Lindsay Jane LeBlanc, PhD

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Current Positions

2025 - present **Professor**
Department of Physics, University of Alberta, Edmonton AB, Canada

2025 - 2032 **Canada Research Chair** (Tier I) in Atomic Quantum Science and Technology

2022 - present **Director**, Quantum Alberta

Past Positions & Education

2020 - 2025 **Associate Professor**
Department of Physics, University of Alberta, Edmonton AB, Canada

2013 - 2020 **Assistant Professor**
Department of Physics, University of Alberta, Edmonton AB, Canada

2014 - 2024 **Canada Research Chair** (Tier II) for Quantum Simulation with Ultracold Quantum Gases

2015 - 2019 **Fellow**, Canadian Institute for Advanced Research (CIFAR)
Quantum Materials Programme

2014 - 2017 **Strategic Chair** (Tier 3) in Hybrid Quantum Systems
Alberta Innovates – Technology Futures

2010 - 2013 **Postdoctoral Fellow**, Joint Quantum Institute, National Institute of Standards and Technology, and the University of Maryland, Gaithersburg MD, USA
Focus: Superfluid behaviour of ultracold bosonic systems in artificial gauge fields
Supervisors: Drs. Ian B. Spielman and William D. Phillips

2005 - 2010 **PhD Studies**, Department of Physics, University of Toronto, Toronto ON, Canada
PhD conferred June 2011
Thesis: “Exploring many-body physics with ultracold atoms”
Advisor: Prof. Joseph H. Thywissen

2004 - 2005 **MSc Studies**, Department of Physics, University of Toronto, Toronto ON, Canada
MSc conferred November 2005
Thesis: “Evaporative cooling in a strongly confining microchip trap”
Advisor: Prof. Joseph H. Thywissen

1999 - 2003 **BSc Studies**, University of Alberta, Edmonton, AB, Canada
BSc in Engineering Physics *with distinction* conferred June 2003
Undergraduate research advisors: Prof. James N. McMullin & Prof. Mark R. Freeman

Career interruption

Feb - Aug 2017 Maternity and parental leave of absence

Selected Awards and Honours

2024	**Outstanding Referee Award**, American Physical Society. Lifetime award, program annually recognizes about 150 of roughly 88,600 ($\sim$0.1%) currently active referees.
2023	**Graduate Mentoring Award**, Faculty of Science, University of Alberta (one per year awarded, nominations by department's graduate student body)
2011 - 2013	**NSERC (Natural Sciences and Engineering Research Council) Canada Post-doctoral Fellowship** *Federal scholarship, for post-doctoral research, $40 000/year*
2012	**Selected Participant**, 62nd Lindau Nobel Laureate Meeting (Lindau, Germany) *Selected in global competition as one of the participating young researchers*
2011	**DAMPhi Thesis Prize** (Canadian Association of Physicists, Division of Atomic and Molecular Physics and Photon Interactions) *Awarded every two years for the best doctoral thesis in atomic and molecular physics in Canada*
2004 - 2010	**Graduate school scholarships**, including: NSERC Canada Graduate Scholarship D (*Federal, $35 000/year for two years*), NSERC Canada Graduate Scholarship M (*Federal , $17 500/year for two years*), Walter C. Sumner Memorial Fellowship (*Academic Federal scholarship, master's level, $17 500/year, $6000 / year for two years*)
1999 - 2003	**Undergraduate scholarships and prizes**, including: Governor General's Silver Medal (*University of Alberta, For top academic standing, to two graduating undergraduate students*), Rt. Honourable C.D. Howe Memorial Fellowship (*University of Alberta, For top academic standing among undergraduates upon graduation, $15 000*), President's Citation (*University of Alberta, Top-tier undergraduate scholarship, $25 000, awarded to 7 students each year*, plus approx. $15 500 in other scholarships)

Publications

All trainees/HQP from the LeBlanc group are highlighted in boldface.

Submitted journal papers

S-2. **N. Milson*, A, Tashchilina*, K. Tamura, D. Florizone** and L.J. LeBlanc. Tuning Topological Charge and Gauge Field Anisotropy in a Spin-1 Synthetic Monopole. Under review. E-print available at [https://arxiv.org/abs/2603.16090] (2026).

