

# Sydney N. Williams

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January 13, 2022

## EDUCATION

**University of Michigan**, Ann Arbor, MI  
*Ph.D.*, Biomedical Engineering, Sep. 2018  
*Dissertation*: [Constrained and Spectral-Spatial RF Pulse Design for Magnetic Resonance Imaging](#)  
*M.S.E.*, Electrical & Computer Engineering, Dec. 2017  
*M.S.E.*, Biomedical Engineering, Apr. 2015

**Illinois Institute of Technology**, Chicago, IL  
*B.S.*, Biomedical Engineering, May 2013 (*Summa Cum Laude*)

**Universidad Politécnica de Madrid**, Madrid, Spain  
Visiting semester in telecommunications engineering with courses instructed in Spanish

## RESEARCH EXPERIENCE

**Postdoctoral Research Associate** University of Glasgow  
Oct. 2018-Present (Promoted Jul. 2021) Glasgow, UK  
Imaging Centre of Excellence (ICE)  
Supervisor: Dr. David A. Porter

- Parallel transmit (pTx) excitation for 7 tesla magnetic resonance imaging (MRI)
- Safety and validation of radiofrequency (RF) coils
- Siemens MRI pulse sequence programming

**Graduate Research Assistant** University of Michigan  
Sep. 2013-Sep. 2018 Ann Arbor, MI  
fMRI Laboratory  
Supervisors: Dr. Douglas C. Noll and Dr. Jeffrey A. Fessler

- Multi-dimensional RF pulse design
- Steady-state MRI sequences
- GE MRI pulse sequence programming

**Undergraduate Research Assistant** DePaul University  
Jun. 2012-Dec. 2012 Chicago, IL  
Medical Informatics Laboratory  
Supervisors: Dr. Daniela Raicu and Dr. Jacob Furst

- NSF-funded Research Experience for Undergraduates (REU)
- Data mining and machine learning for CT image classification
- Evaluation metrics for probabilistic multiclass classifiers.

## TEACHING EXPERIENCE

**The Physics of Medical Imaging** University of Glasgow  
Spring 2020, 2021, 2022 Glasgow, UK  
Guest lecturer and exam writer for joint MSc Medical Physics and BSc Biomedical Engineering Course

- Lecture and exam questions on MRI Hardware and ultra-high field MRI

**Music Signal Processing** University of Michigan  
Fall 2015 Ann Arbor, MI  
Graduate student instructor for freshman undergraduate lab and lecture course  
Course Instructor: Dr. Jeffrey A. Fessler

- Course topics: technical communications skills, signal sampling, continuous vs. discrete signals, Fourier/spectral analysis, and basic concepts of music theory

- Teaching tasks: directing program labs where students engaged in labs and projects, holding weekly office hours, grading lab reports

### **Biomedical Engineering Lab**

Winter/Spring 2015

University of Michigan

Ann Arbor, MI

Graduate student instructor for third-year undergraduate lab and lecture course

Course Instructors: Dr. Dennis Clafin and Dr. Douglas C. Noll

- Course topics: electronic circuits, materials testing, cell culture, basic statistics, and experimental design
- Teaching tasks: organizing morning lab session, overseeing undergraduate instructor aide, grading lab reports, holding weekly office hours, and giving guest statistics lecture

### **Intro to Biomedical Engineering**

Fall 2012

Illinois Institute of Technology

Chicago, IL

Teaching assistant for freshman undergraduate lab and lecture course

Course Instructor: Dr. Bonnie Haferkamp

- Course topics: tissue engineering, neural engineering, and medical imaging
- Teaching tasks: developing experimental protocols, setting up laboratory experiments, and grading lab reports

### **Intro to Calculus**

Spring 2012

Illinois Institute of Technology

Chicago, IL

Teaching assistant for freshman undergraduate architecture students

Course Instructor: Dr. David Maslanka

- Course topics: limits, derivatives, integrals, and other calculus fundamentals
- Teaching tasks: grading worksheets, tutoring students, and holding exam reviews

### **Geometry for Architects**

Fall 2010 and Fall 2011

Illinois Institute of Technology

Chicago, IL

Teaching assistant for freshman undergraduate architecture students

Course Instructor: Dr. David Maslanka

- Course topics: basic geometry and proofs, pre-calculus, and trigonometry
- Teaching tasks: grading worksheets, tutoring students, and holding exam reviews

## **OTHER EXPERIENCE**

### **Software Developer Intern**

Summer 2013

Dialysis Clinic, Inc.

