

# Thomas Brunner

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## Employment

- since 2015 **McGill University**, Montreal, QC, Canada  
Associate Professor (since 2020, *parental leave March - August 2021*)  
Assistant Professor (2015 – 2020)
- 2015–2020 **TRIUMF**, Vancouver, BC, Canada  
Joint Position with McGill University
- 2011–2015 **Stanford University**, Stanford, CA, USA  
Postdoctoral Research Fellow
- 2011 **TRIUMF (TITAN group)**, Vancouver, BC, Canada  
Research Associate
- 2007–2011 **TRIUMF (TITAN group)**, Vancouver, BC, Canada  
PhD student (stationed)
- 2006–2007 **Forschungs-Neutronenquelle Heinz Maier-Leibnitz**, Munich, Germany  
Scientific employee with the positron source NEPOMUC

## Education

- 2007–2011 **Technical University Munich**, Munich, Germany, PhD *Summa Cum Laude*
- 2001–2006 **Technical University Munich**, Munich, Germany, Diplom, *Grade: 1.4*

## Leadership

- Since 2023 McGill's representative on the TRIUMF Science Council
- Since 2023 Delegate (selected in competitive process) with the [Science Meets Parliament Program](#)
- 2023 Scientific Advisory Committee, [Workshop on Xenon Detector  \$0\nu\beta\beta\$  Searches: Steps Towards the Kilotonne Scale](#)
- Since 2022 Board of Directors (Secretary), [Canadian Institute of Nuclear Physics](#)
- Since 2022 NSERC Subatomic Physics Evaluation Section, [committee member](#)
- Since 2021 Spokesperson of EXO-Canada (elected)
- Since 2021 Member of the nEXO Executive Council
- 2019 - 2021 Co-Spokesperson of EXO-Canada (elected)
- 2016-2019 Deputy Spokesperson of EXO-Canada (elected)
- 2019 - 2022 Member of the [IUPAP Neutrino Panel](#) (chair of Working Group 2: Neutrino Masses)
- Dec. 2020 Invited Panelist at the ACFI/Snowmass workshop
- 2019 - 2022 nEXO Ombudsperson (elected)
- Since 2018 nEXO Level 2 Detector System Scientist responsible for Outer Detector
- Since 2018 Liaison between nEXO and SNOLAB
- 2017 - 2019 Member of McDonald Institute Scientific Advisory Committee

- 2017 - 2019 Coordinator of McGill's Center for High Energy Physics Seminar Series
- Since 2016 Member of EXO-200 Experiment Management Team
- 2016 - 2019 Managing Canada's contribution to EXO-200 operation (\$110,000)
- Since 2015 McGill's representative at the EXO-200 and nEXO collaboration boards

## Awards and Scholarships

- 06/2020 - **Canada Research Chair in Subatomic Physics (CRC Tier 2)**  
05/2025
  - 2013 **Scholarship for participation at the 13<sup>th</sup> annual GAIN conference, San Francisco, CA, USA**
- 07/2007 – **Full PhD scholarship by the Evangelische Studienwerk e.V. Villigst**, a German promotion of excellence foundation funded by the Federal Ministry of Education and Research (BMBF) based on scientific and academic merit
  - 12/2010
  - 2007 **Full PhD scholarship, Universität Bayern e.V. Foundation, (*declined by me*)**
  - 2010 **Third prize in the Nuclear Physics A Young Scientist Award for best poster presentation at the int. conf. INPC 2010, Vancouver, BC, Canada**
  - 2010 **Project grant, German exchange office (DAAD) in support of a summer student research project: Design and test of a Bradbury-Nielsen ion gate**
- 11/2010 **Travel fellowship to present the PhD research project at the International Student Workshop on Neutrinoless Double Beta Decay at LNGS, Gran Sasso National Laboratory, Italy**
- 07/2010 **Scholarship for participation at the 24th International Nuclear Physics Conference, Vancouver, BC, Canada**
- 06/2010 **Scholarship for participation at the Joint 2010 US NSF Nuclear Physics Summer School and TRIUMF Summer Institute, Vancouver, BC, Canada**
- 03/2010 **SNOLAB Travel Fellowship to attend the SMI-10 - International Workshop on Stopping and Manipulation of Ions, Stanford, CA, USA**
- 07/2006 **Bund der Freunde der TU München e.V. travel fellowship to participate at the 14th Int. Conf. on Positron Annihilation, Hamilton, ON, Canada**

## Publication List – Thomas Brunner

Names of students and postdocs I supervised are underlined. Publications with McGill/TRIUMF affiliation are marked with  $\circ$ . Author lists with more than 10 co-authors have only the first author and the names of students under my supervision listed. Researchers must keep contributing actively to the collaborations to be included as a co-author. Authors are listed in alphabetical order for EXO-200 and nEXO publications. TITAN publications typically list the student or post doctoral fellow who led the analysis first followed by other contributing collaborators, where principal investigators are listed last. Publications of my group list the students and post doctoral fellow leading the work first (as corresponding author) followed by other contributing group members. I sign publications of my group as the last author.

