Sydney N. Williams

Imaging Centre of Excellence (ICE)
Queen Elizabeth University Hospital
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EDUCATION

University of Michigan, Ann Arbor, MI, USA
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, USA
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

Morro Bay High School, Morro Bay, CA, USA
High school diploma Jun. 2009 (*3rd in class with* 4.4 *GPA*)

RESEARCH EXPERIENCE

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

- Parallel transmission (pTx) 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, Ann Arbor, MI
Sep. 2013-Sep. 2018
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, Chicago, IL
Jun. 2012-Dec. 2012
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 clasification
- Evaluation metrics for probabilistic multiclass classifiers.

JOURNAL PAPERS

1. J. Herrler*, **S. N. Williams***, P. Liebig, C. R. Meixner, B. Ding, P. McElhinney, S. Allwood-Spiers, S. Gunamony, R. Gumbrecht, A. Maier, A. Dörfler, D. A. Porter, A. Nagel, "The effects of RF coils and SAR supervision strategies for clinically applicable non-selective parallel-transmit inversion pulses at 7 tesla", *Submitted*, 2022.
2. **S. N. Williams**, P. McElhinney, and S. Gunamony, "Ultra-High field MRI: parallel-transmit arrays and RF pulse design", *In Revision* with *Physics in Medicine in Biology*, 2022.

*denotes equal authorship

3. **S. N. Williams**, S. Allwood-Spiers*, P. McElhinney*, G. Paterson, J. Herrler, P. Liebig, A. M. Nagel, J. E. Foster, D. A. Porter, S. Gunamony, "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
4. **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.

CONFERENCE PUBLICATIONS

1. **S. N. Williams**, I. Dragonu, B. Ding, P. Liebig, D. A. Porter, "Parallel Transmission (pTx) for Improved Multishot Diffusion Weighted Imaging", emphProc. Org. Hum. Brain Map. (OHBM), 2022, Glasgow, Scotland, UK. Abstract. Short Presentation.
2. **S. N. Williams**, B. Ding, I. Dragonu, P. Liebig, D. A. Porter, "First Evaluation of External Development Sequences for 7T Parallel-Transmit MRI in a Self-Built Coil", *Ann. Sci. Meet. Scot. Imag. Net. Plat. Sci. Exc.* (SINAPSE ASM), 2022, Glasgow, Scotland, UK. *Best Presentation Award*. Abstract.
3. **S. N. Williams**, I. Dragonu, B. Ding, P. Liebig, D. A. Porter, "Simultaneous Multislice pTx for Readout-Segmented Diffusion Imaging at 7 T", *Proc. Int. Soc. Mag. Reson. Med.* (ISMRM), 2022, London, England, UK. Abstract. Short Presentation.
4. P. Liebig, J. Herrler, R. Tomi-Tricot, **S. N. Williams**, B. Ding-Yuan, M. Hlou, V. Chebrolu, F. Gadjimuradov, T. Hilbert, T. Kober, R. Gumbrecht, R. M. Heidemann, T. Benkert, C. Rodgers, D. A. Porter, I. Dragonu, A. Nagel, and S. Malik, "Generalized framework for homogeneous ultra-high-field brain imaging", *Proc. Int. Soc. Mag. Reson. Med.* (ISMRM), 2022, London, England, UK. Abstract.
5. B. Ding, **S. N. Williams**, I. Dragonu, P. Liebig, D. A. Porter, "Parallel transmission for 7T multi-short diffusion-weighted imaging", *Proc. Int. Soc. Mag. Reson. Med. Ultra-High Field Workshop* (ISMRM UHF Workshop), 2022, Lisbon, Portugal. Abstract.
6. **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. *Best Poster Award* Poster.
7. **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.
8. **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. *Magna Cum Laude Award* Abstract.
9. **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.
10. 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.

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11. 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.

12. 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.

13. **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.

14. **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. *Best Poster Award*. Poster. Power Pitch.

15. 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.

16. 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.

17. **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.

18. 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.

19. M. Gil, **S. Williams**, G. Keith, D. Porter, "The effect of B_1^+ inhomogeneity and slice proifle on spin-echo sequences at 7 tesla: computer simulation and experimental validation", *Proc. Brit. Chap. Int. Soc. Mag. Reson. Med.* (BC-ISMRM), 2019, Sheffield, England, UK. Abstract.

20. **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.* (ISMRM), 2019, Montreal, Canada. Abstract.

21. **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.* (ISMRM), 2018, Paris, France. Abstract.

22. **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.

23. **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.* (ISMRM), 2017, Honolulu, HI, USA. Abstract.

24. **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.

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25. **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.* (ISMRM), 2015, Toronto, Canada. *Magna Cum Laude Award*. Abstract.
26. **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.

