Samuel E. Perron, PhD.
(613) 601-7269
sperron6@uwo.ca

Lawson Research Institute
Department of Medical Biophysics
The University of Western Ontario

Education

05/2021 – 04/2025 **Doctor of Philosophy, Physics**
University of Western Ontario – London, Canada
Thesis Title:
MRI Pulse Sequence Development and Accelerated Imaging
Supervisor: *Dr. Alexei V. Ouriadov*

09/2020 – 04/2021 **Master of Science, Physics**
University of Western Ontario – London, Canada
Project Report:
Application of a 2D Frequency Encoding Sectoral Approach to Hyperpolarized ^{129}Xe MRI at Low Field
Supervisor: *Dr. Alexei V. Ouriadov*

09/2014 – 01/2019 **Bachelor of Science, Honours Physics**
University of Ottawa – Ottawa, Canada
Honours Research Project:
^{57}Fe Mössbauer Study of the $RbEuFe_4As_4$ Superconductor
Project Supervisor: *Dr. Zbigniew M. Stadnik*

Research Experience

06/2025 – 09/2026 **Postdoctoral Research Fellowship**
Lawson Research Institute – Dr. Neil Gelman
With Siemens Healthcare Limited – Dr. Gerald Moran

01/2026 – 02/2026 **Research Associate** - Equipment Installation and HQP Training
Lawson Research Institute – Dr. Alexei V. Ouriadov

05/2020 – 04/2025 **Graduate and Pre-Graduate Research**
University of Western Ontario – Dr. Alexei V. Ouriadov

09/2017 – 04/2018 **Undergraduate Honours Research Project**
University of Ottawa – Dr. Zbigniew M. Stadnik

Relevant Work Experience

01/2025 – 04/2025 **Internship – Research & Development (MITACS Accelerate)**
XeUS Technologies LTD. – Nicosia, Cyprus

- Built, tested, and optimized a stopped-flow xenon hyperpolarizer system
- Contributed original ideas to improve design of system (e.g., structural braces, wiring, etc.).
- Received competitive training and certification (first in Canada).

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Teaching Experience

01/2026 – 04/2026 **Secondary Instructor**
University of Western Ontario – London, Canada
Graduate-level MRI Course

09/2020 – 12/2024 **Graduate Teaching Assistant**
University of Western Ontario – London, Canada
First-year physics courses

11/2022 – 12/2022 **Course Co-Developer**
University of Western Ontario – London, Canada
Helped develop laboratory component of graduate-level MRI course

Honours & Awards

2021 – 2023, 2025 International Society for Magnetic Resonance in Medicine (ISMRM) Educational Stipend

2024 Lillian Margaret & Walter David Jackson Scholarship in Physics

2022 3rd Place Best Student Oral Presentation in Division of Physics in Medicine and Biology – Canadian Association of Physicists

2014 University of Ottawa Admission Scholarship

Career Development and Volunteering

29 / 04 / 2026 **Session Chair –**
Imaging Network of Ontario (ImNO) Symposium 2026
Mississauga Convention Centre

09/2025 – 09/2025 **Siemens IDEA Pulse Programming Workshop**
Sunnybrook Hospital

05/2025 – 05/2025 **Volunteer**
University of Western Ontario
Western Discovery Day (community outreach).
Demo and tour MRI physics labs, conduct imaging workshops.

05/2024 – 05/2024 **Volunteer**
Canadian Association of Physicists
Help setup CAP 2024 congress (event space, merchandise, food, etc.).

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PUBLICATION LIST

PEER-REVIEWED PAPERS

1. **Perron, S.**, Tully, C.S., Gupta, S., Fox, M.S., Zagidulin, D., Noël, J.J., and Ouriadov, A. (2025) Implementation of the X-centric pulse sequence at low field for MRI of water penetration in clay, *Journal of Magnetic Resonance*, 373 107852. https://doi.org/10.1016/j.jmr.2025.107852

2. **Perron, S.**, McCormack, D.G., Parraga, G., and Ouriadov, A. (2023) Undersampled Diffusion-Weighted ^{129}Xe MRI Morphometry of Airspace Enlargement: Feasibility in Chronic Obstructive Pulmonary Disease. *MDPI Diagnostics*. Volume 13, Article #1477, 13 pages. https://doi.org/10.3390/diagnostics13081477

3. **Perron, S.**, and Ouriadov, A. (2023) Hyperpolarized ^{129}Xe MRI at Low Field: Current Status and Future Directions. *Journal of Magnetic Resonance*. 348: 107387-107402 https://doi.org/10.1016/j.jmr.2023.107387

4. **Perron, S.**, Ouriadov, A., Wawrzyn, K., Hickling, S., Fox, M.S., Serrai, H., and Santyr, G. (2022) Application of a 2D Frequency Encoding Sectoral Approach to Hyperpolarized ^{129}Xe MRI at Low Field. *Journal of Magnetic Resonance*. 336: 107159-107170 https://doi.org/10.1016/j.jmr.2022.107159

ARTICLES IN PREPARATION FOR SUBMISSION

1. **Perron S.**, Fox M.S., and Ouriadov A. (June 2026) Preliminary Study of a Stretched-Exponential Model of RF Depolarization of Hyperpolarized ^{129}Xe for Highly Accelerated Pulmonary MRI.