### PhD Thesis

*In-Trap decay spectroscopy for  $\beta\beta$  decays*

Thomas Brunner, PhD thesis (2011), Technische Universität München

## Published Refereed Contributions

- [1] ◦ Improved high-precision mass measurements of mid-shell neon isotopes, *Nuclear Physics A* **1033**, 122636 (2023), A. Jacobs, ..., T. Brunner, ..., Z. Hockenbery, et al. (TITAN collaboration)
- [2] ◦ Generative adversarial networks for scintillation signal simulation in EXO-200, *Journal of Instrumentation* **18**, P06005 (2023) (*arXiv:2303.06311*) S. Li, ..., S. Al Kharusi, ..., T. Brunner, C. Chambers, ..., T. McElroy, ..., K. Murray, ..., T. Totev, et al. (EXO-200 collaboration)
- [3] ◦ An integrated online radioassay data storage and analytics tool for nEXO, *Nuclear Instrumentation and Methods A* **1055**, 168477 (2023) (*arXiv:2304.06180*) R. H. M. Tsang, ..., S. Al Kharusi, ..., T. Brunner, ..., C. Chambers, ..., L. Darroch, ..., C. Gingras, ..., D. Gallacher, ..., S. Majidi, ..., K. Murray, ..., S.C. Nowicki, ..., H. Rasiwala, ..., B.M. Rebeiro, ..., L. Rudolph, ..., E. Teimoori Barakoochi, ..., T. Totev, et al. (nEXO collaboration)
- [4] ◦ Search for two-neutrino double-beta decay of  $^{136}\text{Xe}$  to the  $0_1^+$  excited state of  $^{136}\text{Ba}$  with the complete EXO-200 dataset, *Chinese Physics C* **47**, 103001 (2023) (*arXiv:2303.01103*), S. Al Kharusi, ..., T. Brunner, C. Chambers, ..., T. McElroy, ..., K. Murray, ..., T. Totev, et al. (EXO-200 collaboration)
- [5] ◦ Search for MeV electron recoils from dark matter in EXO-200, *Physical Review D* **107**, 012007 (2023) (*arXiv:2207.00897*), S. Al Kharusi, ..., T. Brunner, C. Chambers, ..., T. McElroy, ..., K. Murray, ..., T. Totev, et al. (EXO-200 collaboration)
- [6] ◦ Collision-Induced Dissociation at TRIUMF's Ion Trap for Atomic and Nuclear science, *International Journal of Mass Spectrometry*, **482**, 116931 (2022) (*arXiv:2210.09889*), A. Jacobs, ..., T. Brunner, Z. Hockenbery, et al. (TITAN collaboration)
- [7] ◦ Performance of novel VUV-sensitive Silicon Photo-Multipliers for nEXO, *The European Physical Journal C*, **82**, 1125 (2022) (*arXiv:2209.07765*), G. Gallina, ..., L. Darroch, ..., T. Brunner, ..., S. Al Kharusi, ..., C. Chambers, ..., C. Gingras, ..., D. Gallacher, ..., S. Majidi, ..., K. Murray, ..., H. Rasiwala, ..., B.M. Rebeiro, ..., L. Rudolph, ..., T. Totev, et al. (nEXO collaboration)
- [8] ◦ Summit of the N=40 island of inversion: Precision mass measurements and ab initio calculations of neutron-rich chromium isotopes, *Physics Letters B*, **833**, 137288 (2022), R. Silwal, ..., T. Brunner, ..., Z. Hockenbery, et al. (TITAN collaboration)
- [9] ◦ Development of a  $^{127}\text{Xe}$  calibration source for nEXO, *Journal of Instrumentation*, **17** P07028 (2022) (*arXiv:2201.04681*), B.G. Lenardo, ..., S. Al Kharusi, ..., T. Brunner, ..., L. Darroch, ..., C. Gingras, ..., M. Medina Peregrina, ..., K. Murray, ..., H. Rasiwala, ..., T. Totev, et al. (nEXO collaboration)
- [10] ◦ Mapping the N = 40 Island of Inversion: Precision Mass Measurements of Neutron-rich Fe Isotopes, *Physical Review C*, **105**(4), L041301 (2022), W.S. Porter, ..., T. Brunner, ..., Z. Hockenbery, et al. (TITAN collaboration)
- [11] ◦ The EXO-200 detector, part II: auxiliary systems, *Journal of Instrumentation* **17**, P02015 (2022) (*arXiv:2107.06007*), N. Ackerman, ..., T. Brunner, ..., L. Darroch, ..., T. McElroy, ..., K. Murray, ..., T.I. Totev, et al (EXO-200 collaboration)
- [12] ◦ nEXO: neutrinoless double beta decay search beyond  $10^{28}$  year half-life sensitivity, *Journal of Physics G* **49**, 015104 (2022) (*arXiv:2106.16243*), G Adhikari, S Al Kharusi, ..., T. Brunner, ..., C. Chambers, ..., L. Darroch, ..., C. Gingras, ..., Y. Lan, ..., T. McElroy, ..., M. Medina Peregrina, ..., K. Murray, ..., H. Rasiwala, ..., X. Shang, ..., T.I. Totev, ..., et al. (nEXO collaboration)
- [13] ◦ Status and Perspectives of Neutrino Physics, *Progress in Particle and Nuclear Physics*, **103947** (2022) (*arXiv:2111.07586*), M.S. Athar, S.W. Barwick, T. Brunner, J. Cao, M. Danilov, K. Inoue,

