

Curriculum Vitae

Jacob David Willig-Onwuachi

Title and Office Address:

Assistant Professor
Department of Physics
Grinnell College
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Education:

2001	Ph.D., Physics	Case Western Reserve University
1997	M.S., Physics	University of Iowa
1995	B.A.	Grinnell College

Postdoctoral Training:

2001-2003 *Post Doctoral Research Fellow in Rapid Magnetic Resonance Imaging*
Harvard Medical School/Beth Israel Deaconess Medical Center,
Boston, MA, USA

Awards and Honors:

2009-2010 Harris Fellow, Grinnell College, and Visiting Scholar, University of Western Ontario

2004 New Faculty Research Grant Award, University of California Davis, Academic Senate Committee on Research

2001-2003 NIH/NHLBI Cardiovascular Research Training Program Participant

2001 First Place Student Poster Award and Invited Talk, ISMRM Workshop on MRI Hardware in Cleveland 2001

2000-2001 GAANN Fellow, Case Western Reserve University

2000-2001 International Society for Magnetic Resonance in Medicine Student Stipend

1995 Alumni Senior Award, Grinnell College

1994-1995 Vice President/President of Academic Affairs, Student Government Association, Grinnell College.

1994-1995 LaVerne Noyes Endowed Scholarship, Grinnell College

1993-1994 John Young Memorial Scholarship, Grinnell College

Professional Societies:

1999-2009 International Society for Magnetic Resonance in Medicine
2004-2009 Radiological Society of North America
2004-2005 Society of Molecular Imaging

Positions Held (since 1997):

2006-Present

Grinnell College, Department of Physics

Assistant Professor

Teach undergraduate physics courses of all levels. Conduct independent and collaborative research involving undergraduate students in magnetic resonance imaging and medical physics. Recent courses taught include electromagnetic theory, general physics (traditional lecture/lab format), general “workshop” physics (discovery based format), and advanced laboratory (see Teaching section for more details).

2003-2006

University of California Davis, Department of Radiology

Assistant Professor

Conducted independent and collaborative research in magnetic resonance imaging and medical physics. Lectured on radiology physics for the monthly medical student clerkship class. Lectured on MRI and MRI hardware for the Radiology Physics course for residents.

2003-2006

University of California Davis, Department of Biomedical Engineering

Assistant Adjunct Professor

Conducted independent and collaborative research in magnetic resonance and biomedical engineering. Designed and taught a biomedical instrumentation course for the new undergraduate biomedical engineering program. Taught graduate signal acquisition and analysis course. Advised, mentored, and directed the research of graduate students.

2003-2006

University of California Davis, Department of Biomedical Engineering

Member of the Biomedical Engineering Graduate Group

2003-2006

University of California Davis Medical Center

Member of the Medical Staff, Physician Index Number 009016

2001-2003

Harvard Medical School

Officer

2001-2003

Harvard Medical School/Beth Israel Deaconess Medical Center

Research Fellow

Conducted research in rapid magnetic resonance imaging (MRI), including novel image reconstruction methods and radiofrequency coil development. Specialized in parallel MRI. Advisor: Daniel Sodickson.

1998-2000

Case Western Reserve University

Teaching Assistant, Physics of MRI

Gave selected lectures for a graduate level course in the physics of MRI. Held office hours.

Graded exams and homework. Wrote solution manual for text. Professor: Robert Brown.

Fall Semester 1998, 1999, 2000

1997-2001

Case Western Reserve University

Research Assistant, Electromagnetic Design / Medical Physics

Conducted doctoral research in magnetic resonance imaging coil modeling and development, including shielded gradient coil design using inverse functional methods and exploration of radiofrequency coil design issues for SMASH and SENSE (parallel MRI methods).

Collaborated on additional research in a number of other topic areas including electromagnetic detection of industrial oil contamination, magnetic noise measurement, and a calcium channel dynamics. Acted as system administrator for a cluster of Unix and Linux machines. Advisor: Robert Brown.

1997-1998

Picker International

Summer Intern, MR Surface Coils

Prototyped and tested MR surface coils: doubly tuned spectroscopy coils, multiple-coil arrays, and multi-loop quadrature coil structures. Experience in RF engineering. Advisors: Michael Morich and David Molyneaux.

1996-1997

University of Iowa

Graduate Research Assistant, Plasma Physics

Conducted masters thesis research in experimental plasma physics investigating the parallel velocity shear instability. Experience with high vacuum systems and machining parts for maintaining and upgrading experiment. Advisors: Robert Merlino and Nicola D'Angelo.

