

DEREK FUJIMOTO

CURRICULUM VITAE

TRIUMF

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EDUCATION

2021	University of British Columbia	Ph.D. (Physics)
2015	University of British Columbia	M.Sc. (Physics)
2013	McGill University	B.Sc. (Physics)

PROFESSIONAL EMPLOYMENT

2021–	Postdoctoral Researcher	TRIUMF
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AWARDS

- 2017 Killam Graduate Teaching Assistant Award.
- 2015 Stuart Blussom Quantum Matter Institute QuEST Fellowship.

REFEREED PUBLICATIONS

- 2024 M. Zhao, R. Mammei, D. Fujimoto, “QuSpin Zero-Field Magnetometer Characterization for the TUCAN Experiment”, *Meas. Sci. Technol.*, **36**, 015113 (2024).
- 2024 T. Higuchi, H. Akatsuka, A. Brossard, D. Fujimoto, *et al*, “Polarized Cold-neutron Reflectometry at JRR-3/MINE2 for the Development of Ultracold-neutron Spin Analyzers for a Neutron EDM Experiment at TRIUMF”, *J. Phys. Soc. Jpn.*, **93**, 091009 (2024).
- 2024 E. Thoeng, M. Asaduzzaman, P. Kolb, R. M. L. McFadden, G. D. Morris, J. O. Ticknor, S. R. Dunsiger, V. L. Karner, D. Fujimoto, *et al*, “Depth-resolved characterization of Meissner screening breakdown in surface treated niobium”, *Sci. Rep.*, **14**, 21487 (2024).
- 2023 D. Fujimoto, V. L. Karner, M. H. Dehn, *et al*, “Near-surface dynamics of the ionic liquid EMIM-Ac above and below the glass transition”, *J. Phys. Conf. Ser.*, **2462**, 1, 012051 (2023).
- 2023 D. Fujimoto, O. Brazil, W. C. Oliver, *et al*, “ ^8Li Spin Relaxation as a Probe of the Modification of Molecular Dynamics by Inelastic Deformation of Glassy Polystyrene”, *J. Phys. Conf. Ser.*, **2462**, 1, 012053 (2023).
- 2023 J. O. Ticknor, J. Adelman, A. Chatzichristos, M. H. Dehn, L. Egoriti, D. Fujimoto, *et al*, “Ion-Implanted ^8Li Nuclear Magnetic Resonance in Highly Oriented Pyrolytic Graphite”, *Phys. Rev. B*, **108**, 195437 (2023).
- 2023 W. A. MacFarlane, D. Fujimoto, R. M. L. McFadden, “Inverse Laplace Transform Approaches to βNMR Relaxation”, *J. Phys. Conf. Ser.*, **2462**, 1, 012015 (2023).