- T. Kajita, M. Kowalski, M. Lindner, K.R. Long, N. Palanque-Delabrouille, W. Rodejohann, H. Schellman, K. Scholberg, S.-H. Seo, N.J.T. Smith, W. Winter, G.P. Zeller, R. Zukanovich Funchal
- [14] ◦ Characterization of a Spatially Resolved Multi-Element Laser Ablation Ion Source, *International Journal of Mass Spectrometry* 472, 116763 (2022) (arXiv:2108.10758) K. Murray, C. Chambers, D. Chen, Z. Feng, J. Fraser, Y. Ito, Y. Lan, S. Mendez, M. Medina Peregrina, H. Rasiwala, L. Richez, N. Roy, R. Simpson, J. Dilling, W. Fairbank Jr., A.A. Kwiatkowski, T. Brunner
- [15] ◦ Kiloton-scale xenon detectors for neutrinoless double beta decay and other new physics searches, *Physical Review D* 104 (2021) 112007, (arXiv:2110.01537), A. Avasthi, . . . , T. Brunner, et al.
- [16] ◦ Search for Majoron-emitting modes of  $^{136}\text{Xe}$  double beta decay with the complete EXO-200 dataset, *Physical Review D* 104, 112002 (2021) (arXiv:2109.01327) S. Al Kharusi, . . . , T. Brunner, . . . , C. Chambers, L. Darroch, C. Gingras, H. Rasiwala, Y. Lan, T. McElroy, M. Medina-Peregrina, K. Murray, T. I. Totev, et al. (nEXO collaboration)
- [17] ◦ Mass measurements of  $^{60-63}\text{Ga}$  reduce X-ray burst model uncertainties and extend the evaluated  $T = 1$  isobaric multiplet mass equation, *Physical Review C* 104, 065803 (2021) (arXiv:2111.12788), S.F. Paul, . . . , Z. Hockenbery, . . . , T. Brunner, et al. (TITAN collaboration)
- [18] ◦ Mass measurements of neutron-deficient Yb isotopes and nuclear structure at the extreme proton-rich side of the  $N = 82$  shell, *Physical Review Letters* 127, 112501 (2021), S. Beck, . . . , T. Brunner, et al. (TITAN collaboration)
- [19] ◦ Reflectivity of VUV-sensitive Silicon Photomultipliers in Liquid Xenon, *JINST* 16, P08002 (2021), arXiv:2104.07997, M. Wagenpfeil, . . . , S. Al Kharusi, T. Brunner, C. Chambers, L. Darroch, C. Gingras, H. Rasiwala, Y. Lan, T. McElroy, M. Medina-Peregrina, K. Murray, T. I. Totev, et al. (nEXO collaboration)
- [20] ◦ Examining the nuclear mass surface of Rb and Sr isotopes in  $A \approx 104$  region via precision mass measurement, *Physical Review C* 103, 044320 (2021), I. Mukul, . . . , T. Brunner, et al. (TITAN collaboration)
- [21] ◦ Event Reconstruction in a Liquid Xenon Time Projection Chamber with an Optically-Open Field Cage, *Nuclear Instruments and Methods A* 1000, 165239 (2021), arXiv:2009.10231 (2020), Stiegler, T., . . . , S. Al Kharusi, T. Brunner, L. Darroch, H. Rasiwala, Y. Lan, T. McElroy, M. Medina-Peregrina, K. Murray, T. I. Totev, et al. (nEXO collaboration)
- [22] ◦ Mass Measurements of Neutron-Rich Indium Isotopes for r-Process Studies, *Physical Review C* 103, 025811 (2021), C. Izzo, . . . , T. Brunner, et al. (TITAN collaboration)
- [23] ◦ SNEWS 2.0: A Next-Generation SuperNova Early Warning System for Multi-messenger Astronomy, *New Journal of Physics* 23, 031201 (2021) (arXiv:2011.00035), S. Al Kharusi, . . . , T. Brunner, et al. (SNEWS 2.0 collaboration)
- [24] ◦ Measurement of the Spectral Shape of the  $\beta$ -Decay of  $^{137}\text{Xe}$  to the Ground State of  $^{137}\text{Cs}$  in EXO-200 and Comparison with Theory, *Physical Review Letter* 124, 232502 (2020), S. Al Kharusi, . . . , T. Brunner, C. Chambers, L. Darroch, T. McElroy, K. Murray, T.I. Totev, et al. (EXO-200 Collaboration)
- [25] ◦ Reflectance of Silicon Photomultipliers at Vacuum Ultraviolet Wavelengths, *IEEE Transactions on Nuclear Science* 67, 2501 (2020) (arXiv:1912.01841), P. Lv, . . . , T. Brunner, S. Al Kharusi, L. Darroch, Y. Lan, T. McElroy, M. Medina-Peregrina, K. Murray, T. I. Totev, et al. (nEXO collaboration)
- [26] ◦ Measurement of the scintillation and ionization response of liquid xenon at MeV energies in the EXO-200 experiment, *Physical Review C* 101, 065501 (2020), (arXiv:1908.04128), G. Anton,

- ..., T. Brunner, L. Darroch, Y. Lan, T. McElroy, K. Murray, T. I. Totev, et al. (EXO-200 collaboration)
- [27] ◦ Measurements of electron transport in liquid and gas Xenon using a laser-driven photocathode, *Nuclear Instruments and Methods A* **972**, 163965 (2020) (*arXiv:1911.11580*), O. Njoya, ..., T. Brunner, S. Al Kharusi, L. Darroch, Y. Lan, T. McElroy, M. Medina-Peregrina, K. Murray, T. I. Totev, et al. (nEXO collaboration)
- [28] ◦ Reflectivity and PDE of VUV4 Hamamatsu SiPMs in Liquid Xenon, *Journal of Instrumentation* **15**, P01019 (2020) (*arXiv:1910.06438*), P. Nakarmi, ..., T. Brunner, S. Al Kharusi, L. Darroch, Y. Lan, T. McElroy, M. Medina-Peregrina, K. Murray, T. I. Totev, et al. (nEXO collaboration)
- [29] ◦ Search for Neutrinoless Double-Beta Decay with the Complete EXO-200 Dataset, *Physical Review Letters* **123**, 161802 (2019) (*arxiv:1906.02723*), G. Anton, ..., T. Brunner, L. Darroch, Y. Lan, T. McElroy, K. Murray, T. I. Totev, et al. (EXO-200 collaboration)
- [30] ◦ Simulation of charge readout with segmented tiles in nEXO, *Journal of Instrumentation* **14**, P09020 (2019) (*arXiv: 1907.07512*), Z. Li, ..., T. Brunner, S. Al Kharusi, L. Darroch, Y. Lan, T. McElroy, M. Medina-Peregrina, K. Murray, T. I. Totev, et al. (nEXO collaboration)
- [31] ◦ Characterization of the Hamamatsu VUV4 MPPCs for nEXO, *Nuclear Instruments and Methods A* **940**, 371 (2019), G. Gallina, ..., S. Al Kharusi, T. Brunner, L. Darroch, Y. Ito, Y. Lan, T. McElroy, M. Medina-Peregrina, K. Murray, T.I. Totev, et al. (nEXO collaboration)
- [32] ◦ Improved beam diagnostics and optimization at ISAC via TITAN's MR-TOF-MS, *Nuclear Instruments and Methods A* **463**, 431 (2020), M.P. Reiter, ..., T. Brunner, et al. (TITAN collaboration)
- [33] ◦ Mass Measurements of Neutron-Rich Gallium Isotopes Refine Production of Nuclei of the First  $r$ -Process Abundance Peak in Neutron Star Merger Calculations, *Physical Review C* **101**, 025803 (2020), M.P. Reiter, ..., T. Brunner, et al. (TITAN collaboration)
- [34] ◦ Design of a Multiple-Reflection Time-of-Flight Mass Spectrometer for Barium-tagging, *Hyperfine Interactions* **240**, 97 (2019), K. Murray, J. Dilling, R. Gornea, Y. Ito, T. Koffas, A.A. Kwiatkowski, Y. Lan, M.P. Reiter, V. Varentsov, T. Brunner, with the nEXO collaboration
- [35] ◦ Imaging individual Ba atoms in solid xenon for barium tagging in nEXO, *Nature* **569**, 203 (2019) (*arXiv:1806.10694*), C. Chambers, ..., T. Brunner, L. Darroch, D. Fudenberg, Y. Ito, Y. Lan, K. Murray, T.I. Totev, et al. (nEXO Collaboration)
- [36] ◦ Quenching of the N=32 neutron shell closure studied via precision mass measurements of neutron-rich vanadium isotopes, *Physical Review C*. **98**, 024310 (2018), M.P. Reiter, ..., T. Brunner, et al. (TITAN collaboration)
- [37] ◦ Study of Silicon Photomultiplier Performance in External Electric Fields, *Journal of Instrumentation* **13**, T09006 (2018) (*arXiv:1807.03007*), X.L. Sun, ..., T. Brunner, L. Darroch, D. Fudenberg, Y. Ito, Y. Lan, K. Murray, T.I. Totev, et al. (nEXO Collaboration)
- [38] ◦ VUV-sensitive Silicon Photomultipliers for Xenon Scintillation Light Detection in nEXO, *IEEE Transactions on Nuclear Science* **1** (2018) (*arXiv:1806.02220*), A. Jamil, ..., T. Brunner, L. Darroch, D. Fudenberg, Y. Ito, Y. Lan, K. Murray, T.I. Totev, et al. (nEXO Collaboration)
- [39] ◦ Deep Neural Networks for Energy and Position Reconstruction in EXO-200, *Journal of Instrumentation* **13**, P08023 (2018) (*arXiv:1804.09641*), S. Delaquis, ..., T. Brunner, D. Fudenberg, Y. Lan, K. Murray, et al. (EXO-200 Collaboration)
- [40] ◦ Search for nucleon decays with EXO-200, *Physical Review D* **97**, 072007 (2018) (*arxiv: 1710.07670*), J.B. Albert, ..., T. Brunner, D. Fudenberg, Y. Lan, K. Murray, et al. (EXO-200 Collaboration)