Chicago, IL

- Developer on support team for the largest non-profit US dialysis company
- Solved user-reported problems via communication and technical skills such as SQL, Classic ASP, and report design with SQL Server Reporting Services (SSRS)

### **Private Tutor**

2013

Varsity Tutors

Chicago, IL

- Tutor for middle school, high school, and college students
- Calculus, Physics, Chemistry, ACT Math and Science, and Spanish Language

## **JOURNAL PAPERS**

1. **S. N. Williams**, J-F. Nielsen, J.A. Fessler, and D.C. Noll, "Slab-selective prewinding pulses for steady-state imaging", *In Preparation*.
2. **S. N. Williams**, S. Allwood-Spiers\*, P. McElhinney\*, G. Paterson, J. Herrler, P. Liebig, A. M. Nagel, J. E. Foster, D. A. Porter, G. Shajan, "A nested eight-channel transmit array with open-face concept for human brain imaging at 7 tesla", *Frontiers in Physics*, vol. 9, Jul. 2021. doi: [10.3389/fphy.2021.701330](https://doi.org/10.3389/fphy.2021.701330)
3. **S. N. Williams**, J-F. Nielsen, J.A. Fessler, and D.C. Noll, "Design of spectral-spatial prewinding pulses and their use in small-tip fast recovery steady-state imaging", *Mag. Reson. Med.*, vol. 79(3), Mar. 2018. doi: [10.1002/mrm.26794](https://doi.org/10.1002/mrm.26794).