INVITED PRESENTATIONS

1. "A Firsthand Account of 7T pTx MRI", *CEA NeuroSpin*, Invited Talk, Paris-Saclay, France, Jun. 2022.
2. "First Evaluation of External Development Sequences for 7 T Parallel-Transmit MRI in a Self-Built RF Coil", *Ann. Sci. Meet. Scot. Imag. Net. Plat. Sci. Exc.* (SINAPSE ASM), Jun. 2022, Glasgow, Scotland, UK. *Best Talk Award*
3. "Simultaneous Multislice pTx for Readout-Segmented Diffusion Imaging at 7 T", *Proc. Int. Soc. Mag. Reson. Med.*, London, England, UK, May 2022.
4. "A Firsthand Account of 7T pTx MRI", *University Hospital Erlangen/FAU MRI Colloquium*, Invited Talk, Virtual, Nov. 2021.
5. "What is MRI?", *University of Glasgow Explorathon*, Virtual Public Engagement Talk, Sep. 2021. Presentation.
6. "SAR management in pTx sequence design: the impact of electromagnetic-field-derived virtual observation points", *Proc. Int. Soc. Mag. Reson. Med.*, Virtual, May 2021.
7. "RF pulses and pTx for inner-volume and reduced FOV imaging", *ISMRM High Field Study Group Meeting*, Invited Talk, Virtual, Mar. 2021. Presentation.
8. "SAR management with custom 7 tesla pTx coils", *Siemens Healthineers EMEA Internal Meeting*, Invited Talk, Virtual, Feb. 2021.
9. "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.
10. "Parallel transmit (pTx) techniques for improved image quality", *Neuro-oncology ICE 7 T visit*, Glasgow, Scotland, UK, Oct. 2019.
11. "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.
12. "Slab-selective spectral and spectral-spatial prewinding RF pulses", *Proc. Int. Soc. Mag. Reson. Med.*, Paris, France, Jun. 2018.
13. "Radio frequency pulse design for target magnetic resonance imaging applications", *Northwestern U. Biomed. Eng. Dept. Seminar*, Chicago, IL, Feb. 2018.
14. "Radio frequency pulse design for target magnetic resonance imaging applications", *UMich. Phys. Grad. Student Symposium*, Ann Arbor, MI, Aug. 2017.
15. "Exciting spins: radio frequency pulse design strategies for magnetic resonance imaging", *UMich. Biomed. Eng. Grad. Student Speaker Series*, Ann Arbor, MI, Aug. 2015.
16. "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.

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 officce hours, grading lab reports

Biomedical Engineering Lab — University of Michigan
Winter/Spring 2015 — Ann Arbor, MI
Graduate student instructor for third-year undergraduate lab and lecture course
Course Instructors: Dr. Dennis Claflin 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 — Illinois Institute of Technology
Fall 2012 — 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 — Illinois Institute of Technology
Spring 2012 — 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 — Illinois Institute of Technology
Fall 2010 and Fall 2011 — 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

STUDENT SUPERVISION

1. **Arizona (Rose) Huby**, Primary Supervisor
   University of Glasgow Precision Medicine MSc Dissertation Research
   Thesis: "Analysis of parallel transmission approaches for diffusion imaging at 7 tesla" 2022
2. **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
3. **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

4. **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 rield inhomogeneity of 7T brain MRI" 2020
5. **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
6. **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

OTHER EXPERIENCE

Software Developer Intern Dialysis Clinic, Inc.
Summer 2013 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 Varsity Tutors
2013 Chicago, IL

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

AWARDS

Best Presenter's Award
Scottish Imaging Net. Platform for Sci. Excellence (SINAPSE) 2020, 2021, 2022
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/ AFFLIIATIONS

Professional Society Memberships

- **Int. Soc. for Magnetic Resonance in Medicine (ISMRM)**
  Trainee Member 2014-Present
  - Invited member of Scientific Program Committee for High Field Study Group Workshop Mar. 2022; co-chaired the pre-workshop entitled "Custom RF Coils Parallel-Transmit for UHF"
  - ISMRM Travel Stipend Recipient for 2015, 2017, 2018

  - Committee member of: High Field Study Group, Engineering Study Group, Safety Study Group, British and Irish Chapter, and Iberian Chapter

- **Eur. Soc. for Magnetic Resonance in Medicine and Biol. (ESMRMB)**
  Trainee member 2017-Present
- **Ladies of Code Glasgow**
  Member 2019-Present
  - Invited speaker for local meeting of female software developers and programmers
- **IEEE Int. Conf. on Acoustics, Speech, & Signal Processing (ICASSP)**
  Reviewer 2021-Present
  - Invited reviewer for 3 conference papers
- **Uni. of Michigan Biomedical Engineering Grad. Student Council**
  Member and President 2014-2018
  - Lead academic, professional, and social events for UofM BME graduate students including but not limited to departmental seminars, graduate recruitment weekends, Midwest speaker exchange programs, and faculty and student mixers.
- **Biomedical Engineering Society (BMES)**
  Student member 2012-2013
- **Order of Omega Honors Greek Society**
  Member invited as top 3% of academic class 2012-2013
- **Tau Beta Pi**
  Member of national honors engineering society 2011-2013

Reviews

- **Magnetic Resonance in Medicine** (Journal) 2020-Present
- **ISMRM** Conference Abstracts 2017-Present
- **IEEE ICASSP** (Conference Papers) 2021-Present

Skills, Volunteering, & Miscellaneous

- **Spanish Language Certification**
  B2 Advanced-Intermediate Level Dipoloma by the Institute of Cervantes 2011
- **Big Brothers Big Sisters of Washtenaw County**
  Volunteer big sister for high school student 2014-2016
- **TAAL Indian Fusion Dance**
  Member of competitive University of Michigan cultural dance team 2013-2015
- **Kappa Phi Delta**
  Member and elected president of local sorority at Illinois Inst. of Tech. 2009-2013