S-1. **B. Babaei, B.D. Smith, A. Tretiakov,** A. Narayanan, L.J. LeBlanc. Microwave-optical double-resonance vector magnetometry with warm Rb atoms. Under revision at *Applied Physics Letters*. E-print available at [arxiv.org:2507.08791] (2025)

Refereed journal papers

Independent resesarch

J-17. **A. Tretiakov**, C. A. Potts, **Y. Y. Lu**, J. P Davis, L. J. LeBlanc Manipulating optical absorption and polarization using microwave control in an atomic vapour (2024). *Journal of Physics Photonics* **6**, 035007 (2024).

J-16. **L. W. Cooke, A. Tashchilina**, M. Protter, **J. Lindon, T. Ooi**, F. Marsiglio, J. Maciejko, L. J. LeBlanc. Demonstration of Floquet engineered non-Abelian geometric phase for holonomic quantum computing. *Phys. Rev. Research*. **6**, 013057 (2024).

J-15. **N. Milson, A. Tashchilina, T. Ooi, A. Czarnecka,** Z. F. Ahmad, L. J. LeBlanc. High-dimensional reinforcement learning for optimization and control of ultracold quantum gases. *Machine Learning: Science & Technology* **4**, 045057 (2023).

J-14. **B.D. Smith, B. Babaei**, A. Narayanan, L.J. LeBlanc. Microwave-to-optical conversion in a room-temperature 87Rb vapor with frequency-division multiplexing control. *Communications Physics* **6** 338 (2023).

J-13. **J. Lindon, A. Tashchilina, L. W. Cooke,** L. J. LeBlanc Complete unitary qutrit control in ultracold atoms. *Physical Review Applied* **19**, 034089 (2023).

J-12. **A. Rastogi, E. Saglamyurek, T. Hrushevskyi**, L. J. LeBlanc Superradiance-mediated photon storage for broadband quantum memory. *Physical Review Letters* **129**, 120502 (2022).

J-11. **B. D. Smith, L. W. Cooke,** L. J. LeBlanc. GPU-accelerated solutions of the nonlinear Schrödinger equation. *Comp. Phys. Comm.* **275**, 108314 (2022).

J-10. **M. Ruether**, C. A. Potts, J. P. Davis and L. J. LeBlanc. Polymer-loaded three dimensional microwave cavities for hybrid quantum systems. *Journal of Physics Communications* **5** 121001 (2021).

J-9. **E. Saglamyurek, T. Hrushevskyi, A. Rastogi, L. W. Cooke, B. D. Smith,** and L. J. LeBlanc. Storing short single-photon-level optical pulses in Bose-Einstein condensates for high-performance quantum memory. *New Journal of Physics* **23**, 043028 (2021).

J-8. **J. Maldaner**, S. Al-Sumaidae, G. J. Hornig, L. J. LeBlanc, and R. G. DeCorby. Liquid infiltration of monolithic open-access Fabry-Perot microcavities. *Applied Optics* **59** 7125-7130 (2020).

J-7. **A. Tretiakov, C. A. Potts, T. S. Lee, M. J. Thiessen**, J. P. Davis, L. J. LeBlanc. Atomic microwave-to-optical signal transduction via magnetic-field coupling in a resonant microwave cavity. *Applied Physics Letters* **116**, 164101 (2020). [Cover paper, Featured manuscript].

J-6. **E. Saglamyurek, T. Hrushevskyi, L. W. Cooke, A. Rastogi**, L. J. LeBlanc. Single-photon-level light storage in cold atoms using the Autler-Townes splitting protocol. *Physical Review Research* **1**, 022004(R) (2019).

J-5. **A. Rastogi, E. Saglamyurek, T. Hrushevskyi, S. Hubele**, L. J. LeBlanc. Discerning quantum memories based on electromagnetically-induced-transparency and Autler-Townes-splitting protocols. *Physical Review A* **100**, 012314 (2019).

J-4. **A. Tretiakov** and L. J. LeBlanc. Microwave Rabi resonances beyond the small-signal regime. *Physical Review A* **99**, 043402 (2019).