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\*denotes equal authorship

## CONFERENCE PUBLICATIONS

1. **S. N. Williams**, J. Herrler, P. Liebig, P. McElhinney, S. Allwood-Spiers, J. E. Foster, S. Gunamony, A. M Nagel, D. A. Porter, “Comparing specific absorption rate (tissue heating) management methods for pTx MRI at 7 T”, *Ann. Sci. Meet. Scot. Imag. Net. Plat. Sci. Exc.* (SINAPSE ASM), 2021, Virtual. [Poster](#).
2. **S. N. Williams**, J. Herrler, P. Liebig, P. McElhinney, S. Gunamony, A. M Nagel, D. A. Porter, “SAR management in pTx sequence design: the impact of electromagnetic-field-derived virtual observation points”, *Proc. Int. Soc. Mag. Reson. Med.* (ISMRM), 2021, Virtual. [Abstract](#).
3. **S. N. Williams**, S. Allwood-Spiers, P. McElhinney, Y. Tao, J. E. Foster, S. Gunamony, D. A. Porter, “Validation of SAR management procedure for dynamic pTx RF waveforms using a self-built coil at 7 tesla”, *Proc. Int. Soc. Mag. Reson. Med.* (ISMRM), 2021, Virtual. [Abstract](#).
4. **S. N. Williams**, I. Dragonu, P. Liebig, D. A. Porter, “Multi-slice 2D pTx readout-segmented diffusion-weighted imaging using slice-by-slice  $B_1^+$  shimming”, *Proc. Int. Soc. Mag. Reson. Med.* (ISMRM), 2021, Virtual. [Abstract](#).
5. S. Gunamony, R. Müller, P. McElhinney, **S. N. Williams**, N. Groß-Weege, N. Weiskopf, H. E. Möller, D. Feinberg, “A 16-channel transmit 96-channel receive head coil for NexGen 7T scanner”, *Proc. Int. Soc. Mag. Reson. Med.* (ISMRM), 2021, Virtual. [Abstract](#).
6. J. Herrler, **S. N. Williams**, P. Liebig, S. Gunamony, C. Meixner, A. Maier, A. Dörfler, D. A. Porter, A. M. Nagel, “Evaluating Universal and Fast Online Customized Pulses for parallel transmission using two different RF coils”, *Proc. Int. Soc. Mag. Reson. Med.* (ISMRM), 2021, Virtual. [Abstract](#).
7. J. Herrler, P. Liebig, R. Gumbrecht, **S. N. Williams**, C. Meixner, A. Maier, A. M. Nagel, “Improved B0 mapping with universal parallel transmit pulses at 7 tesla”, *Proc. Int. Soc. Mag. Reson. Med.* (ISMRM), 2021, Virtual. [Abstract](#).
8. **S. N. Williams\***, S. Allwood-Spiers\*, P. McElhinney, Y. Tao, J. E. Foster, D. A. Porter, S. Gunamony, “Validation and safety approval of a dual-mode head coil for pTx applications in vivo at 7 tesla”, *Proc. Int. Soc. Mag. Reson. Med.* (ISMRM), 2020, Virtual. [Abstract](#). [Presentation](#).
9. **S. N. Williams**, S. Allwood-Spiers, P. McElhinney, Y. Tao, J. E. Foster, D. A. Porter, S. Gunamony, “First in vivo images from an in-house parallel transmit coil for MRI at 7 tesla”, *Ann. Sci. Meet. Scot. Imag. Net. Plat. Sci. Exc.* (SINAPSE ASM), 2020, Virtual. [Poster](#). [Power Pitch](#).
10. S. Allwood-Spiers, P. McElhinney, **S. N. Williams**, Y. Tao, J. E. Foster, D. A. Porter, S. Gunamony, “Safety validation of a custom-built head coil for 7T human scanning”, *Ann. Sci. Meet. Scot. Imag. Net. Plat. Sci. Exc.* (SINAPSE ASM), 2020, Virtual.
11. P. McElhinney, S. Allwood-Spiers, **S. N. Williams**, Y. Tao, J. E. Foster, D. A. Porter, S. Gunamony, “Numerical optimisation of an open-faced head coil design for MRI at 7 tesla”, *Ann. Sci. Meet. Scot. Imag. Net. Plat. Sci. Exc.* (SINAPSE ASM), 2020, Virtual.
12. **S. N. Williams**, P. McElhinney, S. Allwood-Spiers, Y. Tao, J. E. Foster, D. A. Porter, S. Gunamony, “Comparing the practical effects of VOP compressions for SAR monitoring at 7 T”, *MN Workshop U.H.F. Im.*, 2019, Minneapolis, Minnesota, USA. [Abstract](#).
13. G. Bruce, G. Keith, **S. Williams**, D. Porter, “The effect of  $B_1$  variation on  $T_1$  estimates at 7 tesla’, *Proc. Brit. Chap. Int. Soc. Mag. Reson. Med.* (BC- ISMRM), 2019, Sheffield, England, UK. [Abstract](#).
14. M. Gil, **S. Williams**, G. Keith, D. Porter, “The effect of  $B_1^+$  inhomogeneity and slice profile on spin-echo sequences at 7 tesla: computer simulation and