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- [42] ◦ Characterization of an Ionization Readout Tile for nEXO, *Journal of Instrumentation* *13*, P01006 (2018) (*arXiv:1710.05109v1*), M. Jewell, . . . , T. Brunner, D. Fudenberg, Y. Ito, Y. Lan, K. Murray, et al. (nEXO Collaboration)
- [43] ◦ Sensitivity and Discovery Potential of nEXO to Neutrinoless Double Beta Decay, *Physical Review C* *97*, 065503 (2018) (*arXiv: arXiv:1710.05075v1*), J.B. Albert, . . . , T. Brunner, D. Fudenberg, Y. Ito, Y. Lan, K. Murray, et al. (nEXO Collaboration)
- [44] ◦ Searches for Neutrinoless Double Beta Decay with the Upgraded EXO-200 Detector , *Physical Review Letters* *120*, 072701 (2018) (*arXiv:1707.08707*), J.B. Albert, . . . , T. Brunner, D. Fudenberg, Y. Lan, K. Murray, et al. (EXO-200 Collaboration), **Mentioned in Physics Viewpoint: The Hunt for No Neutrinos**
- [45] ◦ Trace radioactive impurities in final construction materials for EXO-200, *Nuclear Instruments and Methods A*, *871*, 169 (2017) (*arXiv:1703.10799*), D.S. Leonard, . . . , T. Brunner, D. Fudenberg, Y. Lan, K. Murray, et al. (EXO-200 Collaboration)
- [46] ◦ Searches for Double Beta Decay of  $^{134}\text{Xe}$  with EXO-200, *Physical Review D* *96*, 092001 (2017) (*arXiv:1704.05042*), J.B. Albert, . . . , T. Brunner, D. Fudenberg, Y. Lan, K. Murray, et al. (EXO-200 Collaboration)
- [47] ◦ Electroweak Decay Studies of Highly Charged Radioactive Ions with TITAN at TRIUMF, *Invited article for Atoms* *5*, 14 (2017) - special issue on “Perspectives of Atomic Physics Using Highly Charged Ions” (*arXiv:1611.06151*), K.G. Leach, I. Dillmann, R. Klawitter, E. Leistenschneider, A. Lennarz, T. Brunner, D. Frekers, C. Andreiou, A.A. Kwiatkowski, J. Dilling (TITAN)
- [48] ◦ Measurement of the Drift Velocity and Transverse Diffusion of Electrons in Liquid Xenon with the EXO-200 Detector, *Physical Review C* *95*, 025502 (2017) (*arXiv:1609.04467*), J.B. Albert, . . . , T. Brunner, D. Fudenberg et al. (EXO-200 Collaboration)
- [49] ◦ An Optimal Energy Estimator to Reduce Correlated Noise for the EXO-200 Light Readout, *Journal of Instrumentation* *11*, P07015 (2016) (*arxiv:1605.06552*), C.G. Davis, . . . , T. Brunner, et al. (EXO-200 Collaboration)
- [50] ◦ First Search for Lorentz and CPT Violation in Double Beta Decay with EXO-200, *Physical Review D* *93*, 072001 (2016) (*arxiv:1601.07266*), J.B. Albert, . . . , T. Brunner, D. Fudenberg, et al. (EXO-200 Collaboration)
- [51] ◦ Cosmogenic Backgrounds to  $0\nu\beta\beta$  in EXO-200, *Journal of Cosmology and Astroparticle Physics (JCAP)* *2016*, 029 (2016) (*arxiv:1512.06835*), J.B. Albert, . . . , T. Brunner, D. Fudenberg, et al. (EXO-200 Collaboration)
- [52] ◦ Search for  $2\nu\beta\beta$  decay of  $^{136}\text{Xe}$  to the  $0_1^+$  excited state of  $^{136}\text{Ba}$  with the EXO-200 liquid xenon detector , *Physical Review C* *93*, 035501 (2016) (*arxiv:1511.04770*), J.B. Albert, . . . , T. Brunner, et al. (EXO-200 Collaboration)
- [53] Measurements of the ion fraction and mobility of alpha and beta decay products in liquid xenon using the EXO-200 detector , *Physical Review C* *92*, 045504 (2015) (*arXiv:1506.00317*), J.B. Albert, . . . , T. Brunner, et al. (EXO-200 Collaboration)
- [54] Investigation of radioactivity-induced backgrounds in EXO-200, *Physical Review C* *92*, 015503 (2015) (*arXiv: 1503.06241*), J.B. Albert, . . . , T. Brunner, et al. (EXO-200 Collaboration)
- [55] Penning Trap Mass Measurements Utilizing Highly Charged Ions as a Path to Benchmark Isospin-Symmetry Breaking Corrections in  $^{74}\text{Rb}$ , *Physical Review C* *91*, 045504 (2015), S. Malbrunot-Ettenauer, T. Brunner, et al. (TITAN collaboration)