- 2023 V. L. Karner, A. Chatzichristos, D. Fujimoto, *et al*, “Effects of the rhombohedral distortion in LaAlO_3 on the quadrupolar splitting of the implanted $^8\text{Li}^+$ NMR”, *J. Phys. Conf. Ser.*, **2462**, 1, 012058 (2023).
- 2023 W. A. MacFarlane, M. Oudah, R. M. L. McFadden, D. Huang, A. C. Chatzichristos, D. Fujimoto, *et al*, “ ^8Li β NMR studies of Epitaxial Thin Films of the 3D topological Dirac semimetal Sr_3SnO ”, *J. Phys. Conf. Ser.*, **2462**, 1, 012057 (2023).
- 2023 W. A. MacFarlane, J. K. Shenton, Z. Salman, A. Chatzichristos, D. L. Cortie, M. Dehn, D. Fujimoto, *et al*, “The Site and High Field β NMR Properties of $^8\text{Li}^+$ Implanted in $\alpha\text{-Al}_2\text{O}_3$ ”, *J. Phys. Conf. Ser.*, **2462**, 1, 012009 (2023).
- 2023 E. Thoeng, R. M. L. McFadden, S. Saminathan, G. D. Morris, P. Kolb, B. Matheson, M. Asaduzzaman, R. Baartman, S. Dunsiger, D. Fujimoto, *et al*, “A New High Parallel-Field Spectrometer at TRIUMF’s β -NMR Facility”, *Rev. Sci. Instrum.*, **94**, 023305 (2023).
- 2023 R. Matsumiya, H. Akatsuka, C. P. Bidinosti, C. A. Davis, B. Franke, D. Fujimoto, (et al), “The Precision nEDM Measurement with UltraCold Neutrons at TRIUMF”, *JPS Conf. Proc.*, **37**, 020701 (2023).
- 2022 R. M. L. McFadden, D. Szunyogh, N. Bravo-Frank, A. Chatzichristos, M. H. Dehn, D. Fujimoto, *et al*, “Magnesium(II)-ATP Complexes in 1-Ethyl-3-Methylimidazolium Acetate Solutions Characterized by ^{31}Mg β -Radiation-Detected NMR Spectroscopy”, *Angew. Chem. Int. Ed.*, **61**, 35, e202207137 (2022).
- 2022 J. R. Adelman, D. Fujimoto, *et al*, “Nuclear magnetic resonance of ^8Li ions implanted in ZnO ”, *Phys. Rev. B*, **106**, 035205 (2022).
- 2022 Y. Komatsu, R. Shimizu, R. Sato, M. Wilde, K. Nishio, T. Katase, D. Matsumura, H. Saitoh, M. Miyauchi, J. R. Adelman, R. M. L. McFadden, D. Fujimoto, *et al*, “Repeatable Photoinduced Insulator-to-Metal Transition in Yttrium Oxyhydride Epitaxial Thin Films”, *Chem. Mat.*, **34**, 8, 3616–3623 (2022).
- 2022 I. McKenzie, D. Fujimoto, *et al*, “A β -NMR study of the depth, temperature, and molecular-weight dependence of secondary dynamics in polystyrene: Entropy–enthalpy compensation and dynamic gradients near the free surface”, *J. Chem. Phys.*, **156**, 8, 084903 (2022).
- 2021 D. Fujimoto, “bfit: A Python Application For Beta-Detected NMR”, *J. Open Source Softw.*, **6**, 65 (2021).
- 2021 V. L. Karner, A. Chatzichristos, D. L. Cortie, D. Fujimoto, *et al*, “Evolution of the metallic state in $\text{LaNiO}_3/\text{LaAlO}_3$ superlattices measured by ^8Li β -detected NMR”, *Phys. Rev. B*, **104**, 20, 205114 (2021).
- 2020 D. Fujimoto, W. A. MacFarlane, J. Rottler, “Energy barriers and cooperative motion at the surface of freestanding glassy polystyrene films”, *J. Chem. Phys.*, **153**, 15, 154901 (2020).
- 2020 R. M. L. McFadden, A. Chatzichristos, D. L. Cortie, D. Fujimoto, *et al*, “Local electronic and magnetic properties of the doped topological insulators $\text{Bi}_2\text{Se}_3\text{:Ca}$ and $\text{Bi}_2\text{Te}_3\text{:Mn}$ investigated using ion-implanted ^8Li β -NMR”, *Phys. Rev. B*, **102**, 235206 (2020).