2. **Perron S.**, Fox M.S., and Ouriadov A. (June 2026) Free-Lunch MRI: Tackling Limitations of a Signal Decay-Based Compressed-Sensing Method for Accelerated Low Field MRI.

PEER REVIEWED CONFERENCE TALKS AND POSTERS

1. **Perron, S.***, Dassanayake, P., Biernaski, H., Prato, F.S., Moran, G., and Gelman, N. (May 2026) Bowel Wall Relaxation in the Human Gut: Preliminary Findings at 3.0T. In Proceedings of the 35th Annual Meeting of ISMRM. Cape Town, South Africa. (International, Poster).

2. **Perron, S.***, Dassanayake, P., Biernaski, H., Prato, FS., Moran, G., Gelman, N. (April 2026) Preliminary MRI Study of T1 Relaxation of the Bowel Wall in Healthy Humans at 3.0T, Imaging Network of Ontario (ImNO), Mississauga, Canada. (Regional, Poster).

3. **Perron, S.***, Yohans, J, Sun, Q, Liao, Y, Shaw, GS, Burton, JP, Goldhawk, DE, Prato, FS, Moran, G and Gelman, N (April 2026) High-field NMR T2 Relaxation of Bacterial Samples. Imaging Network of Ontario (ImNO), Mississauga, Canada. (Regional, Oral).

4. **Perron, S.***, Fox, M.S., and Ouriadov, A. (June 2025) 10-Fold Acceleration of Pulmonary ^{129}Xe MRI Enabled by the Sectoral Pulse Sequence. London Imaging Discovery Day. London, ON, Canada. (Regional, Oral Competition)

5. **Perron, S.***, Fox, M.S., & Ouriadov, A. (May 2025) Highly Accelerated Pulmonary MRI Using RF Depolarization of ^{129}Xe: The Sectoral Pulse Sequence. In Proceedings of the 34th Annual Meeting of ISMRM. Honolulu, HI, U.S. (International, Poster)

6. **Perron, S.***, Fox, M.S., and Ouriadov, A. (June 2024) Development of New Sampling Schemes for Highly Accelerated Low Field MRI: X-Centric and Sectoral Pulse Sequences. London Imaging Discovery Day. London, ON, Canada. (Regional, Oral Competition)

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7. **Perron, S.***, Fox, M.S., & Ouriadov, A. (May 2024) Pulse Sequence Optimization for Highly Accelerated Low-Field MRI: X-Centric and Sectoral. London Health Research Day. London, ON, Canada. (Regional, Poster)

8. **Perron, S.***, Fox, M.S., & Ouriadov, A. (May 2024) Pulse Sequence Considerations for Accelerated Low Field MRI. Canadian Association of Physicists (CAP) 2024. London, ON, Canada. (National, Oral Competition)

9. **Perron, S.***, Fox, M.S., & Ouriadov, A. (March 2024) Pulse Sequence Optimization for Highly Accelerated Low-Field MRI: X-Centric and Sectoral. Imaging Network Ontario (ImNO) 2024. Mississauga, ON, Canada. (Provincial, Poster)

10. **Perron, S.***, Fox, M.S., and Ouriadov, A. (June 2023) Preliminary Study of Accelerated Human Lung MRI with Hyperpolarized ^{129}Xe. London Imaging Discovery Day. London, ON, Canada. (Regional, Oral Competition)

11. **Perron, S.***, Gupta, S., Fox, M.S., Zagidulin, D., Noël, J.J., & Ouriadov, A. (June 2023) Direct 2D Imaging of Water Penetration In Clay Using Low Field MRI. Canadian Association of Physicists (CAP) 2023. Fredericton, NB, Canada. (National, Oral Competition)

12. **Perron, S.***, Fox, M.S., & Ouriadov, A. (June 2023) Accelerated 2D Multislice MRI with Hyperpolarized ^{129}Xe in Human Lungs. Canadian Association of Physicists (CAP) 2023. Fredericton, NB, Canada. (National, Oral Competition)

13. **Perron, S.***, Fox, M.S., & Ouriadov, A. (June 2023) Implementation of Hyperpolarized 129Xe Accelerated MRI in Phantom and Human Lungs: Preliminary Study and Troubleshooting. In Proceedings of the 32nd Annual Meeting of ISMRM. Toronto, Canada. (International, Poster)

14. **Perron, S.***, Fox, M.S., & Ouriadov, A. (March 2023) Accelerated 3D MRI with Inhaled Hyperpolarized ^{129}Xe in Human Lungs: Troubleshooting. Imaging Network Ontario (ImNO) 2023. London, ON, Canada. (Provincial, Oral Competition)

