ernst. *Magnetic Resonance in Medicine*, **75**(6), 2341 (2016)

Optical Tracking With Two Markers for Robust Prospective Motion Correction for Brain Imaging. Aditya Singh, Benjamin Zahneisen, **Brian Keating**, et al. *Magnetic Resonance Materials in Physics, Biology and Medicine*, **28**(6), 523 (2015)

- Comparison of Optical and MR-based Tracking. Kazim Gumus, **Brian Keating**, et al. *Magnetic Resonance in Medicine*, **74**(3), 894 (2015)
- Schizophrenia-risk variant rs6994992 in the neuregulin-1 gene on brain developmental trajectories in typically-developing children. With Vanessa Duet, et al. *Translational Psychiatry*, **4**, e392 (2014)
- Propagation of Calibration Errors in Prospective Motion Correction Using External Tracking. Benjamin Zahneisen, **Brian Keating** and Thomas Ernst. *Magnetic Resonance in Medicine*, **72**(2), 381 (2014)
- Prevention of Motion-Induced Signal Loss in Diffusion-Weighted EPI by Dynamic Restoration of Gradient Moments. Kazim Gumus, **Brian Keating**, et al. *Magnetic Resonance in Medicine*, **71**(6), 2006 (2014)
- Real-time Dynamic Frequency and Shim Correction for Single-Voxel Magnetic Resonance Spectroscopy. **Brian Keating** and Thomas Ernst. *Magnetic Resonance in Medicine*, **68**(5), 1339 (2012)
- Prospective Motion Correction for Single-Voxel <sup>1</sup>H MR Spectroscopy. **Brian Keating**, Weiran Deng, J. Cooper Roddey, Nathan White, Anders Dale, V. Andrew Stenger and Thomas Ernst. *Magnetic Resonance in Medicine*, **64**(3), 672 (2010)
- Entropic, LES and Boundary Conditions in Lattice Boltzmann Simulations of Turbulence. George Vahala, **Brian Keating**, Min Soe, Jefferey Yepez, Linda Vahala and Sean Ziegeler. *The European Physical Journal, Special Topics*, **171**, 167 (2009)
- Entropic Lattice Boltzmann Representations Required to Recover Navier-Stokes Flows. **Brian Keating**, George Vahala, Jeffrey Yepez, Min Soe and Linda Vahala. *Physical Review E* **75**, 036712 (2007)
- Analysis of the Shadow-Sausage Effect Caustic. James A. Lock, Charles Adler, Jonathan Mulholland, **Brian Keating** and Diana Ekelman. *Applied Optics*, **42** 418 (2003)
- Experimental measurement of total internal reflection rainbows. Charles Adler, James A. Lock, Jonathan Mulholland, **Brian Keating** and Diana Ekelman. *Applied Optics*, **42** 406 (2003)

## CONFERENCE PRESENTATIONS

- B. Keating**, A. Singh, B. Zahneisen, L. Chang and T. Ernst. Predictive Filtering for Improved Robustness in Prospective Motion Correction. Presented at the 22<sup>nd</sup> annual meeting of the International Society for Magnetic Resonance in Medicine. (May 2014)

- B. Keating** and T. Ernst. Correction of Motion-Induced Phase Variance in Single-Voxel  $^1\text{H}$  Spectroscopy. Presented at the 21<sup>st</sup> annual meeting of the International Society for Magnetic Resonance in Medicine. (April 2013)
- B. Keating**. Adaptive Motion and Shim Correction for Single-Voxel Spectroscopy. Oral presentation given at the IDEA Users Meeting. (June 2012)
- B. Keating** and T. Ernst. Real Time Dynamic Shimming for MR Spectroscopy Using 2-dimensional RF Excitations. Oral Presentation given at the 19<sup>th</sup> annual meeting of the International Society for Magnetic Resonance in Medicine. (May 2011)
- L. Anderson, L. Chang, S. Buchthal, **B. Keating**, C. Cloak, T. Ernst. Early Neonatal Brain Development: Correlation between DTI and MRS. Presented at the 18<sup>th</sup> annual meeting of the International Society for Magnetic Resonance in Medicine. (May 2010)
- B. Keating** and T. Ernst. Motion-Induced Frequency and Shim Variations during Localized  $^1\text{H}$  MR Spectroscopy with Prospective Motion Correction. Presented at the 18<sup>th</sup> annual meeting of the International Society for Magnetic Resonance in Medicine. (May 2010)
- B. Keating** and T. Ernst. Real-Time Dynamic Shimming for Localized  $^1\text{H}$  Spectroscopy. Oral presentation at the International Society for Magnetic Resonance Motion Tracking workshop. (February 2010)
- B. Keating**, J. C. Roddey, W. Deng, A. Dale, N. White, V. A. Stenger, and T. Ernst. 3-D Prospective Motion Correction for MR Spectroscopy. (April 2009). E-poster 6671, presented at the 17<sup>th</sup> annual meeting of the International Society for Magnetic Resonance in Medicine.
- M. Soe, **B. Keating**, G. Vahala, J. Yepez, L. Vahala. Large Eddy – Lattice Boltzmann (LE-LB) Simulation of Fluid and MHD Turbulence. (July 2007). Talk given by G. Vahala at the Discrete Simulation of Fluid Dynamics Conference.
- B. Keating**, G. Vahala, L. Vahala and M. Soe. Large Eddy Simulations of MHD Using the Lattice Boltzmann Algorithm. (April 2007). Poster presented at the Sherwood Fusion Theory Conference.
- L. Vahala, G. Vahala and **B. Keating**. Quasi-Equilibria Lattice Boltzmann Schemes for MHD Turbulence. (April 2007). Poster presented at the International Sherwood Fusion Theory Conference.
- B. Keating**, G. Vahala, L. Vahala, M. Soe, J. Yepez. Entropic Lattice Boltzmann Simulations of Turbulence. (October 2006). Poster presented at the annual meeting of the Division of Plasma Physics.

N. Phillips, **B. Keating**, G. Vahala, L. Vahala. MHD Turbulence,  $\text{divB}=0$  and Lattice Boltzmann Simulations. (November 2006). Poster presented at the annual meeting of the Division of Plasma Physics.

**B. Keating**, G. Vahala, J. Carter, M. Soe, L. Vahala and J. Yopez (April 2006). Unconditionally Stable Lattice Boltzmann Schemes for 3D MHD. Poster presented at the Sherwood Fusion Theory conference.