- 2020 J. O. Ticknor, I. Umegaki, R. M. L. McFadden, V. L. Karner, A. Chatzichristos, D. Fujimoto, *et al*, “Investigation of Ionic and Anomalous Magnetic Behavior in CrSe₂ Using ⁸Li β -NMR”, *RSC Adv.*, **10**, 8190–8197 (2020).
- 2019 D. Fujimoto, R. M. L. McFadden, *et al*, “The dynamics of liquid 1-ethyl-3-methylimidazolium acetate measured with implanted-ion ⁸Li β -NMR”, *Chem. Mat.*, **31**, 22, 9346–9353 (2019).
(16 authors)
- 2019 R. M. L. McFadden, A. Chatzichristos, K. H. Chow, D. L. Cortie, M. H. Dehn, D. Fujimoto, *et al*, “Ionic and electronic properties of the topological insulator Bi₂Te₂Se investigated via β -detected nuclear magnetic relaxation and resonance of ⁸Li”, *Phys. Rev. B*, **99**, 125201 (2019).
- 2019 V. L. Karner, A. Chatzichristos, D. L. Cortie, M. H. Dehn, O. Foyevtsov, K. Foyevtsova, D. Fujimoto, *et al*, “Local Metallic and Structural Properties of the Strongly Correlated Metal LaNiO₃ using ⁸Li β -NMR”, *Phys. Rev. B*, **100**, 16, 165109 (2019).
- 2019 A. Chatzichristos, R. M. L. McFadden, M. H. Dehn, S. R. Dunsiger, D. Fujimoto, *et al*, “Bi-Arrhenius diffusion and surface trapping of ⁸Li⁺ in rutile TiO₂”, *Phys. Rev. Lett.*, **123**, 9, 095901 (2019).
- 2018 D. M. Szunyogh, R. M. L. McFadden, V. L. Karner, A. Chatzichristos, T. D. Goodacre, M. H. Dehn, L. Formenti, D. Fujimoto, *et al*, “Direct observation of Mg²⁺ complexes in ionic liquid solutions by ³¹Mg β -NMR spectroscopy”, *Dalt. Trans.*, **47**, 41, 14431–14435 (2018).
- 2018 I. McKenzie, Y. Chai, D. L. Cortie, J. A. Forrest, D. Fujimoto, *et al*, “Direct measurements of the temperature, depth and processing dependence of phenyl ring dynamics in polystyrene thin films by β -detected NMR”, *Soft Matter*, **14**, 36, 7291–7544 (2018).
- 2018 R. M. L. McFadden, A. Chatzichristos, M. H. Dehn, D. Fujimoto, *et al*, “On the Use of ³¹Mg for β -Detected NMR Studies of Solids”, *JPS Conf. Proc.*, **21**, 011047 (2018).
- 2018 V. L. Karner, R. M. L. McFadden, M. H. Dehn, D. Fujimoto, *et al*, “Beta-Detected NMR of LSAT and YSZ”, *JPS Conf. Proc.*, **21**, 011024 (2018).
- 2016 D. Fujimoto, C. Hearty, “Characterization of the aging and excess noise of a Hamamatsu fine mesh photopentode.”, *Nucl. Instrum. Methods Phys. Res. Sect. A*, **823**, 149–155 (2016).

CONFERENCE PRESENTATIONS

- 2023 nEDM2023 - The 5th Workshop on Searches for a Neutron Electric Dipole Moment
“Overview and Status of the TUCAN EDM Experiment” (Oral)
- 2023 New physics searches at the precision frontier (INT-23-1b)
“Progress and Goals of the TRIUMF nEDM Measurement” (Oral)
- 2023 Winter Nuclear & Particle Physics Conference 2023
“An Introduction to the TUCAN EDM Measurement” (Oral)

- 2022 15th International Conference on Muon Spin Rotation Relaxation and Resonance
“First depth-resolved beta-NMR measurements of 1-ethyl-3-methylimidazolium acetate” (Oral)
- 2022 15th International Conference on Muon Spin Rotation Relaxation and Resonance
“Near-surface dynamics of 1-ethyl-3-methylimidazolium acetate above and below the glass transition” (Poster)
- 2022 15th International Conference on Muon Spin Rotation Relaxation and Resonance
“ ^8Li spin relaxation as a probe of the modification of molecular dynamics by inelastic deformation of glassy polystyrene” (Poster)
- 2022 15th International Conference on Muon Spin Rotation Relaxation and Resonance
“Inverse Laplace transform approaches to β NMR relaxation” (Poster)
- 2020 American Physical Society March Meeting (virtual session)
“Ionic liquid dynamics measured with implanted-ion β -NMR” (Oral)
- 2020 American Physical Society March Meeting (COVID cancelled)
“Surface and bulk dynamics of compressed polystyrene films: A β -NMR study” (Poster)
- 2018 American Physical Society March Meeting
“Molecular Dynamics of Polystyrene Films: Comparison Between Atomistic Simulations and beta-NMR Measurements” (Oral)
- 2017 The 14th International Conference on Muon Spin Rotation, Relaxation and Resonance
“ β NMR studies of Enhanced Dynamics in Polymer Thin Films” (Oral)
- 2017 The 14th International Conference on Muon Spin Rotation, Relaxation and Resonance
“Spin-lattice relaxation in β NMR through molecular dynamics” (Poster)
- 2015 The 21st Belle II General Meeting
“Hamamatsu Photopentode Excess Noise Factor” (Oral)
- 2015 16th Annual Meeting of the APS Northwest Section
“A Belle II Custom Photomultiplier Tube” (Oral)