15. **Perron, S.***, Fox, M.S., and Ouriadov, A. (June 2022) Novel Accelerated Imaging Method for ^{1}H and ^{129}Xe MRI with Deep Learning. London Imaging Discovery Day. London, ON, Canada. (Regional, Oral Competition)

16. **Perron, S.***, Fox, M.S., & Ouriadov, A. (June 2022) Novel Accelerated Imaging Method for ^{1}H and ^{129}Xe MRI with Deep Learning. Canadian Association of Physicists (CAP) 2022. Hamilton, ON, Canada. (National, Oral Competition) *Awarded 3rd place DPMB Best Student Oral Presentation*

17. **Perron, S.***, Fox, M.S., & Ouriadov, A. (May 2022) Improvements of Image Quality of ^{1}H and ^{129}Xe MRI by Using an Advanced Acquisition and Reconstruction Method Coupled with Deep Learning. In Proceedings of the 31st Annual Meeting of ISMRM. London, England, UK. (International, Poster)

18. **Perron, S.***, Fox, M.S., & Ouriadov, A. (March 2022) An Advanced Acquisition/Reconstruction Method for ^{1}H and ^{129}Xe MRI with Deep Learning. Imaging Network Ontario (ImNO) 2022. Virtual. (Provincial, Poster)

19. **Perron, S.***, Fox, M.S., Serrai, H., & Ouriadov, A. (June 2021) The Use of a Novel Sampling/Reconstruction Method for Non-Proton and Low Field MRI. Canadian Association of Physicists (CAP) 2021. Virtual. (National, Oral Competition)

20. **Perron, S.***, Fox, M.S., Serrai, H., & Ouriadov, A. (May 2021) Feasibility of a Novel Sampling/Reconstruction Method Ensuring a SNR Benefit Over the Traditional Sampling Approach. In Proceedings of the 30th Annual Meeting of ISMRM. Virtual. (International, Poster)

21. **Perron, S.***, Fox, M.S., Serrai, H., & Ouriadov, A. (March 2021) The Use of a Novel Sampling/Reconstruction Method for Non-Proton and Low-Field MRI. Imaging Network Ontario (ImNO) 2021. Virtual. (Provincial, Poster)

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Research Statement

My main research focus involves developing new imaging tools for magnetic resonance imaging (MRI). This can be broken down into two avenues: (1) imaging of short signal-lifetime samples, and (2) imaging of hyperpolarized gases. Both of these directions often necessitate developing new pulse sequences tailored to these specific applications, or reconstruction tools for accelerated images.

My past work has included the application of the X-Centric pulse sequence for imaging water penetration into clay at low magnetic field strengths. At typical field strengths found on clinical scanners, the signal-lifetime of water bound in clay is extremely short (less than a millisecond) and thus prohibits high-resolution imaging; by scanning at lower field strengths however, the signal decays much slower (few milliseconds), permitting 2D and 3D studies. The X-Centric pulse sequence boasts short acquisition windows and a short echo-time, minimizing image blurring from this signal decay; by accelerating this sequence, real-time 3D imaging of water penetration in clay is also possible.

My second focus concerns hyperpolarized xenon gas, specifically for use in lung imaging. This gas has a non-recoverable magnetization, unlike water molecules in tissues, prohibiting the use of the vast majority of commercially available pulse sequences. The SPRITE-Sectoral pulse sequence was modified to be completely frequency-encoded, significantly reducing the number of radiofrequency pulses and ensuring the non-recoverable magnetization of these gases is efficiently used and not wasted. In other works, my focus has been on developing acquisition methods for accelerated pulmonary MRI using these gases; this in turn reduces scan times and demanding breath-hold durations for patients with compromised lung function.

My current work involves imaging live bacteria in human and pig intestines. Specifically, the bacteria *Lactobacillus Crispatus* exhibits extremely fast magnetization relaxation rates, possibly due to high manganese content in these bacteria. Relaxation rates in the gut are already high, but the fast signal decay of these bacteria may provide additional contrast information for the study of the gut microbiome and probiotic use. However, the main challenge remains the same: the signal of these bacteria decays quickly, necessitating rapid acquisitions.

I intend to develop my research for a physics-based approach to pre-clinical research. Many problems and research questions arising in pre-clinical work are directly comparable to problems in other fields; for example, both the water in clay and bacteria projects share similar challenges and approaches, namely the short signal lifetime (both around 3ms). The intersection of these research questions encourages creative solutions.

Main Research Skills and Interests

- Pulse Sequence Development (Tecmag, Siemens IDEA training underway)
- MRI Reconstruction and data processing (MATLAB, Python, IDL, 3D-Slicer)
- Compressed-Sensing and accelerated imaging
- Hyperpolarized gases, ^{129}Xe (hardware, processing, protocol design, lung imaging, polarization physics)
- Pre-clinical imaging; short relaxation time MRI; UTE; Non-Cartesian acquisitions; low-field MRI; gut imaging;