J-3. **E. Saglamyurek, T. Hrushevskyi, A. Rastogi**, K. Heshami, and L. J. LeBlanc, Coherent storage and manipulation of broadband photons via dynamically controlled Autler-Townes splitting. *Nature Photonics* **12**, 774–782 (2018).

J-2. **A. Tretiakov** and L. J. LeBlanc, Magnetic-field-mediated coupling and control in hybrid atomic-nanomechanical systems. *Physical Review A* **94**, 043802 (2016).

J-1. C. A. Potts, A. Melnyk, H. Ramp, M. H. Bitarafan, D. Vick, L. J. LeBlanc, J. P. Davis, R.G. DeCorby. Tunable open-access microcavities for on-chip cQED. *Applied Physics Letters* **108**, 041103 (2016).

Supervised research

JS-13. L. J. LeBlanc, K. Jiménez-García, R. A. Williams, M. C. Beeler, W. D. Phillips, I. B. Spielman. Gauge Matters: Observing the vortex-nucleation transition in a Bose-Einstein condensate, *New Journal of Physics* **17**, 065016 (2015).

JS-12. K. Jiménez-García, L. J. LeBlanc, R. A. Williams, M. C. Beeler, C. Qu, M. Gong, C. Zhang, I. B. Spielman. Tunable Spin-Orbit Coupling via Strong Driving in Ultracold Atom Systems, *Physical Review Letters*, **114**, 125301 (2015).

JS-11. R. A. Williams, M. C. Beeler, L. J. LeBlanc, K. Jiménez-García, and I. B. Spielman. A Raman-induced Feshbach resonance in an effectively single-component Fermi gas, *Physical Review Letters* **111**, 095301 (2013).

JS-10. L. J. LeBlanc, M. C. Beeler, K. Jiménez-García, A. R. Perry, S. Sugawa, R. A. Williams, and I. B. Spielman. Direct observation of Zitterbewegung in a BEC, *New Journal of Physics*, **15**, 073011 (2013).

JS-9. M. C. Beeler, R. A. Williams, K. Jiménez-García, L. J. LeBlanc, A. R. Perry, and I. B. Spielman. The spin Hall effect in a quantum gas, *Nature*, **498**, 201-204 (2013).

JS-8. L. J. LeBlanc, K. Jiménez-García, R. A. Williams, M. C. Beeler, A. R. Perry, W. D. Phillips, and I. B. Spielman. Observation of a superfluid Hall effect, *Proceedings of the National Academy of Sciences of the United States of America*, **109**, 10811 (2012).

JS-7. K. Jiménez-García, L. J. LeBlanc, R. A. Williams, M. C. Beeler, A. R. Perry, and I. B. Spielman. Peierls substitution in an Engineered Lattice Potential, *Physical Review Letters* **108**, 225303 (2012).

JS-6. R. A. Williams, L. J. LeBlanc, K. Jiménez-García, M. C. Beeler, A. R. Perry, W. D. Phillips, and I. B. Spielman. Synthetic Partial Waves in Ultracold Atomic Collisions, *Science* **335**, 314 (2012).

JS-5. L. J. LeBlanc, A.B. Bardon, J. McKeever, M. H. T. Extavour, J. H. Thywissen, F. Piazza, and A. Smerzi. Dynamics of a tunable superfluid junction, *Physical Review Letters* **106**, 025302 (2011).

JS-4. L. J. LeBlanc, J. H. Thywissen, A. Burkov, and A. Paramekanti. Repulsive Fermi gas in a harmonic trap: Ferromagnetism and spin textures, *Physical Review A* **80**, 013607 (2009).

JS-3. L. J. LeBlanc and J. H. Thywissen. Species-specific optical lattices, *Physical Review A* **75**, 053612 (2007).

JS-2. S. Aubin, S. Myrskog, M.H.T. Extavour, L. J. LeBlanc, D. McKay, A. Stummer, J. H. Thywissen. Rapid sympathetic cooling to Fermi degeneracy on a chip, *Nature Physics* **2**, 384-387 (2006).