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- experimental validation”, *Proc. Brit. Chap. Int. Soc. Mag. Reson. Med.* (BC-ISMARM), 2019, Sheffield, England, UK. [Abstract](#).
15. **S. N. Williams**, J-F. Nielsen, J.A. Fessler, and D.C. Noll, “A simple method for constrained optimal control RF pulse design”, *Proc. Int. Soc. Mag. Reson. Med.* (ISMARM), 2019, Montreal, Canada. [Abstract](#).
  16. **S. N. Williams**, J-F. Nielsen, J.A. Fessler, and D.C. Noll, “Slab-selective spectral and spectral-spatial prewinding RF pulses”, *Proc. Int. Soc. Mag. Reson. Med.* (ISMARM), 2018, Paris, France. [Abstract](#).
  17. **S. N. Williams**, D.C. Noll, and J.A. Fessler, “Minimum out-of-slice error SMS RF pulse design with direct peak, power, and in-slice error constraints”, *Proc. Eur. Soc. Mag. Reson. Med. Biol.* (ESMRMB), 2017, Barcelona, Spain. [E-poster](#).
  18. **S. N. Williams**, D.C. Noll, and J.A. Fessler, “Improved simultaneous multislice pulse design directly constraining peak RF amplitude,””, *Proc. Int. Soc. Mag. Reson. Med.* (ISMARM), 2017, Honolulu, HI, USA. [Abstract](#).
  19. **S. N. Williams**, D.C. Noll, and J.A. Fessler, “Spectral-spatial RF pulse design with direct constraints on peak amplitude and integrated power”, *In Vivo MR Gordon Research Conference*, 2016, Andover, NH, USA.
  20. **S. Williams**, H. Sun, J-F. Nielsen, J.A. Fessler, and D.C. Noll, “A spectral-spatial pulse for improved signal recovery in the small-tip fast recovery sequence”, *Proc. Int. Soc. Mag. Reson. Med.* (ISMARM), 2015, Toronto, Canada. *Magna Cum Laude Award*. [Abstract](#).
  21. **S. Williams**, M. Harris, J. Furst, and D. Raicu, “Area under the distance threshold curve as an evaluation measure for probabilistic classifiers,” *Proc. Mach. Learn. Data Min.* (MLDM), 2013, New York City, NY, USA. doi: [10.1007/978-3-642-39712-749](https://doi.org/10.1007/978-3-642-39712-749).

## INVITED PRESENTATIONS

1. “A Firsthand Account of 7T pTx MRI”, *University Hospital Erlangen/FAU MRI Colloquium*, Invited Talk, Virtual, Nov. 2021.
2. “What is MRI?”, *University of Glasgow Explorathon*, Virtual Public Engagement Talk, Sep. 2021. [Presentation](#).
3. “SAR management in pTx sequence design: the impact of electromagnetic-field-derived virtual observation points”, *Proc. Int. Soc. Mag. Reson. Med.*, Virtual, May 2021.
4. “RF pulses and pTx for inner-volume and reduced FOV imaging”, *ISMARM High Field Study Group Meeting*, Invited Talk, Virtual, Mar. 2021. [Presentation](#).
5. “SAR management with custom 7 tesla pTx coils”, *Siemens Healthineers EMEA Internal Meeting*, Invited Talk, Virtual, Feb. 2021.
6. “Applications of RF pulse designs: inner volume imaging, SMS, B1 shimming & pTx”, *Proc. Int. Soc. Mag. Reson. Med.*, Invited Educational Talk, Virtual, Aug. 2020. [Syllabus](#). [Presentation](#).
7. “Parallel transmit (pTx) techniques for improved image quality”, *Neuro-oncology ICE 7 T visit*, Glasgow, Scotland, UK, Oct. 2019.
8. “Initial investigation of a spokes slice-selective pTx RF pulse design for MRI at 7 tesla”, *SINAPSE Annual Scientific Meeting*, Dundee, Scotland, UK, Jun. 2019.
9. “Slab-selective spectral and spectral-spatial prewinding RF pulses”, *Proc. Int. Soc. Mag. Reson. Med.*, Paris, France, Jun. 2018.
10. “Radio frequency pulse design for target magnetic resonance imaging applications”, *Northwestern U. Biomed. Eng. Dept. Seminar*, Chicago, IL, Feb. 2018.
11. “Radio frequency pulse design for target magnetic resonance imaging applications”, *UMich. Phys. Grad. Student Symposium*, Ann Arbor, MI, Aug. 2017.

12. “Exciting spins: radio frequency pulse design strategies for magnetic resonance imaging”, *UMich. Biomed. Eng. Grad. Student Speaker Series*, Ann Arbor, MI, Aug. 2015.
13. “A spectral-spatial pulse for improved signal recovery in the small-tip fast recovery sequence”, *Proc. Int. Soc. Mag. Reson. Med.*, Toronto, Canada, May 2015.