Courses Taught:

Grinnell College, Department of Physics

General Physics I (PHY 131 conventional), Instructor of Record

Taught undergraduate introductory calculus-based physics course with laboratory covering topics in Newtonian mechanics, including force, energy, gravity, conservation principles, oscillation, and rotational motion. The course included three hours of lecture and three hours of lab each week. Lab topics followed lecture topics. (4 Credits)

Fall 2006

General Physics I (PHY 131 workshop), Instructor of Record

Taught undergraduate introductory calculus-based and discovery-based (or activity based) physics course based on curriculum by Priscilla Laws (Dickinson College) and Mark Schneider (Grinnell College). Topics covered included Newtonian mechanics, waves, and quantum mechanics. This course was hands on and consisted of six hours of guided lab instruction each week. (4 credits)

Spring 2007, Spring 2008, Spring 2009

General Physics II (PHY 132 workshop), Instructor of Record

Taught undergraduate introductory calculus-based and discovery-based (or activity based) physics course based on curriculum by Priscilla Laws (Dickinson College) and Mark Schneider (Grinnell College). Topics covered included fluid flow, CD circuits, electric charge and force, electromagnetism, waves, and optics. This course was hands on and consisted of six hours of guided lab instruction each week. (4 credits)

Fall 2007

Electromagnetic Theory (PHY 335), Instructor of Record

Taught undergraduate junior-level course on electricity and magnetism with an advanced treatment of electric and magnetic fields and potentials, including the laws of Coulomb, Ampere, and Faraday, Maxwell's equations, and electromagnetic waves. This course included 3 hours of lecture each week. (4 credits)

Fall 2006, Fall 2007

Advanced Laboratory (PHY 462), Instructor of Record

Taught undergraduate senior-level laboratory course that provides a research-like experience in experimental physics. Experiments included Zeeman effect, optical pumping, parametric oscillator, nuclear magnetic resonance, evanescent microwaves, muon lifetime, etc. In addition to learning laboratory techniques, methods of data analysis, and advanced topics in modern physics, students practiced reading journal articles, presenting scientific results, and writing scientific papers. This course included 6 hours of lab each week. (2 credits)

Spring 2007, Fall 2007, Spring 2009

UC Davis, Department of Biomedical Engineering and Biomedical Engineering Graduate Group

Biomedical Instrumentation (BIM 111), Instructor of Record

Designed and taught a biomedical instrumentation course for the new undergraduate biomedical engineering program. Topics covered in the course included signal and noise, signal processing, physiological systems and signals, a variety of sensors and transducers, various optical and electron microscopy techniques, circuit analysis, and molecular analysis. Installed new National Instruments data acquisition systems. Laboratory experiments included LabView programming, analog-to-digital conversion, optical microscopy, stress and strain, and electroencephalography.

Winter 2004, Winter 2006

Introduction to Biomedical Imaging (BIM 242), Lecturer

Taught one fifth of a graduate course on Biomedical Imaging: section on magnetic resonance imaging. Gave lectures, assigned and graded homework, wrote and graded exam.

Fall 2005

Signal Acquisition and Analysis (BIM 281), Instructor of Record

Taught graduate laboratory course on signal acquisition and analysis, including topics on Fourier analysis, convolution, analog to digital conversion, binary counting, op-amp circuits, biopotentials, circuit analysis, impulse response, and signal-to-noise ratio. The course included labs on nuclear magnetic resonance, microscopy, and electroencephalography.

Spring 2005

The Century of Biomedical Imaging (FRS 003-013), Lecturer

Lectured and facilitated discussion on the history of magnetic resonance imaging for a freshman seminar surveying the development of biomedical imaging over the past century.
Fall 2005

UC Davis Medical Center, Department of Radiology

Radiology Physics for Residents, Lecturer

Lectured on MRI hardware, image artifacts, system maintenance, and magnet safety for radiology residents taking a physics review course.

Summer 2004, Summer 2005

Medical Student Clerkship, Lecturer

Lectured for monthly medical student clerkship class on the physics of radiology including topics on x-ray imaging, computed tomography, fluoroscopy, positron emission tomography, ultrasound, and magnetic resonance imaging.

2003-2006

Beth Israel Deaconess Medical Center

MR Core Curriculum, Lecturer

Lectured on selected topics for an introduction to MR course for radiology residents.

Summer 2002

Case Western Reserve University Upward Bound Program

Instructor

Designed and taught a two week lab-based physics course for high school students.

July 1999

Student Research, Advising, Mentoring, and Independent Study:

Advisor, Mentored Advanced Project, Prabal Adhikari, MRI Techniques and Technology II: Radiofrequency Distortion for High Field MRI.