JS-1. S. Aubin, M.H.T. Extavour, S. Myrskog, L.J. LeBlanc, J. Esteve, S. Singh, P. Scrutton, D. McKay, R. McKenzie, I. Leroux, A. Stummer, and J.H. Thywissen. Trapping Fermionic ^{40}K and Bosonic ^{87}Rb on a Chip. *Journal Low Temperature* Phys. **140**, 377-396 (2005).

Book chapters

Supervised research

BC-2. L. J. LeBlanc and I. B. Spielman. Bose-Einstein Condensates in Artificial Gauge Fields, *in Universal Themes of Bose-Einstein Condensation*, N. Proukakis, D. Snoke, and P. Littlewood (Eds.), Cambridge University Press (Cambridge, UK). Ch. 15, pp. 299-321 (2017).

BC-1. M. H. T. Extavour, L. J. LeBlanc, J. McKeever, A. B. Bardon, S. Aubin, S. Myrskog, T. Schumm, and J. H. Thywissen. Fermions on atom chips, *in Atom Chips*, J. Reichel, V. Vuletic, eds., (Wiley-VCH, Weinheim, Germany) pp. 365-394 (Ch. 12) (2011).

Invited commentaries

Independent research

IC-5. L. J. LeBlanc, Unleashing spontaneity in a time crystal (Perspective). *Science* **377**, 576-577 (2022).

IC-4. L. J. LeBlanc, Viewpoint: Molecules vs. magnetism: the quest for an ultracold ferromagnet *Physics*, **11**, 131, (2018).

IC-3. L. J. LeBlanc, Quantum Physics: Interactions propel a magnetic dance (News and Views), *Nature* **546**, 481–482 (2017).

IC-2. L. J. LeBlanc, Quantum Physics: Two-atom bunching (News and Views), *Nature* **520**, 36-37 (2015).

IC-1. L. J. LeBlanc, Polar exploration (News and Views), *Nature* **505**, 627-628 (2014).

White paper

Independent research

WP-1. M. Gundogan, T. Jennewein, F. Kimiaee Asadi, E. Da Ros, **E. Saglamyurek**, D. Oblak, T. Vogl, D. Rieländer, J. Sidhu, S. Grandi, L. Mazzarella, J. Wallnfer, P. Ledingham, L. LeBlanc, M. Mazzera, M. Mohageg, J. Wolters, A. Ling, M. Atatüre, H. de Riedmatten, D. Oi, C. Simon, M. Krutzik. A Case for Quantum Memories in Space, Decadal Survey on Biological and Physical Sciences Research in Space (National Academies of Sciences Engineering Medicine, 2021). Available at: aarxiv.org/abs/2111.09595.

Invited presentations

Independent research

P-79. Frontiers in Optics and Laser Science 2026, Rochester, NY. (Sept 2026)

P-78. Photonics North 2026, Quebec QC. (Jun 2026)

P-77. Photonics for Quantum 2026, Waterloo, ON. (Jun 2026)

P-76. Québec-Ontario consortium on Quantum Protocols (QUORUM) Annual Workshop, ' Strathmere, ON. (May 2026)

P-75. CAP Student Advisory Council (SAC) "Neutral-atom quantum technologies" (presented online, 26 Aug 2025)

P-74. Gordon Research Conference in Quantum Control of Light and Matter (2025) "Geometric and Dynamical Phase in Ultracold Spin-1 Ensembles: Opportunities for Novel States in Quantum Information and Quantum Simulation." Newport, RI (presented online, 04 Aug 2025)

P-73. CAP Congress 2025 "Qutrits and geometric phase via quantum control in ultracold spin-1." Saskatoon, SK (10 June 2025).

P-72. Photonics North 2025, "Using superradiance to enhance photon storage and generation in cold ensemble-based rubidium quantum memories." Ottawa, ON (20 May 2025).

P-71. Bristol Quantum Information Technologies (BQIT) Workshop 2025, "Quantum state control in ultracold spin-1 systems: Qutrits and geometric phases." Bristol, UK (30 April 2025).

P-70. Canadian Conference for Undergraduate Women* in Physics (CCUW*iP) 2025, University of Calgary. "Harnessing the light-matter interaction for quantum technologies." Calgary, AB (01 Feb 2025).