TEACHING

2019	Instructor	Enriched Experimental Physics
2016–18	Instructor	Enriched Physics I Laboratory
2016–17	Instructor	Experimental Physics Lab
2016–18	Head Teaching Assistant	Experimental Physics Lab
2015, 19	Head Teaching Assistant	Enriched Experimental Physics
2014–18	Head Teaching Assistant	Enriched Physics I Laboratory
2016–17	Teaching Assistant	Experimental Physics Lab
2014–15, 19	Teaching Assistant	Enriched Experimental Physics
2013–18	Teaching Assistant	Enriched Physics I Laboratory

SUPERVISED STUDENTS

- 2024 M. Zhao, Undergraduate Coop.
UBC Department of Physics and Astronomy
- 2023 A. Sankaran, Undergraduate Coop.
UBC Department of Mechanical Engineering
- 2023 P. Luers, Undergraduate Coop.
UBC Department of Physics and Astronomy
- 2023 T. Peterson, Undergraduate Coop.
UNBC Department of Physics
- 2023 P. Berard, Undergraduate Coop.
UBC Department of Mechanical Engineering
- 2022 R. Curtis, Undergraduate Coop.
UBC Department of Physics and Astronomy
- 2022, 24 L. Smith, Undergraduate Coop.
UBC Department of Mechanical Engineering

COMPLEMENTARY EDUCATION

- 2023 Crane Operator Training.
TRIUMF
- 2022 Advanced Radiation Protection Training (Nuclear Energy Worker).
TRIUMF
- 2018 Instructional Skills Workshop.
UBC Centre for Teaching, Learning, and Technology
- 2014, 17–18 Creating Inclusive Classrooms.
UBC Centre for Teaching, Learning, and Technology
- 2013 TA Professional Development Workshop.
UBC Department of Physics and Astronomy

UNIVERSITY SERVICE

- 2023 WNPPC Student Poster Judge.
- 2022 WNPPC Student Presentation Judge.
- 2018 Graduate Course Load Review Committee.

RELATED WORK

- Software API for interfacing with various Siglent devices using SCPI commands.
<https://github.com/ucn-triumf/SiglentDevices>
- Software Unofficial QuSpin Zero Field Magnetometer DAQ and control API.
<https://pypi.org/project/QZFM/>
- Software β -NMR and β -NQR data fitting and visualization GUI and API.
<https://pypi.org/project/bfit/>

- Software Muon data (MUD) file reader and asymmetry calculator for β -NMR and β -NQR at TRIUMF.
<https://pypi.org/project/bdata/>
- Software Muon data (MUD) file reader for μ SR at TRIUMF.
<https://pypi.org/project/mud-py/>
- Software GUI for the viewing and comparison of CCD images taken for the β -NMR and β -NQR experiments at TRIUMF.
<https://pypi.org/project/bccd/>
- Hardware β -NMR spectrometer high-temperature upgrade.

SKILLS

- Languages English (native), French (good).
Python, L^AT_EX, Julia, Cython, MATLAB, ROOT, C++, BASH.
- Experimental Magnetic shielding, β -NMR, β -NQR, logic circuits, photomultiplier tubes, calorimetry, UHV systems, experiment & equipment design, clean room, cryogenics, ion beams.
- Computational Molecular dynamics, LAMMPS, Monte-Carlo, Gaussian DFT, curve fitting, data processing, Tkinter.
- Engineering Solidworks, 3D printing.
- Teaching Learner-centered, inquiry-based, evidence-based, Socratic questioning, course and rubric design, learning goals, creating inclusive classrooms.
- Soft Skills Leadership, organization, communication, presentations, safety.