- [56] An RF-only ion-funnel for extraction from high-pressure gases, *International Journal of Mass Spectrometry* 379, 110 (2015), T. Brunner, D. Fudenberg, et al. (nEXO Collaboration)
- [57] The TITAN in-trap decay spectroscopy facility at TRIUMF, *Nuclear Instruments and Methods A* 780, 91 (2015), K.G. Leach, A. Grossheim, A. Lennarz, T. Brunner, et al. (TITAN collaboration)
- [58] Spectroscopy of Ba and Ba<sup>+</sup> deposits in solid xenon for barium tagging in nEXO, *Physical Review A* 91, 022505 (2015), B. Mong, . . . , T. Brunner, et al. (nEXO Collaboration)
- [59] An apparatus to manipulate and identify individual Ba ions from bulk liquid Xe, *Review of Scientific Instruments* 85, 095114 (2014), K. Twelker, . . . , T. Brunner, et al. (nEXO Collaboration)
- [60] Search for Majoron-emitting modes of double-beta decay of <sup>136</sup>Xe with EXO-200, *Physical Review D* 90, 092004 (2014), J.B. Albert, . . . , T. Brunner, et al. (EXO-200 Collaboration)
- [61] In-trap spectroscopy of charge-bred radioactive ions, *Physical Review Letters* 113, 082502 (2014), A. Lennarz, . . . , T. Brunner, et al.
- [62] Search for Majorana neutrinos with the first two years of EXO-200 data, *Nature*, 510, 229 (2014), J.B. Albert, . . . , T. Brunner, et al. (EXO-200 Collaboration)
- [63] TITAN: An ion trap facility for on-line mass measurement experiments, *Hyperfine Interactions* 225, 143 (2014), A.A. Kwiatkowski, . . . , T. Brunner, et al.
- [64] Electron-capture branching ratio measurements of odd-odd intermediate nuclei in double-beta decay at the TITAN facility, *Hyperfine Interactions* 225, 157 (2014), A. Lennarz, T. Brunner, et al.
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- [66] New determination of double- $\beta$ -decay properties in <sup>48</sup>Ca: high-precision  $Q$ -value measurement and improved nuclear matrix element calculations, *Physical Review C*, 89, 045502 (2014), A. A. Kwiatkowski, T. Brunner, et al. (TITAN collaboration)
- [67] Charge breeding rare isotopes for high precision mass measurements: challenges and opportunities, *Physica Scripta*, T156, 014098 (2013), M.C. Simon, . . . , T. Brunner, et al. (TITAN collaboration)
- [68] TITAN: an ion trap for accurate mass measurements of ms-half-life nuclides, *Applied Physics B*, 114, 99 (2014), A. Chaudhuri, . . . , T. Brunner, et al. (TITAN collaboration)
- [69] Evidence for the extinction of the N=20 neutron-shell closure for <sup>32</sup>Mg from direct mass measurements, *Physical Review C*, 88, 054317 (2013), A. Chaudhuri, . . . , T. Brunner, et al. (TITAN collaboration)
- [70] Trapped-ion decay spectroscopy and determination of ground-state components of double-beta decay matrix elements, *European Physics Journal A*, 49, 142 (2013), T. Brunner, et al. (TITAN collaboration)
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### Manuscripts Published in Refereed Conference Proceedings

- [CP1] ◦ ‘Searching for a needle in a haystack;’ A Ba-tagging approach for an upgraded nEXO experiment, *Nuclear Instrumentation and Methods B* 541, 298 (2023) , H. Rasiwala, K. Murray, Y. Lan, C. Chambers, M. Cvitan, T. Brunner, R. Collister, T. Daniels, R. Elmansali, W. Fairbank, R. Gornea, G. Gratta, T. Koffas, A.A. Kwiatkowski, K.G. Leach, A. Lennarz, C. Malbrunot, D. Ray, R. Shaikh, L. Yang, for the nEXO Ba-tagging group
- [CP2] ◦ Looking for Cherenkov light in liquid xenon with LoLX, *Nuclear Instrumentation and Methods A* 1047, 167876 (2023) , L. Galli, S. Al Kharusi, . . . , T. Brunner, . . . , C. Chambers, . . . , L. Darroch, . . . , E. Egan, . . . , D. Gallacher, . . . , T. McElroy, . . . , B.M. Rebeiro, . . . , L. Rudolph, et al.
- [CP3] ◦ Measuring the half-life of n-rich  $^{100}\text{Rb}$  with the TITAN MR-TOF-MS, *J. Phys. Conf. Ser.*, 1643, 012057 (2020), K. Leach,. . . , T. Brunner, et al. (TITAN collaboration)
- [CP4] ◦ Decay Spectroscopy Of Highly Charged Radioactive Ions With Titan At TRIUMF, *PoS INPC2016*, 097 (2017), K. Leach,. . . , T. Brunner, et al. (TITAN collaboration)
- [CP5] Low-Background In-Trap Decay Spectroscopy with TITAN at TRIUMF, *JPS Conference Proceedings* 6, 020040 (2015) (*arXiv:1411.4083v1*), K.G. Leach,. . . , T. Brunner, et al. (TITAN collaboration)
- [CP6] Precision mass measurements of short-lived nuclides for nuclear structure studies at TITAN, *European Physics Journal Web of Conferences* 66, 02030 (2014), A. Chaudhuri, . . . , T. Brunner, et al. (TITAN collaboration)
- [CP7] A setup for Ba-ion extraction from a high pressure Xe gas for double-beta decay studies with EXO, *Nuclear Instruments and Methods in Physics Research B*, 317, 473 (2013), T. Brunner, D. Fudenberg, A. Sabourov, V. Varentsov G. Gratta, D. Sinclair, for the EXO Collaboration
- [CP8] Design of a  $\beta$ -detector for TITAN-EC and the first electron-capture branching ratio measurement in a Penning trap, *Journal of Physics: Conference Series*, 312, 072006 (2011), T. Brunner, et al.
- [CP9] Precision mass measurements of neutron halo nuclei using the TITAN Penning trap, *Hyperfine Interactions*, 199, 167 (2011), M. Brodeur, T. Brunner, et al. (TITAN collaboration)
- [CP10] In-trap decay spectroscopy for  $2\nu\beta\beta$  decay experiments, *Hyperfine Interactions*, 199, 191 (2011), T. Brunner, et al.
- [CP11] Collinear laser spectroscopy with reverse-extracted bunched beams at TRIUMF, *Hyperfine Interactions*, 199, 357 (2011), E. Mané, . . . , T. Brunner, et al.
- [CP12] In-Trap Decay Spectroscopy of Radioactive Nuclei at TITAN/TRIUMF for a Determination of  $2\nu\beta\beta$  Matrix Elements, *AIP Conference Proceedings* 1182, 100 (2009), S. Ettenauer, T. Brunner, et al.
- [CP13] Electron capture branching ratio measurements in an ion trap for double beta decay experiments at TITAN, *Nuclear Instruments and Methods in Physics Research B* 266, 4643 (2008), T. Brunner, et al. (TITAN collaboration)

