

# DEREK FUJIMOTO

## CURRICULUM VITAE

### TRIUMF

4004 Wesbrook Mall, Vancouver, BC, V6T 2A3  
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dfujimoto@triumf.ca

### 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

- 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).  
(16 authors)
- 2023 D. Fujimoto, O. Brazil, W. C. Oliver, *et al*, “ $^8\text{Li}$  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).  
(19 authors)
- 2021 D. Fujimoto, “bfit: A Python Application For Beta-Detected NMR”, *J. Open Source Softw.*, **6**, 65 (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).
- 2019 D. Fujimoto, R. M. L. McFadden, *et al*, “The dynamics of liquid 1-ethyl-3-methylimidazolium acetate measured with implanted-ion  $^8\text{Li}$   $\beta$ -NMR”, *Chem. Mat.*, **31**, 22, 9346–9353 (2019).  
(16 authors)
- 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).
- 2023 W. A. MacFarlane, D. Fujimoto, R. M. L. McFadden, “Inverse Laplace Transform Approaches to  $\beta$ NMR 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  $\text{LaAlO}_3$  on the quadrupolar splitting of the implanted  $^8\text{Li}^+$  NMR”, *J. Phys. Conf. Ser.*, **2462**, 1, 012058 (2023).  
(11 authors)
- 2023 W. A. MacFarlane, M. Oudah R. M. L. McFadden, D. Huang, A. C. Chatzichristos, D. Fujimoto, *et al*, “ $^8\text{Li}$   $\beta$ NMR studies of Epitaxial Thin Films of the 3D topological Dirac semimetal  $\text{Sr}_3\text{SnO}$ ”, *J. Phys. Conf. Ser.*, **2462**, 1, 012057 (2023).  
(18 authors)
- 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  $\beta$ NMR Properties of  $^8\text{Li}^+$  Implanted in  $\alpha\text{-Al}_2\text{O}_3$ ”, *J. Phys. Conf. Ser.*, **2462**, 1, 012009 (2023).  
(17 authors)
- 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  $\beta$ -NMR Facility”, *Rev. Sci. Instrum.*, **94**, 023305 (2023).  
(19 authors)
- 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).  
(48 authors)
- 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  $^{31}\text{Mg}$   $\beta$ -Radiation-Detected NMR Spectroscopy”, *Angew. Chem. Int. Ed.*, **61**, 35, e202207137 (2022).  
(25 authors)
- 2022 J. R. Adelman, D. Fujimoto, *et al*, “Nuclear magnetic resonance of  $^8\text{Li}$  ions implanted in  $\text{ZnO}$ ”, *Phys. Rev. B* (2022).  
(17 authors)
- 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).  
(21 authors)
- 2022 I. McKenzie, D. Fujimoto, *et al*, “A  $\beta$ -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).  
(12 authors)
- 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  $^8\text{Li}$   $\beta$ -detected NMR”, *Phys. Rev. B*, **104**, 20, 205114 (2021).  
(16 authors)

- 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  $^8\text{Li}$   $\beta$ -NMR”, *Phys. Rev. B*, **102**, 235206 (2020).  
(16 authors)
- 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  $\text{CrSe}_2$  Using  $^8\text{Li}$   $\beta$ -NMR”, *RSC Adv.*, **10**, 8190–8197 (2020).  
(15 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  $\text{Bi}_2\text{Te}_2\text{Se}$  investigated via  $\beta$ -detected nuclear magnetic relaxation and resonance of  $^8\text{Li}$ ”, *Phys. Rev. B*, **99**, 125201 (2019).  
(19 authors)
- 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  $\text{LaNiO}_3$  using  $^8\text{Li}$   $\beta$ -NMR”, *Phys. Rev. B*, **100**, 16, 165109 (2019).  
(22 authors)
- 2019 A. Chatzichristos, R. M. L. McFadden, M. H. Dehn, S. R. Dunsiger, D. Fujimoto, *et al*, “Bi-Arrhenius diffusion and surface trapping of  $^8\text{Li}^+$  in rutile  $\text{TiO}_2$ ”, *Phys. Rev. Lett.*, **123**, 9, 095901 (2019).  
(15 authors)
- 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  $\text{Mg}^{2+}$  complexes in ionic liquid solutions by  $^{31}\text{Mg}$   $\beta$ -NMR spectroscopy”, *Dalt. Trans.*, **47**, 41, 14431–14435 (2018).  
(26 authors)
- 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  $\beta$ -detected NMR”, *Soft Matter*, **14**, 36, 7291–7544 (2018).  
(13 authors)
- 2018 R. M. L. McFadden, A. Chatzichristos, M. H. Dehn, D. Fujimoto, *et al*, “On the Use of  $^{31}\text{Mg}$  for  $\beta$ -Detected NMR Studies of Solids”, *JPS Conf. Proc.*, **21**, 011047 (2018).  
(20 authors)
- 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).  
(12 authors)