For high field MR Imaging the usual assumption that the RF waves travel uniformly through the body breaks down. The dielectric properties of the tissue and the smaller wavelength of RF used at high field result in interesting and unusual interactions of the RF with the tissue. Rather than using the RF as a kind of “flash” to take a picture of the sample, the RF now behaves more like it is scattering off of the sample. How it scatters depends on the properties and geometry of the tissue. We investigated several analytical models for understanding this behavior and used numerical modeling to reproduce observed results in simulation. In future work, we plan to explore if this scattering behavior can be used as a novel way to extract information about the object being imaged. (MAP Summer 2008, continued on an hourly basis Fall 2008 and as independent research PHY397 Spring 2009).

Advisor, Directed Summer Research Project, Ilyya Tyshchenko, Motion Correction with Parallel Imaging II.

This project builds on a 2008 MAP simulating motion correction with SMASH and GRAPPA. We set out to verify results from the previous summer and test our algorithm

with new phantom and *in vivo* data. It turned out that the data we had was not appropriate for the tests we wanted to run, so we ran new and more rigorous simulations. We discovered from these simulations a new and more accurate method for determining SMASH weights. We also developed a new way of determining GRAPPA weights using a neural network algorithm. In addition, we devised a genetic algorithm for managing correction steps with multiple equivalent solutions. We received new data at the end of the summer, and hope to run further testing in future work. The end goal will be to rigorously assess the potential for success of this technique in a number of different applications. (MIP Summer 2008, continued on an hourly basis Fall 2008).

Advisor, Directed Summer Research Project, Yuyang Fan, Earth's Field Imaging.

In 2007, the physics department acquired a Terranova Earth's Field Magnetic Resonance Imaging System from Magritek, Ltd.. This is a desktop-sized low-power MR scanner that can be used for experiments in our advanced laboratory course and for student/faculty research. We confronted a number of problems, however, in setting up this piece of equipment related to variations in the local magnetic field (due to iron rebar in the floors) and emf noise. Consequently, there were a number of customizations we had to make to get the system operating properly. We constructed a shield to reduce emf noise, developed a set of procedures for setting up and optimizing imaging parameters before an experiment, wrote a short document outlining these procedures (to be given to students using the Terranova system in courses in the future), and began to prepare a set of experiments that can be used in the physics curriculum. (MIP Summer 2008, continued on an hourly basis Fall 2008).

Advisor, Mentored Advanced Project, Abel Assefa and Geoff Jacobs, MRI Techniques and Technology: Q-measurement, a Review and How-To.

Guided summer research project on MRI detector coils. A standard measure of the performance of a radiofrequency detector coil for MR imaging is the "quality factor" or Q-factor. While the theory behind this resonant characteristic is well understood and Q measurements are used widely to characterize coils, there is significant inconsistency in how Q is measured and surprisingly little literature on how to most accurately perform these measurements. The goal of this project is to examine various common methods (as well as more obscure methods) for measuring Q and to compare experimental results with MatLab simulations based on theory. (Summer 2007).

Advisor, Mentored Advanced Project, Paden Roder, MRI Techniques and Technology: Motion Correction with Parallel Imaging.

Guided summer research project on detecting and correcting motion corruption in MR images using parallel imaging. Parallel MRI uses the multiple detectors to acquire multiple data points or multiple regions of the image simultaneously (in parallel). This results in some redundant spatial information that can be used to check for self-consistency in the data (to see if the patient has moved during the scan). So far this kind of motion correction has only been demonstrated with an early implementation of parallel MR called SMASH. The goal of this project is to verify published results using SMASH and then upgrade the technique to use GRAPPA, a technique generally considered to be more robust. (Summer 2007).

Instructor, Abel Assefa, Independent Reading, Fundamentals of NMR and MRI

Guided independent reading course for a junior physics major on nuclear magnetic

resonance and magnetic resonance imaging. Held weekly meetings and discussions on assigned reading and topics, including chemical shift, spectroscopy, J-coupling, 2D NMR, inversion recovery, spin echo, phase and frequency encoding. Assignments included homework problems, a paper, and measuring T1 and T2 with a TeachSpin laboratory experiment. (Spring 2007).

Graduate Advisor, Bo Peng, Biomedical Engineering, University of California Davis

Doctoral project focuses on technical aspects of simultaneous combination of magnetic resonance imaging and positron emission tomography (PET) and the interaction between the two imaging systems. A PET insert for a 7 Tesla MRI scanner is being built. The magnetic field can interfere severely with the PET detectors and electronics.