- [CP14] Determination of Positron Beam Parameters by Various Diagnostic Techniques, *Applied Surface Science* 255, 50 (2008), C. Hugenschmidt, T. Brunner, J. Mayer, C. Piochacz, K. Schreckenbach, and M. Stadlbauer
- [CP15] Spectrometer for the investigation of temperature dependent Ps formation and material dependent moderation efficiency, *physica status solidi (c)* 4, 3989 (2007), T. Brunner and C. Hugenschmidt
- [CP16] Positron experiments at the new positron beam facility NEPOMUC at FRM II, *physica status solidi (c)* 4, 3947 (2007), C. Hugenschmidt, T. Brunner, S. Legl, J. Mayer, C. Piochacz, M. Stadlbauer, and K. Schreckenbach

### Submitted Journal Publications Under Review

- [SP1] ◦ Simulation Study of Photon-to-Digital Converter (PDC) Timing Specifications for LoLX Experiment, *Submitted to IEEE TNS* (2023) ([arXiv:2310.18607](#)) N.V.H. Viet, . . . , S. Al Kharusi, Thomas Brunner, C. Chambers, . . . , E. Egan, D. Gallacher, T. McElroy, B. Rebeiro, L. Rudolph, et al.
- [SP2] ◦ First direct  ${}^7\text{Be}$  electron capture  $Q$ -value measurement towards high-precision BSM neutrino physics searches, *Submitted to Physical Review Letter* (2023) ([arXiv:2308.13379](#)) R. Bhandari, . . . , T. Brunner, . . . , Z. Hockenbery, et al.

### Other Journal Publications

- [JP1] ◦ Searching for  $0\nu\beta\beta$  decay in  ${}^{136}\text{Xe}$  - towards the tonne-scale and beyond, *Nuclear Physics News* 27(3), 14 (2017) (*invited article, not refereed*) ([arXiv:1704.01528](#)), Thomas Brunner, Lindley Winslow
- [JP2] Electron-capture branching ratio measurements with a Penning trap for determination of  $2\nu\beta\beta$  nuclear matrix elements, *TRIUMF progress report 2010*, T. Brunner for the TITAN-EC collaboration

### Non-Refereed Publications

- [CDR1] ◦ Fundamental Symmetries, Neutrons, and Neutrinos (FSNN): Whitepaper for the 2023 NSAC Long Range Plan, [arXiv:2304.03451](#) (2023), B. Acharya, . . . , T. Brunner, et al.
- [CDR2] ◦ Neutrinoless Double Beta Decay, [arXiv:2212.11099](#) (2022), C. Adams, . . . , T. Brunner, et al.
- [CDR3] ◦ nEXO Pre-Conceptual Design Report, [arXiv:1805.11142](#) (2018), S. Al Kharusi, . . . , T. Brunner, L. Darroch, D. Fudenberg, Y. Ito, Y. Lan, K. Murray, T. Nguyen, T.I. Totev, et al. (nEXO Collaboration)

## Invited Seminars and Colloquiums

- November 17, 2023 **Building Connections: Science Outreach in the McGill Department of Physics and Trottier Space Institute**, *Physical Society Colloquium, co-presented with 3 other members of the outreach committee*, McGill University, Montreal, Canada
- February 8, 2023 **Understanding the Universe through Neutrinos with nEXO**, *Facility for Rare Isotope Beams Seminar*, Michigan State University, Lansing, MI, USA
- November 30, 2022 **nEXO's quest to Understanding the Universe through Neutrinos**, *Physics Colloquium*, University of Texas at Arlington, Arlington, TX, USA
- June 30, 2022 **Searching for neutrinoless double beta decay with nEXO**, *Particle Physics Seminar*, Technical University Dresden, Dresden, Germany