## MANUSCRIPTS IN PREPARATION

in press J. O. Ticknor, J. Adelman, A. Chatzichristos, M. H. Dehn, L. Egoriti, D. Fujimoto, *et al*, “Ion-Implanted  $^8\text{Li}$  Nuclear Magnetic Resonance in Highly Oriented Pyrolytic Graphite”, *Phys. Rev. B*, arXiv:2301.07821 (in press).  
(16 authors)

## CONFERENCE PRESENTATIONS

- 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  
“ $^8\text{Li}$  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  $\beta\text{NMR}$  relaxation” (Poster)
- 2020 American Physical Society March Meeting (virtual session)  
“Ionic liquid dynamics measured with implanted-ion  $\beta\text{-NMR}$ ” (Oral)
- 2020 American Physical Society March Meeting (COVID cancelled)  
“Surface and bulk dynamics of compressed polystyrene films: A  $\beta\text{-NMR}$  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  
“ $\beta\text{NMR}$  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  $\beta\text{NMR}$  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)

## EXPERIMENTS

- 2020– D. Fujimoto, W. A. MacFarlane, “Interfacial dynamics of ionic liquids and glasses measured with  $\beta\text{-NMR}$ ”, *TRIUMF Experiment*, **M2072**, Active (2020–).

- 2019–20 D. Fujimoto, R. F. Kiefl, W. A. MacFarlane, “Depth-resolved dynamics in polymer thin films near the glass transition using  $\beta$ NMR”, *TRIUMF Experiment*, **M1892**, Closed (2019–20).
- 2018– D. Fujimoto, G. L. W. Cross, W. A. MacFarlane, “The modification of polymer dynamics by plastic deformation studied by  $^8\text{Li}$   $\beta$ NMR”, *TRIUMF Experiment*, **M1760**, Active (2018–).
- 2021– M. Stachura, “ $\beta$ -NMR spectroscopy to explore the coordination chemistry of different Ac-based novel chelators and radiopharmaceuticals”, *TRIUMF Experiment*, **L131**, Active (2021–).
- 2021– J. O. Ticknor, W. A. MacFarlane, “Exploration of dilute-limit lithium diffusion in anion substituted molybdenum disulfide using  $\beta$ -NMR”, *TRIUMF Experiment*, **M2101**, Active (2021–).
- 2021– J. O. Ticknor, W. A. MacFarlane, “ $^8\text{Li}$  studies of  $\text{Li}^+$  ionic mobility in entropy stabilized oxides”, *TRIUMF Experiment*, **M2100**, Active (2021–).
- 2020– V. L. Karner, W. A. MacFarlane, “ $\beta$ -NMR investigation of the magnetism in  $\text{La}_2\text{CuO}_4/\text{LaNiO}_3$  superlattices”, *TRIUMF Experiment*, **M2078**, Active (2020–).
- 2022– W. A. MacFarlane, J. O. Ticknor, “*beta*-NMR study of topological surface states in superconducting  $\text{Fe}_{1+y}(\text{Te}_{1-x}\text{Se}_x)$ ”, *TRIUMF Experiment*, **M2061**, Active (2022–).
- 2021– W. A. MacFarlane, J. O. Ticknor, “Dilute-limit lithium diffusion in an inorganic solid state electrolyte thin film: Lithium lanthanum titanate”, *TRIUMF Experiment*, **M2045**, Active (2021–).
- 2020– I. McKenzie, J. A. Forrest, “Calibrating  $^8\text{Li}_+$  implantation profiles in polystyrene and studying secondary dynamics in ultra-thin polystyrene films”, *TRIUMF Experiment*, **M2038**, Active (2020–).
- 2019– C. D. P. Levy, M. Stachura, “Using  $\beta$ -NMR spectroscopy to explore the coordination chemistry of different Ac-based novel chelators and radiopharmaceuticals”, *TRIUMF Experiment*, **M1960**, Active (2019–).
- 2019– J. A. Forrest, I. McKenzie, “Transformation of ultrastable polymer glasses”, *TRIUMF Experiment*, **M1945**, Active (2019–).
- 2018–19 M. H. Dehn, R. F. Kiefl, “Strain-induced ferroelectricity in  $\text{SrTiO}_3$  thin films”, *TRIUMF Experiment*, **M1871**, Closed (2018–19).
- 2018–19 I. McKenzie, “Local dynamics of polystyrene probed by  $\mu\text{SR}$ ”, *TRIUMF Experiment*, **M1841**, Closed (2018–19).
- 2018–21 R. M. L. McFadden, H. Nakamura, W. A. MacFarlane, “ $^8\text{Li}$  betaNMR study of the Inverse Perovskite Oxide Topological Dirac Semimetals”, *TRIUMF Experiment*, **M1822**, Closed (2018–21).
- 2018–21 V. L. Karner, U. Niemann, W. A. MacFarlane, “ $^8\text{Li}$   $\beta$ NMR study of the origin of the heavy fermions in epitaxial films of  $\text{LiV}_2\text{O}_4$ ”, *TRIUMF Experiment*, **M1821**, Closed (2018–21).
- 2017–21 R. M. L. McFadden, W. A. MacFarlane, “ $\beta$ -NMR studies of lithium-ion mobility in tunnel structured materials”, *TRIUMF Experiment*, **M1771**, Closed (2017–21).