Additionally the PET insert can cause artifacts and noise in the MR images. This research is focused on the MR aspects of understanding and minimizing the interference between the two systems.

(2005-Present).

Graduate Advisor, Young-Seob Seo, Biomedical Engineering, University of California Davis

Doctoral project focused on motion correction for MR thermometry using parallel imaging. Thermal ablation of tumors is most effective when done under image guidance. MR thermometry can provide feedback on tissue coagulation, but only in stationary organs. The thermal maps can be severely corrupted if motion is present. Prior motion correction algorithms have not been fully successful for MR thermometry in moving organs. A correction technique based on parallel imaging concepts holds promise for reducing motion artifact and providing coregistration images in time.

(2005-2006).

Chair, Qualifying Exam Committee; and Member, Dissertation Committee for Benjamin Jarrett, Ph.D. Candidate, Biomedical Engineering, University of California Davis (2005-2006).

Chair, Qualifying Exam Committee and Member, Defense Committee for Yutaka Natsuaki, Ph.D. Candidate, Biomedical Engineering, University of California Davis (2005-2007).

Member, Qualifying Exam Committee, and Dissertation Committee for Ciprian Catana, Ph.D. Candidate, Biomedical Engineering, University of California Davis (2004-2006).

Member, Qualifying Exam Committee and Dissertation Committee for Hongtao Xie, Ph.D. Candidate, Biomedical Engineering, University of California Davis (2005-2006).

Advisor; Chair, Dissertation Committee; and Member, Oral Exam Committee for Young-Seob Seo, Ph.D. Candidate, Biomedical Engineering, University of California Davis (2005-2006).

Reviewer, Masters Thesis of Susan Youens, M.S. Candidate, Biomedical Engineering, University of California Davis (2005).

Conferences Attended on Teaching and Pedagogy:

PEW Midstates Science and Mathematics Consortium: New Faculty Workshop, Hope College, Holland, MI. July 14–16, 2006.

American Association of Physics Teachers: New Physics and Astronomy Faculty Workshop,

American Center for Physics, College Park, MD. November 6–9, 2008.

Mellon 23 Workshop: Broadening Access to STEM Fields, Carleton College, Northfield MN. June 25-26, 2009.

Presentations:

International

2003

“Phase-constrained parallel MR image reconstruction: using symmetry to increase acceleration and improve image quality.”

Eleventh Scientific Meeting of the ISMRM,
Toronto, Ontario, Canada, July 12, 2003.

2001

Invited Talk: “Birdcage-Like Coils for Perfectly Sinusoidal SMASH Fields”
ISMRM Workshop on MRI Hardware,
Cleveland, Ohio, USA. February 25, 2001.

“Perfectly sinusoidal SMASH field shapes from birdcage sectors.”

Ninth Scientific Meeting of the ISMRM,
Glasgow, Scotland, UK, April 27, 2001.

2000

“SMASH RF coil arrays: specialized design considerations.”

Eighth Scientific Meeting of the ISMRM,
Denver, CO, USA, April 7, 2000.

National

2008

“Discrimination by Association: Unpacking the Knapsack of Privileges for Mono-Racial, Heterosexual Couples.”

With Angela Onwuachi-Willig.

Thirteenth Annual Latino/a Critical Theory Conference,
Seattle, WA, October 4, 2008.

2000

“Supershielding of magnetic fields.”

April Meeting of the American Physical Society,
Long Beach, CA, April 30, 2000.

Regional

2004

Invited Lecture: “Topics in MRI”

Biomedical Engineering Seminar,

Biomedical Engineering Department, University of California Davis,
Davis, California, USA. February 23, 2004.

2000

Invited Lecture: “Supershielding of Magnetic Fields”

Spin Physics Group, University of Michigan,
Ann Arbor, Michigan, USA. June 2, 2000.

Invited Lecture: “Supershielding Magnetic Fields”
Fermi Lab,
Batavia, Illinois, USA. July 25, 2000.

1999

Invited Lecture: “Making SENSE of SMASH: Partially Parallel Acquisition”
MR Division, Picker International,
Cleveland, Ohio, USA. September 2, 1999.

Original Articles:

Onwuachi-Willig A, **Willig-Onwuachi J**. A House Divided: Housing Discrimination and the Invisibility of the Multiracial Family. *Harvard Civil Rights Civil Liberties Law Review*, 2009; 44: 231-253.