- December 21, 2021 **Neutrinoless double beta decay and nEXO**, *TRISTAN MPP meeting*, Schloss Ringberg, Rottach-Egern, Germany
- March 3, 2020 **The hunt for Majorana neutrinos with nEXO**, *FPD Experimental Seminar*, Stanford Linear Accelerator, Menlo Park, USA
- February 6, 2020 **Understanding the Universe through Neutrinos**, *Physics Week Colloquium*, Polytechnique Montreal, Montreal, Canada
- October 17, 2019 **Fishing in a sea of Xe – Searching for ‘new physics’ with nEXO**, *Physics Colloquium*, Groningen University, Groningen, Netherlands
- October 15, 2019 **Fishing in a sea of Xe: Hunting for Majorana neutrinos with nEXO**, *Seminar on fundamental interactions and symmetries*, Austrian Academy of Sciences, Austria
- May 14, 2019 **Searching for  $0\nu\beta\beta$  with EXO-200 and nEXO**, *LPPC Seminar*, Harvard University, Cambridge, USA
- May 3, 2018 **Neutrinos and the Hunt for these Ghostly Particles**, *Physics Matters Public Lecture Series*, McGill Physics Department, Montreal, Canada
- April 12, 2018 **Fishing in a sea of Xe - Searching for double-beta decay with nEXO**, *Physics Seminar*, University of Massachusetts Lowell, Lowell, USA
- March 15, 2018 **Searching for  $0\nu\beta\beta$  with EXO-200 and nEXO**, *Physics Seminar*, Central Michigan University, Mount Pleasant, USA
- March 6, 2018 **nEXO – Searching for Neutrinoless Double-Beta Decay in  $^{136}\text{Xe}$** , *Physics Colloquium*, Colorado School of Mines, Golden, USA
- December 20, 2017 **Barium-Ion Extraction from Xenon Gas for  $^{136}\text{Xe}$   $\beta\beta$  Decay Studies with nEXO**, *Atomic Physics Seminar*, FAIR-GSI, Darmstadt, Germany
- December 5, 2017 **Searching for  $0\nu\beta\beta$  with EXO-200 and nEXO**, *Seminar*, Czech Technical University in Prague, Prague, Czech Republic
- November 3, 2017 **Barium-Ion Extraction from Xenon Gas for  $^{136}\text{Xe}$   $\beta\beta$  Decay Studies with nEXO**, *Physics Colloquium*, University of Alberta, Edmonton, Canada
- May 26, 2017 **Barium-Ion Extraction from Xenon Gas for  $^{136}\text{Xe}$   $\beta\beta$  Decay Studies with nEXO**, *Seminar*, Colorado State University, Fort Collins, USA
- November 24, 2016 **EXO - Searching for a Neutrinoless Double-Beta Decay**, *TRIUMF Colloquium*, TRIUMF, Vancouver, Canada
- November 23, 2016 **EXO - Searching for neutrinoless  $\beta\beta$  decay**, *Physics and Astronomy Colloquium*, University of Victoria, Victoria, Canada
- October 27, 2016 **Searching for neutrinoless  $\beta\beta$  decays with EXO-200 and nEXO**, *E15 Seminar*, Technical University Munich, Munich, Germany
- December 9, 2015 **Searching for neutrinoless  $\beta\beta$  decays with EXO-200 and nEXO**, *3IT Seminar*, Université de Sherbrooke, Sherbrooke, Canada
- May 8, 2015 **Fishing in a sea of Xe - Searching for double-beta decay with nEXO**, *Special Seminar*, Max Planck Institute for Nuclear Physics, Heidelberg, Germany
- May 7, 2015 **Fishing in a sea of Xe: Barium ion tagging for double-beta decay studies with nEXO**, *Particle Physics Seminar*, Universität Erlangen-Nürnberg, Germany
- March 20, 2015 **Fishing in a sea of Xe-Searching for double-beta decay with nEXO**, *Special Physics Seminar*, McGill University, Montréal, QC, Canada
- November 20, 2014 **Fishing in a sea of Xe: Barium ion tagging for double-beta decay studies with nEXO**, *Physics Department Seminar*, Carleton University, Ottawa, ON, Canada

- February 17, 2014 **Barium ion tagging for  $^{136}\text{Xe}$  double-beta decay studies with nEXO**, *Nuclear Physics Seminar*, University of Notre Dame, Notre Dame, IN, USA
- November 15, 2013 **Fishing in a sea of Xe: Barium ion tagging for  $^{136}\text{Xe}$  double-beta decay studies with EXO**, *TRIUMF Colloquium*, TRIUMF, Vancouver, BC, Canada
- October 22, 2013 **Barium-ion tagging for  $^{136}\text{Xe}$  double-beta decay studies with EXO**, *P-25 seminar*, Los Alamos National Laboratory, Los Alamos, NM, USA
- December 17, 2012 **Ba<sup>+</sup> tagging for the EXO experiment**, *LEBIT group seminar*, National Superconducting Cyclotron Laboratory, East Lansing, MI, USA
- November 1, 2011 **A trapper's tale: High precision nuclear physics measurements with trapped ions at TITAN**, *Seminar at La Plata University*, La Plata, Argentina
- July 12, 2011 **A trapper's tale: High precision nuclear physics experiments with trapped ions at TITAN**, *Seminar at CENPA, University of Washington*, Seattle, WA, USA
- June 15, 2011 **High precision nuclear physics measurements with trapped ions at TITAN**, *HEPL Seminar, Stanford University*, Stanford, CA, USA
- May 26, 2011 **From neutrinos to nuclear physics - in-trap decay spectroscopy for  $2\nu\beta\beta$  decay experiments at TITAN**, *Seminar, Simon Fraser Univ.*, Vancouver, Canada
- April 8, 2011 **High precision experiments with trapped ions at TITAN**, *Seminar, Laboratory for High Energy Physics (LHEP), University Bern*, Bern, Switzerland
- December 16, 2010 **Fundamental physics with stored ions at TITAN**, *Seminar, institute for nuclear and particle physics, Technical University Dresden*, Dresden, Germany
- April 27, 2010 **In-trap decay spectroscopy for  $2\nu\beta\beta$  decay experiments**, *PSI Seminar E12, Technical University Munich*, Munich, Germany
- March 25, 2010 **Fundamental physics with trapped ions at TITAN**, *LBL Nuclear Physics Forum*, Berkeley, CA, USA
- January 9, 2008 **Measurements of  $\beta\beta$  Decay Nuclear Matrix Elements via Electron Capture Branching Ratios at TITAN**, *E12 Seminar, Technical Univ. Munich*, Germany

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## Invited Lectures

- May 4, 2023 Invited Lecture (virtual), fifth annual Summer Student Particle (Astro) Physics Workshop, **Hunting for Majorana Neutrinos with nEXO**
- Summer 2022 Invited lecture at Exotic Beam Summer School at Notre Dame 2022, *Understanding the Universe through Neutrinos and how nuclear physics helps us understand neutrinos*
- May 11, 2022 Invited Lecture (virtual), fourth annual Summer Student Particle (Astro) Physics Workshop, **The quest to discover Majorana Neutrinos with nEXO**
- Summer 2021 Invited lecture at 2021 Exotic Beam Summer School, *declined due to parental leave*
- May 6, 2021 Invited Lecture (virtual), third annual Summer student Particle (Astro) Physics Workshop, **Hunting for Majorana Neutrinos with nEXO**
- Summer 2020 Invited lecture at 2020 Exotic Beam Summer School, *canceled due to COVID-19*

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## Conference and Workshop Organization

- 2023 **Organizer** of the 2023 nEXO summer Collaboration Meeting, Montreal, Canada
- 2023–2024 **Co-Chair**, 2024 WNPPC, Bromont Quebec, Canada
- 2022–2023 **Organizing committee**, 2023 WNPPC, Banff, Canada