P-69. Quantum Optics and Atomic, Molecular, and Optical Physics Seminar, University of Toronto. "Quantum control over ultracold spin-1 systems: from qutrits to geometric phase." Toronto, ON (20 Jan 2025).

P-68. Photon 2024 (Institute of Physics). "Atomic quantum technologies: quantum memory and nonlinear microwave atom-optics." Swansea, UK. (05 Sept 2024).

P-67. 32nd International Materials Research Congress (IMRS), 'Harnessing the light-matter interaction for quantum control in ultracold gases." Cancun, MX (21 Aug 2024).

P-66. Photonics for Quantum 2024 (SPIE), "Efficient broadband quantum memory using ultracold atoms." Waterloo, ON (17 June 2024).

P-65. DAMOP 2024 [Division of Atomic, Molecular and Atomic Physics (of the American Physical Society)] Meeting. "Status and progress of DEI in the DAMOP community." Fort Worth, TX, USA (06 June 2024).

P-64. Photonics North 2024, "Holonomic quantum state control in ultracold atoms" Vancouver, BC (27-30 May 2024).

P-63. Canada-France Quantum Alliance (CAFQA) Workshop, "Storing and manipulating photonic signals via quantum memory in neutral atoms." Ottawa, ON (21-23 May 2024).

P-62. Center for Quantum Research and Technology (CQRT) Seminar, University of Oklahoma. "Quantum state control via light-matter interactions in cold and ultracold atoms gases: quantum memory and holonomic quantum operations." Norman, OK, USA (17 Apr 2024).

P-61. Prairie Universities Physics Seminar Series (PUPSS), University of Saskatchewan. “Light-matter interactions in cold and ultracold neutral atomic gases: Applications to quantum technologies.” Saskatoon, SK (28 Nov 2023).

P-60. SBQMI Seminar, Stuart Blusson Quantum Matter Institute, University of British Columbia “Light-matter interactions in cold and ultracold neutral atomic gases: Applications to quantum memory and holonomic quantum operations.” Vancouver, BC (26 Oct 2023).

P-59. JQI Seminar, Joint Quantum Institute, University of Maryland. “Broadband spin-wave quantum memories in cold and ultracold atomic systems.” College Park, MD, USA (25 Sept 2023).

P-58. Photonics North 2023. “Coherent, atom-mediated microwave-to-optical conversion in a warm rubidium vapour.” Montréal, QC, (13 June 2023).

P-57. Graduate Symposium Seminar, DAMOP 2023 Meeting. “Absorb, store, and reemit: Quantum memory via coherent light-matter interactions and collective atomic excitations.” Spokane, WA, USA (05 June 2023).

P-56. Photonics for Quantum 2023, Rochester, NY (05-08 June 2023) [Declined due to conflict with DAMOP]

P-55. Seminar, MIT/Harvard Center for Ultracold Atoms, Massachusetts Institute of Technology. “Quantum memory and quantum state engineering in cold and ultracold atoms.” Cambridge, MA, USA (19 April 2023).

P-54. Seminar, Centre for Quantum Information and Control, University of New Mexico. “Harnessing the atom-light interaction for quantum memory and novel quantum states.” Albuquerque, NM, USA (15 December 2022).

P-53. Physics Colloquium, University of Regina (presented online). “Quantum technologies with warm, cold, and ultracold atoms.” Regina, SK (04 November 2022).

P-52. Physics Colloquium, Boston College (presented online). “Harnessing the atom-light interaction for quantum memory and novel quantum states.” Boston, MA, USA. (19 October 2022).

P-51. Frontiers in Optics [Optica], Rochester, NY. (16-20 October 2022) [Declined due to personal conflict]

P-50. Alberta Quantum Summit, “Quantum state control for quantum computing in cold atoms.” Calgary AB. (12 October 2022).

P-49. Third Workshop on Quantum Repeaters and Networks,“Panel: Quantum Networking in Canada.” , Chicago, IL (20 Aug 2022).

P-48. International Network in Space Quantum Technologies, Workshop 1. [Declined] Glasgow, UK (03-05 Aug 2022).

P-47. DAMOP 2022 Meeting Large-bandwidth photonic storage and manipulation with cold and ultracold atoms. Orlando, FL (Jun 2022).