Willig-Onwuachi J, Eagan TP, Shvartsman ShM, Brown RW. Designer RF Field Profiles for Parallel Imaging Applications. *Concepts in Magnetic Resonance Part B: Magnetic Resonance Engineering* 2005; 27B: 75-85.

Willig-Onwuachi J, Yeh EN, Grant AK, Ohlinger MA, McKenzie CA, Sodickson DK. Phase-constrained parallel MR image reconstruction. *Journal of Magnetic Resonance* 2005; 176:187-198.

Yeh EN, Stuber M, McKenzie CA, Botnar RM, Ohlinger MA, Grant AK, **Willig J**, Sodickson DK. Inherently self-calibrating spiral parallel imaging. *Magnetic Resonance in Medicine* 2005; 54:1-8.

Brown RW, Cheng Y-CN, Eagan TP, Kidane TK, Mathur H, Petschek RG, Sherwin WG, Shvartsman ShM, **Willig JD**. Toward shielding improvements in MRI gradients and other systems. *Magnetic Resonance Materials in Physics, Biology and Medicine (MAGMA)* 2002; 13:186-192.

Shvartsman ShM, Brown RW, Eagan TP, **Willig JD**. Supershielding: trapping of magnetic fields. *IEEE Transactions on Magnetics* 2001; 37:3116-3119.

Shvartsman ShM, Brown RW, Cheng Y-CN, Eagan TP, Fujita H, Morich MA, Petropoulos LS, **Willig JD**. Application of the SUSHI method to the design of gradient coils. *Magnetic Resonance in Medicine* 2001; 45:147-155.

Willig J, Merlino RL, D’Angelo N. Experimental study of the parallel velocity shear instability. *Physics Letters A* 1997; 236:223-226.

Willig J, Merlino RL, D’Angelo N. Experimental study of the collisional parallel velocity shear instability. *Journal of Geophysical Research –A* 1997; 102:27249-27255.

Merlino RL, An T, **Willig J**, D’Angelo N. The effect of negative ions and neutral particle collisions on the parallel velocity shear instability.” Invited Paper, in Proc. of the fifth symposium on double layers, potential formation, and relative nonlinear phenomena in plasmas. Sendai, Japan, (September 17-19, 1996), Ed. by Sendai “Plasma Forum,” Tohoku University, World Scientific Publishing Co. Pte. Ltd, Singapore, 1997, pp. 290-299.

Theses:

Willig-Onwuachi, J.D. Field Optimization in Magnetic Resonance Imaging: Striving for Perfect Shielding and Perfect Sinusoids. Diss. Case Western Reserve University, 2001. Ann Arbor: UMI 2001. 3027327.

Willig-Onwuachi, J.D. Experimental Study of the Collisional Parallel Velocity Shear Instability. Thesis. The University of Iowa, 1997.

Patents:

Willig-Onwuachi J.D., Brown R.W., and Shvartsman Sh.M.. Birdcage coils for simultaneous acquisition of spatial harmonics. US Patent No. 6791321. September 14, 2004.

Supervised Student Presentations:

“Desktop MRI Using Earth’s Magnetic Field,” 23rd National Conference on Undergraduate Research (NCUR), La Crosse, Wisconsin, April 18, 2009, Yuyang Fan. (Oral Presentation)

“FDTD Simulation of Dielectric Resonances,” 23rd National Conference on Undergraduate Research (NCUR), La Crosse, Wisconsin, April 17, 2009, Prabal Adhikari. (Oral Presentation)

“Motion correction techniques in parallel MRI,” 23rd National Conference on Undergraduate Research (NCUR), La Crosse, Wisconsin, April 16, 2009, Illya Tyshchenko. (Oral Presentation)

“Desktop MRI Using Earth’s Magnetic Field,” Physics Seminar, Grinnell College, Grinnell, Iowa, Apr. 14, 2008, Yuyang Fan. (Oral Presentation)

“Motion correction techniques in parallel MRI,” Physics Seminar, Grinnell College, Grinnell, Iowa, Apr. 14, 2008, Illya Tyshchenko. (Oral Presentation)

“A Distorted Brain! FDTD Simulations of Dielectric Resonance,” Physics Seminar, Grinnell College, Grinnell, Iowa, Apr. 7, 2008, Prabal Adhikari. (Oral Presentation)

“Desktop MRI Using Earth’s Magnetic Field,” Midstates Consortium for Math and Science Undergraduate Symposium, Washington University, St. Louis, Missouri, Nov. 1, 2008, Yuyang Fan. (Oral Presentation)

“Motion correction techniques in parallel MRI,” Midstates Consortium for Math and Science Undergraduate Symposium, Washington University, St. Louis, Missouri, Nov. 1, 2008, Illya Tyshchenko. (Oral Presentation)