- 2021-2022 **Organizing committee** 2022 WNPPC, virtual
  - 2021 **Session manager**, Emerging Technology, Int. TIPP Conf. (*declined, parental leave*)
  - 2021 **Organizer** of the nEXO Platform Layout and Loading Workshop, virtual
- 2020-2021 **Chair**, 2021 WNPPC, virtual, Canada
  - 2020 **Co-organizer** of the 2020 Subatomic Physics Summer Lecture Series, virtual
  - 2020 **LOC** for the 2020 Multi-Messenger Workshop at McGill, Montreal, Canada
- 2019-2020 **Organizing committee** for the 2020 WNPPC, Banff, Canada
  - 2019 **Co-organizer** of the 1st North-Eastern Symposium on Particle Physics, Astrophysics, Medical Imaging and Quantum Computing Instrumentation, Sherbrooke, Canada
  - 2019 **Co-organizer** of the 1st LoLX collaboration meeting, Montreal, Canada
  - 2019 **Host** of the nEXO Outer Detector workshop, Montreal, Canada
  - 2019 **Co-organizer** of the 13th int. SMI workshop, Montreal, Canada
- 2018-2019 **Organizing committee** for the 2019 WNPPC, Banff, Canada
- 2017-2018 **Organizing committee** for the 2018 WNPPC, Mont Tremblant, Canada
- 2016 **Organizing Committee** Ariel Science Workshop, TRIUMF, Vancouver

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## Committee Membership

- 2023 - Chair's Advisory Committee
  - 2023 Faculty of Science CRC 1 Candidate Selection Committee
- 2022 - Physics Outreach Committee (**Chair**)
- 2022 - 2023 Hiring committee, faculty in subatomic physics, McGill
- 2021 - 2022 Expense Management Steering Committee
  - 2019-2021 Chair's Advisory Committee
- 2020 - 2021 Physics Contingency Committee
  - Since 2020 nEXO Diversity, Equity, and Inclusion Committee (founding member)
  - 2020 Faculty of Science Fall 2020 Planning Group
  - 2020 Faculty of Science Fall 2020 Undergrad Lab Planning Group
- 2018-2020 McGill GPS Fellowships Evaluation Comm. for NSERC Vanier CGDS competition
- Since 2019 nEXO Code of Conduct committee
- 2018-2020 Electronics Engineering Support Committee (**Chair** 2019-2020)
  - 2018 Review committee of the TRIUMF undergraduate program (**Chair**)
  - 2018 Hiring committee for a electronics engineer at the McGill Physics Dpt. (**Chair**)
  - 2018 Hiring committee for a MI mechanical engineer at the McGill Physics Dpt. (**Chair**)
  - 2018 Hiring committee for a teaching lab technician at the McGill Physics Department
  - 2017 Hiring committee for an electronics eng. at the McGill Physics Department (**Chair**)
- 2016-2017 Hiring committee for cosmology position (faculty) at the McGill Physics Department
- 2015-2016 Graduate Committee at the McGill Physics Department
  - 2016 Graduate Scholarship Committee at the McGill Physics Department
- 2016 - 2020 McGill Undergraduate Curriculum Committee
  - Since 2016 McGill Undergraduate Teaching Lab Committee, **Chair** 2016-2021
  - 2018 Shared experience on getting my research started at McGill's event for new faculty

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## Outreach and Community Service (since 2015)

- 11/2023 Co-organizer of the Physics Hackathon 2023, Montreal, Canada
- 10/2023 Co-organizer of the Physics Activities at the McGill Open House 2023, Montreal, Canada
- 05/2023 Co-organizer of the Outreach Committee activities for 24-hrs of Science, Montreal, Canada
- 02/2023 Judge, Weizmann Physics Competition for 11<sup>th</sup> and 12<sup>th</sup> grade students, Montreal, Canada
- 11/2022 Co-organizer of the Physics Hackathon 2022, Montreal, Canada
- 10/2022 Co-organizer of the Physics Activities at the McGill Open House 2022, Montreal, Canada
- 10/2022 Panelist at a MGAPS event for undergraduates interested in graduate studies, Montreal, Canada
- 10/2021 Panelist at a MGAPS event for undergraduates interested in graduate studies, Montreal, Canada
- 10/2020 Panelist at MGAPS *Getting into Grad School* information event, Montreal, Canada
- 05/2020 Presentation at McGill Faculty of Science *Sun and Science* event, Montreal, Canada
- 02/2020 Judge, Weizmann Physics Competition for 11<sup>th</sup> and 12<sup>th</sup> grade students, Montreal, Canada
- 01/2020 Presentation at McGill Faculty of Science *Soup and Science* event, Montreal, Canada
- 11/2019 Panelist at CUPC career event *Applying for Grad School*, Montreal, Canada
- 11/2019 CINF representative at the CUPC career fair, Montreal, Canada
- Since 2019 Implementation and operation of Physics Makerspace with four 3D printer and a CNC router
- 10/2019 Panelist at MGAPS *Getting into Grad School* information event, Montreal, Canada
- 10/2018 Panelist at MGAPS *Getting into Grad School* information event, Montreal, Canada
- 08/2018 Panelist at *STEM brunch*, Montreal, Canada
- 2018 Guest lecture and demonstration of Franck-Hertz experiment at all girl's local high schools visit at McGill *Physics Day*, Montreal, Canada
- 04/2018 Presentation at *Physics Matters* series, Montreal, Canada
- 02/2018 Judge, Weizmann Physics Competition for 11<sup>th</sup> and 12<sup>th</sup> grade students, Montreal, Canada
- 10/2017 Panelist at MGAPS *Getting into Grad School* information event, Montreal, Canada
- 01/2016 Presentation at McGill Faculty of Science *Soup and Science* event, Montreal, Canada
- 2017 - 2019 Supervised the rebuilding of a spark chamber muon detector. The spark chamber has been presented to the public during open house days in 2017 and 2018 and a *Physics Matter* lecture in 2019.
- Since 2015 Mentor with the Evangelische Studienwerk Villigst e.V., Germany

Lab Tours I regularly open my lab for lab tours. Listed here are tours that we offered as part of larger events:

- McGill Open House 2023
- McGill Open House 2022
- Brunner Neutrino Lab open lab for Women in Science conference (2019)
- Lab tour for McGill Space Institute MEGA group (2019)
- Brunner Neutrino Lab open lab for CUPC (2019)
- Lab tour for students visiting from a local girls high school, Royal West Academy and Westmount High School (2018)