P-46. Photonics North 2022. “Rapid & long-lived photonic storage and manipulation with cold and ultracold atoms.” Niagara Falls, ON. (24 May 2022)

P-45. Colloquium, Institute for Laser Physics, University of Hamburg, Hamburg, Germany, (presented online). Storing and manipulating photonic signals in cold and ultracold atoms. (27 Apr 2022)

P-44. Quantum Days 2022 (Online conference, Canada-wide). “Holonomies and quantum computation with ultracold neutral atoms” (07 Feb 2022)

P-43. Physics Colloquium, Simon Fraser University, Burnaby, BC (presented online) “Quantum technology with warm, cold, and ultracold atoms” (05 Nov 2021)

P-42. Big Quantum Bio Seminar, hosted via UCLA, Los Angeles, CA (presented online) “Warm atoms and microwave cavities for quantum technologies.” (21 Oct 2021)

P-41. IQUIST (Illinois Quantum Information Science and Technology Center) Seminar, University of Illinois, Urbana-Champaign, IL (presented online) “Storing and manipulating electromagnetic systems using atoms: a cold-atom quantum memory and a room-temperature atomic radio.” (12 Oct 2021)

P-40. Quantum Fluids and Solids (QFS) 2021, Bangalore, India (presented online), “Engineering holonomies using Floquet driving in a BEC” (11 Aug 2021)

P-39. OSA (Optical Society of America) Sensing Congress, Vancouver, BC (Virtual congress), "Microwave and optical-manipulation of rubidium atoms in 3D microwave cavities" (21 July 2021).

P-38. Quantum Enabled Science & Technology (QuEST) Seminar, Theme III, hosted by Inter-University Center for Astronomy and Astrophysics (IUCAA), Pune, India (presented online) “Controlling the atom-light interaction for quantum memory and quantum computing.” (09 July 2021)

P-37. AMO Physics Colloquium, Universität Bonn (presented online), "Atom-based storage and manipulation of electromagnetic signals: a cold-atom quantum memory and a room-temperature atomic radio" (09 March 2021).

P-36. Center for Quantum Research and Technology Seminar, University of Oklahoma (presented online), "Atom-based storage and manipulation of electromagnetic signals: a cold-atom quantum memory and a room-temperature atomic radio" (05 March 2021).

P-35. Quantum Days 2021 (Online conference, Canada-wide). “Quantum Internet Canada” (12 Jan 2021)

P-34. Institute for Quantum Computing (IQC) Colloquium, University of Waterloo (presented online), "Exploring quantum technologies using ultracold quantum matter" (30 Nov 2020).

P-33. Canadian Undergraduate Physics Conference (CUPC) Keynote Talk (nationwide conference for physics undergraduates, hosted by Western University, presented online). Quantum technology with ultracold atoms. (06 Nov 2020).

P-32. RQMP (le regroupement québécois sur les matériaux de pointe) Seminar, hosted by McGill University (presented online). Atomic quantum memory and manipulation in the Autler-Townes Regime (24 Sept 2020).

P-31. CLEO (Conference on Laser Electronics and Optics) (San Jose, CA, USA; converted to live remote presentation due to COVID-19) Fast and efficient optical memory and manipulation in cold and ultracold atomic ensembles (14 May 2020).

P-30. Bristol Quantum Information Technologies Workshop (Bristol, UK; converted to live remote presentation due to COVID-19) Fast and efficient optical memory and manipulation in cold and ultracold atomic ensembles (30 April 2020).

P-29. INTRIQ (Institute Interdisciplinaire d’Information Quantique) Seminar, McGill University (Montreal, QC). Cancelled due to COVID-19 (12 April 2020).

P-28. Physics Colloquium, York University (Toronto, ON), Exploring quantum technologies using ultracold quantum matter (11 Feb 2020).

