

# Jacob Willig-Onwuachi

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## Research Interests:

I enjoy using physics to solve applied problems. In pursuing this challenge over the years, I have conducted experimental and computational physics research projects in a broad range of areas, including plasma physics, industrial physics, radiofrequency (RF) engineering, and imaging physics. Magnetic resonance imaging (MRI) is a particularly interesting and exciting field that is a great example of physics in action. Physics serves as a foundation for MRI—from the basic principles to the newest technical design challenges. My research is based on using the physics behind MRI to improve medicine through technological advancements or the development of new imaging techniques, e.g., acquiring images faster, making images more accurate, or designing shorter scanners for increased patient access and reduced claustrophobia. My recent work has focused primarily on parallel MRI (which exploits redundancy in the data acquired 'in parallel' from multiple detector coils), novel image reconstruction methods, non-linear MRI, and connecting quantum and classical descriptions of spin physics.

## Selected Publications:

"R-2\*-Corrected Water-Fat Imaging Using Compressed Sensing and Parallel Imaging", Wiens C, McCurdy C, Willig-Onwuachi J, and McKenzie C, *Magnetic Resonance in Medicine* 2014; **71**: 608-616.

"Magnetic resonance thermal imaging combined with SMASH navigators in the presence of motion", Seo Y, Willig-Onwuachi J, and Walton J, *Journal of Applied Clinical Medical Physics* 2012; **13**: 172-187.

"Computationally Rapid Method of Estimating SNR for Phased Array Image Reconstructions", Wiens C, Kisch S, Willig-Onwuachi J, and McKenzie C, *Magnetic Resonance in Medicine* 2011; **66**: 1192-1197.

"Studies of the interactions of an MRI system with the shielding in a combined PET/MRI scanner", Peng B, Walton J, Cherry S, Willig-Onwuachi J, *Physics in Medicine and Biology* 2010; **55**: 265-280.

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

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