- 2017– R. M. L. McFadden, W. A. MacFarlane, “Polaronic effects in titanates studied with  $\beta$ -NMR”, *TRIUMF Experiment*, **M1770**, Active (2017–).
- 2017– R. M. L. McFadden, I. Umegaki, J. Sugiyama, W. A. MacFarlane, “ $\beta$ -NMR studies of dilute-limit lithium diffusion in van der Waals layered solids”, *TRIUMF Experiment*, **M1743**, Active (2017–).
- 2016–18 M. H. Dehn, R. F. Kiefl, “Magneto electric effects in  $\text{Cr}_2\text{O}_3$ ”, *TRIUMF Experiment*, **M1614**, Closed (2016–18).
- 2015–19 J. Sugiyama, “Li distribution in the interface between electrode and electrolyte”, *TRIUMF Experiment*, **M1490**, Closed (2015–19).
- 2015–18 I. McKenzie, “Depth-resolved measurements of dynamics in polymer thin films using spin-polarized radioactive probes”, *TRIUMF Experiment*, **M1354**, Closed (2015–18).
- 2016 W. A. MacFarlane, “ $\beta$ -NMR studies of the surface states of topological insulators”, *TRIUMF Experiment*, **M1306**, Closed (2016).

## 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

- 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. Luers, Undergraduate Coop.  
UBC Department of Physics and Astronomy
- 2023 P. Berard, Undergraduate Coop.  
UBC Department of Mechanical Engineering
- 2022 R. Curtis, Undergraduate Coop.  
UBC Department of Physics and Astronomy
- 2022 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  $\beta$ -NMR and  $\beta$ -NQR data fitting and visualization GUI and API.  
<https://pypi.org/project/bfit/>
- Software Muon data (MUD) file reader and asymmetry calculator for  $\beta$ -NMR and  $\beta$ -NQR at TRIUMF.  
<https://pypi.org/project/bdata/>
- Software Muon data (MUD) file reader for  $\mu$ SR at TRIUMF.  
<https://pypi.org/project/mud-py/>
- Software GUI for the viewing and comparison of CCD images taken for the  $\beta$ -NMR and  $\beta$ -NQR experiments at TRIUMF.  
<https://pypi.org/project/bccd/>
- Software A simple python GUI for extracting data from images of figures.  
<https://pypi.org/project/rigur/>
- Hardware  $\beta$ -NMR spectrometer high-temperature upgrade.
- Software Microsoft spreadsheet plagiarism checker.  
<https://pypi.org/project/compsheet/>

## SKILLS

- Languages English (native), French (good).  
Python, L<sup>A</sup>T<sub>E</sub>X, Julia, Cython, MATLAB, ROOT, C++, BASH, C.
- Experimental  $\beta$ -NMR,  $\beta$ -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.