## STUDENT SUPERVISION

1. **Catherine Stephens**, Secondary Supervisor  
University of Glasgow Medical Physics MSc Dissertation Research  
Thesis: “Development of an improved computer model for magnetic resonance imaging at ultra-high field strength” 2021
2. **Omar Salim**, Secondary Supervisor  
University of Glasgow Brain Sciences MSc Dissertation Research  
Thesis: “Using parallel transmit pulses to improve magnetic resonance neuroimaging at 7 tesla” 2021
3. **Iain Taylor**, Primary Supervisor  
University of Glasgow Medical Physics MSc Dissertation Research  
Thesis: “Design of generalizable parallel transmit (pTx) radiofrequency (RF) pulses for mitigating RF field inhomogeneity of 7T brain MRI” 2020
4. **George Bruce**, Secondary Supervisor  
University of Glasgow Medical Physics MSc Dissertation Research  
Thesis: “Optimization of 7 tesla MRI sequence parameters by measuring human brain relaxation times in vivo” 2019
5. **Matthew Gil**, Tertiary Supervisor  
University of Glasgow Medical Physics MSc Dissertation Research  
Thesis: “The effect of B1 inhomogeneity and slice profile on MRI pulse sequences at 7 tesla: computer simulation and experimental validation” 2019

## AWARDS

**Magna Cum Laude Presenter’s Award**  
International Society of Magnetic Resonance in Medicine (ISMRM) 2015, 2021

**Triumph Over Adversity Award**  
University of Michigan Rackham Merit Fellows Program 2017

**Graduate Assistance in Areas of National Need Fellowship**  
University of Michigan Department of Biomedical Engineering 2014-2016

**Outstanding Poster Award**  
In Vivo Magnetic Resonance Gordon Research Conference 2016

**Honorable Mention of Graduate Research Fellowship**  
National Science Foundation (NSF) 2014

**University of Michigan Graduate Fellowship**  
University of Michigan Department of Biomedical Engineering 2013-2014

**Illinois Institute of Technology Camras Scholar**  
Full-tuition academic scholarship 2009-2013

**Orfalea Scholar**  
Private local scholarship from the San Luis Obispo Community Foundation 2009-2013

## SERVICE/ AFFILIATIONS

**International Society for Magnetic Resonance in Medicine (ISMRM)**  
Trainee member 2014-Present  
Invited member of Scientific Program Committee for High Field Study Group Workshop Mar. 2022  
Invited journal paper reviewer for *Magnetic Resonance in Medicine*  
Committee member of: High Field Study Group, Engineering Study Group, British and Irish Chapter, and Iberian Chapter  
Conference abstract reviewer

**Eur. Society for Magnetic Resonance in Medicine and Bio. (ESMRMB)**

Trainee member	2017-Present
<b>Ladies of Code Glasgow</b>	
Member	2019-Present
<b>IEEE Int. Conf. on Acoustics, Speech, &amp; Signal Processing (ICASSP)</b>	
Invited paper reviewer	2021, 2022
<b>Graduate Society of Women Engineers (GradSWE)</b>	
Student member and elementary outreach team leader	2015-2017
<b>University of Michigan Biomedical Engineering Graduate Student Council</b>	
Co-president leading academic, professional, and social events for the graduate students of the UM BME department	2014-2018
<b>Big Brothers Big Sisters of Washtenaw County</b>	
Volunteer big sister for high school student	2014-2016
<b>TAAL Indian Fusion Dance</b>	
Member of competitive University of Michigan cultural dance team	2013-2015
<b>Biomedical Engineering Society (BMES)</b>	
Student member	2012-2013
<b>Order of Omega Honors Greek Society</b>	
Member invited as top 3% of academic class	2012-2013
<b>Tau Beta Pi</b>	
Member of national honors engineering society	2011-2013
<b>Kappa Phi Delta</b>	
Member and elected president of local sorority at Illinois Inst. of Tech.	2009-2013
<b>Spanish Language Certification</b>	
B2 Advanced-Intermediate Level Dipoloma by the Institute of Cervantes	2011