“A Distorted Brain! Simulations of Dielectric Resonance using Finite-Difference-Time-Domain,” Midstates Consortium for Math and Science Undergraduate Symposium, Washington University, St. Louis, Missouri, Nov. 1, 2008, Prabal Adhikari. (Oral Presentation)

“Desktop MRI Using Earth’s Magnetic Field,” 17th Annual Science Student Research Poster Session, Grinnell College, Grinnell, Iowa, Sept. 20, 2008, Yuyang Fan, (Poster Presentation)

“Parallel Magnetic Resonance Imaging,” 17th Annual Science Student Research Poster Session, Grinnell College, Grinnell, Iowa, Sept. 20, 2008, Illya Tyshchenko. (Poster Presentation)

“Simulations of Dielectric Resonance,” 17th Annual Science Student Research Poster Session, Grinnell College, Grinnell, Iowa, Sept. 20, 2008, Prabal Adhikari. (Poster Presentation)

- Presentation)
“MRI Image Reconstruction,” Midstates Consortium for Math and Science Undergraduate Symposium, University of Chicago, Chicago, Illinois, Nov. 10, 2007, Paden Roder. (Oral Presentation)
“MRI Image Reconstruction,” Physics Seminar, Grinnell College, Grinnell, Iowa, Oct. 2, 2007, Paden Roder. (Oral Presentation)
“Q Factor Measurement of MRI Detector Coils,” Physics Seminar, Grinnell College, Grinnell, Iowa, Oct. 2, 2007, Geoff Jacobs. (Oral Presentation)
“Q-Factor Measurement of MRI Detector Coils,” 16th Annual Science Student Research Poster Session, Grinnell College, Grinnell, Iowa, Sept. 29, 2007, Geoff Jacobs. (Poster Presentation)
“MRI Image Reconstruction,” 16th Annual Science Student Research Poster Session, Grinnell College, Grinnell, Iowa, Sept. 29, 2007, Paden Roder. (Poster Presentation)

Abstracts:

- Roder P, Willig-Onwuachi J. GRAPPA navigators: motion correction with parallel imaging. Proceedings of The International Society for Magnetic Resonance in Medicine, 2008, p. 1291.
- Jacobs G, Assefa A, Willig-Onwuachi J. Q measurement and simulation for RF coils. Proceedings of The International Society for Magnetic Resonance in Medicine, 2008, p. 1082.
- Peng B. J., Walton J., Catana C., Cherry S. R., Willig-Onwuachi J. MRI/PET insert: investigations of eddy currents on copper shields in the bore. Proceedings of The International Society for Magnetic Resonance in Medicine, 2007, p. 999.
- Peng B. J., Catana C., Walton J., Cherry S. R., Willig-Onwuachi J. Placing a PET insert in the bore of a 7T magnet: Initial study of the interactions of the MRI system with the PET shielding. Proceedings of The International Society for Magnetic Resonance in Medicine, 2006, p. 1358.
- Catana C., Wu Y., Judenhofer M. S., Walton J. H., Peng B. J., Willig-Onwuachi J., Pichler B. J., Cherry S. R. Combining PET and MRI – Challenges in developing an MR compatible PET insert. Proceedings of The International Society for Magnetic Resonance in Medicine, 2006, p. 785.
- Eagan TP, Willig-Onwuachi JD, Shvartsman SM, Cheng Y-CN, Brown RW. The SENSE-cage: a half-birdcage volume coil. Proceedings of The International Society for Magnetic Resonance in Medicine, 2004, p. 1606.
- Sodickson D, Hardy C, Zhu Y, Giaquinto R, Rohling K, Dumoulin C, Kenwood G, McKenzie C, Ohliger M, Willig-Onwuachi J, Grant A, Yeh E, Kressel H, Rofsky N. Highly accelerated parallel MRI on an MR scanner with 32 channels. Proceedings of the Radiological Society of North America, 2003, p. 331, #172.
- Sodickson D, Hardy C, Zhu Y, Giaquinto R, Rohling K, Dumoulin C, Kenwood G, McKenzie C, Ohliger M, Willig-Onwuachi J, Grant A, Yeh E, Kressel H, Rofsky N. Highly accelerated parallel MRI on an MR scanner with 32 receiver channels. Proceedings of the Radiological Society of North America, 2003, p. 469.

Willig-Onwuachi JD, Yeh EN, Grant AK, Ohliger MA, McKenzie CA, Sodickson DK. Phase-constrained parallel MR image reconstruction: using symmetry to increase acceleration and improve image quality. Proceedings of The International Society for Magnetic Resonance in Medicine, 2003, p. 19.

Yeh EN, McKenzie CA, Grant AK, Ohliger MA, Willig-Onwuachi JD, Sodickson DK. Generalized noise analysis for magnitude image combinations in parallel MRI. Proceedings of The International Society for Magnetic Resonance in Medicine, 2003, p. 21.

Sodickson DK, Lee RF, Giaquinto RO, Collins CM, McKenzie CA, Ohliger MA, Grant AK, Willig-Onwuachi JD, Yeh EN, Kressel HY. Depth penetration of RF coil arrays for sequential and parallel MR imaging. Proceedings of The International Society for Magnetic Resonance in Medicine, 2003.

Willig-Onwuachi J, McKenzie C, Grant A, Ohliger M, Yeh E, Sodickson D. Variable density single shot parallel imaging in the presence of T2 decay. Proceedings of The International Society for Magnetic Resonance in Medicine, 2002, p. 2406.

Grant A, McKenzie C, Ohliger M, Willig J, Yeh E, Sodickson D. Error point spread functions for parallel imaging. Proceedings of The International Society for Magnetic Resonance in Medicine, 2002, p. 2407.

Yeh E, Stuber M, McKenzie C, Ohliger M, Grant A, Willig J, Sodickson D. Self-calibrated spiral parallel imaging. Proceedings of The International Society for Magnetic Resonance in Medicine, 2002, p. 2390.

Yeh E, McKenzie C, Lim D, Ohliger M, Grant A, Willig J, Rofsky N, Sodickson D. Parallel Imaging with Augmented Radius in k-Space (PARS). Proceedings of The International Society for Magnetic Resonance in Medicine, 2002, p. 2399.

Willig J, Brown R, Eagan T, Shvartsman Sh. Perfectly sinusoidal SMASH field shapes from Birdcage sectors. Proceedings of The International Society for Magnetic Resonance in Medicine, 2001, p. 696.

Shvartsman Sh, Brown R, Cheng Y-C, Eagan T, Willig J. A variation on variational methods: disk gradient example. Proceedings of The International Society for Magnetic Resonance in Medicine, 2001, p. 1139.

Eagan T, Brown R, Mathur H, Petschek R, Shvartsman Sh, Willig J. Limits on shielding for MRI coils. Proceedings of The International Society for Magnetic Resonance in Medicine, 2001, p. 1143.

Willig J, Brown R, Cheng Y-C, Eagan T, Shvartsman Sh. Birdcage-like coils for perfectly sinusoidal SMASH fields. Syllabus of the ISMRM Workshop on MRI Hardware in Cleveland, 2001, p. 45.

Willig J, Brown R, Cheng Y-C, Eagan T, Shvartsman Sh. Open coil systems and supershielding of magnetic fields. Syllabus of the ISMRM Workshop on MRI Hardware in Cleveland, 2001, p. 46.

Shvartsman Sh, Brown R, Cheng Y-C, Eagan T, Willig J. A modified SUSHI method: axial gradient coil example. Syllabus of the ISMRM Workshop on MRI Hardware in Cleveland, 2001, p. 44.

Eagan T, Brown R, Cheng Y-C, Mathur H, Petschek R, Shvartsman Sh, Willig J. Theoretical

limits on magnetic field shielding. Syllabus of the ISMRM Workshop on MRI Hardware in Cleveland, 2001, p. 38.

Willig J, Shvartsman Sh, Brown R, Eagan T. Savoring the SUSHI method: a gradient coil shielding menu. Proceedings of the International Society for Magnetic Resonance in Medicine, 2000, p. 335.

Willig J, Brown R, Eagan T, Shvartsman Sh. SMASH RF coil arrays: specialized design considerations. Proceedings of the International Society for Magnetic Resonance in Medicine, 2000, p. 559.

Zhang Q, Willig J, Wendt M, Duerk JL. A micro RF coil for device tracking and intravascular imaging: design optimization. Proceedings of the Interventional MRI 3rd Symposium, 2000.

Willig J, Shvartsman Sh, Eagan T, Brown R. Supershielding of magnetic fields. Bulletin of the American Physical Society, Program of the April Meeting, 2000, v. 45, n. 2, H21-8, p. 85.

Brown RW, Eagan TP, Shvartsman ShM, Willig JD. Supershielding of magnetic fields. Proceedings of the 9th Biennial IEEE Conference on Electromagnetic Field Computation, 2000.

Shvartsman Sh, Brown R, Morich M, Petropoulos L, Willig J. A new “supershielding” method applied to the design of gradient coils. Proceedings of the International Society for Magnetic Resonance in Medicine, 1999, p. 2045.

Opinion Editorials:

Onwuachi-Willig A, Willig-Onwuachi J. Now Each Citizen Can Proclaim “I Love You, and We Can Live in Iowa,” *Iowa City Press Citizen*. Apr. 4, 2009. (Invited)

Onwuachi-Willig A, Willig-Onwuachi J. Iowa Supreme Court Should Again Be a Pioneer, *Iowa City Press Citizen*. Dec. 9, 2008: 9A.

Institutional Service and Committee Membership:

Grinnell College

Co-leader and member, Planning and Organizing Committee, Early Career Faculty Group, Grinnell College (2007-2009).

Member, Mellon Mays Undergraduate Fellowship Program Selection Committee, Grinnell College (2009).

Instructor and Speaker, Grinnell Science Project, Grinnell College (2006, 2007, 2008).

Member, Howard Hughes Medical Institute 2008 Resubmission and Steering Committee, Grinnell College (2007-2009).

Science Division Representative, Race and Ethnicity Curriculum Development Committee, Grinnell College (2007-2008).

Science Division Representative, Alumni Senior Award Committee, Grinnell College (2007, 2008).

Speaker, New Faculty Orientation, Grinnell College (2007).

University of California Davis

Author and Grader, Instrumentation Question, Preliminary Exam, Biomedical Engineering Graduate Group, University of California Davis (2005-2006).

Co-Author, Instrumentation Question, Preliminary Exam, Biomedical Engineering Graduate Group, University of California Davis (2004, 2007).

Member, Imaging Track Admissions Review Committee, Biomedical Engineering Graduate Group, University of California Davis (2005).

Member, Undergraduate Committee, Biomedical Engineering Department, University of California Davis (2005-2006).

Member, Executive Committee, Biomedical Engineering Graduate Group, University of California Davis (2004-2005).

Member, Radiology Web Redesign Committee, UC Davis (2003-2004).

Member, Radiology Research Committee, UC Davis (2003-2005).

Service to Academic and Scientific Community:

Moderator, Emerging MR System Concepts, International Society for Magnetic Resonance in Medicine, Seattle, Washington. Co-moderator: Blaine Chronik (2006).

Ad Hoc Member, Biomedical Imaging Technology Study Section (BMIT), Center for Scientific Review, National Institutes of Health (2004, 2006).

Outside Reviewer, Biomedical Imaging Technology Study Section (BMIT), Center for Scientific Review, National Institutes of Health (2005).

Referee, *Magnetic Resonance in Medicine* (2003-Present).

Referee, *Journal of Magnetic Resonance Imaging* (2004-Present).

Referee, *RadioGraphics* (2004-Present).

Grants:

1. TITLE: Line-by-line motion correction of magnetic resonance images through the use of multiple detector coils
AGENCY: Committee for Support of Faculty Scholarship, Grinnell College
AMOUNT: \$74,100 plus overhead
DATES: 2009-2010
P.I. J Willig-Onwuachi
STATUS: In Progress
2. TITLE: MRI techniques and technology Part IIb
AGENCY: Committee for Support of Faculty Scholarship, Grinnell College
AMOUNT: \$2,970
DATES: Fall 2008
P.I. J Willig-Onwuachi
STATUS: Completed
3. TITLE: MRI techniques and technology Part II
AGENCY: Committee for Support of Faculty Scholarship, Grinnell College
AMOUNT: \$12,200
DATES: Summer 2008
P.I. J Willig-Onwuachi
STATUS: Completed

4. TITLE: MRI techniques and technology: Q-measurement, a review and HowTo; and Motion correction with GRAPPA
AGENCY: Committee for Support of Faculty Scholarship, Grinnell College
AMOUNT: \$11,700
DATES: Summer 2007
P.I. J Willig-Onwuachi
STATUS: Completed
5. TITLE: Array Coil for MRI Breast Cancer Detection without contrast injection
AGENCY: New Faculty Research Grant Program, UC Davis
AMOUNT: \$2500
DATES: 2004-2005
P.I. J Willig-Onwuachi
STATUS: Completed
6. TITLE: Cardiovascular Research Training Program for Jacob Willig-Onwuachi
AGENCY: National Institutes of Health/NHLBI (5 T32 HL07374-22)
AMOUNT: \$68,680
DATES: 7/15/01 – 7/14/03
P.I: J Willig-Onwuachi
STATUS: Completed