P-27. Quantum Innovators Workshop (Institute for Quantum Computing, Waterloo ON) Optical Autler-Townes quantum memory in ultracold atomic ensembles (29 Sept 2019)

P-26. 8th Conference for Quantum Information and Quantum Control (CQIQC-VIII, Toronto ON) Fast and efficient optical memory and manipulation in cold and ultracold atomic ensembles (26 August 2019)

P-25. Women in Physics Canada (WiPC) Conference, (Montréal, QC) Exploring and manipulating quantum matter using cold atoms. (26 June 2019)

P-24. Gordon Research Conference (GRC) on Atomic Physics, (Newport, RI) Spin-dependence, artificial gauge fields, and superfluidity in BECs. (13 June 2019)

P-23. Canadian Association of Physicists Congress, (Burnaby, BC) Spin-dependent superfluidity in ultracold BECs. (4 June 2019)

P-22. Photonics North, (Quebec, QC) Storing and manipulating light in a cold atomic quantum memory using Autler-Townes splitting. (21 May 2019)

P-21. Physics Colloquium / CAP Lecture Tour, Université de Montréal (Montréal, QC), The quantum playground: an ultracold atoms apparatus and the games we can play (22 Mar 2019).

P-20. Physics Colloquium / CAP Lecture Tour, Université de Sherbrooke (Sherbrooke, QC), The quantum playground: an ultracold atoms apparatus and the games we can play (20 Mar 2019).

P-19. Physics Colloquium / CAP Lecture Tour, Bishop's University (Sherbrooke, QC), The quantum playground: an ultracold atoms apparatus and the games we can play (20 Mar 2019).

P-18. Physics Colloquium / CAP Lecture Tour, Université de Laval (Québec, QC), The quantum playground: an ultracold atoms apparatus and the games we can play (19 Mar 2019).

P-17. Physics Colloquium, Michigan State University (East Lansing, MI) Storing and manipulating light for quantum memory and manipulation using Autler-Townes splitting in cold atoms. (19 Feb 2019)

P-16. Physics Seminar, Washington University in St. Louis (St. Louis, MO) Optical quantum memory and manipulation of broadband light using Autler-Townes splitting in cold atoms (17 Dec 2018)

P-15. (Keynote) Canadian Undergraduate Physics Conference (CUPC), (Edmonton, AB) In pursuit of quantum mechanics: A tale of lasers and labs and really cold atoms. (16 August 2018).

P-14. (Keynote) Quantum Alberta Workshop, (Calgary, AB) Putting the Autler-Townes effect to work for quantum memory and manipulation. (18 July 2018).

P-13. DAMOP 2018, (Fort Lauderdale, FL) Coherent storage and processing of broadband light via the Autler-Townes effect in cold Rb atoms (29 May 2018).

P-12. (Keynote) American Physical Society Northwest Section Meeting, (Penticton, BC) Mimicking spin-orbit coupling in ultracold quantum gases (14 May 2016).

P-11. Physics Colloquium, McMaster University (Hamilton, ON) Quantum simulation with spin-orbit coupling in ultracold quantum gases (9 March 2016).

P-10. Physics Colloquium, University of Guelph (Guelph, ON) Quantum simulation with spin-orbit coupling in ultracold quantum gases (8 March 2016).

P-9. Physics Colloquium, University of Northern British Columbia (Prince George, BC) Collective quantum effects in ultracold atomic gases (1 February 2016).

P-8. Institute for Quantum Science and Technology, University of Calgary (Calgary, AB) Collective quantum effects in ultracold atomic gases (19 November 2015).

P-7. Canadian Association of Physicists Congress, University of Alberta (Edmonton, AB) Engineered Spin-orbit Coupling in Ultracold Quantum Gases (16 June 2015).

P-6. Canadian Association of Physicists Lecture Tour, University of Winnipeg (Winnipeg, MB) Exploring the secrets of many-particle quantum mechanics using laser-cooled quantum gases (13 March 2015).

P-5. Canadian Association of Physicists Lecture Tour, Lakehead University (Thunder Bay, ON) Exploring the secrets of many-particle quantum mechanics using laser-cooled quantum gases (12 March 2015).

P-4. Canadian Association of Physicists Lecture Tour, University of Lethbridge (Lethbridge, AB) Exploring the secrets of many-particle quantum mechanics using laser-cooled quantum gases (29 January 2015).

P-3. Alberta Quantum-Nano Meeting 2, (Red Deer, AB) Quantum simulation in ultracold atomic gases (14 July 2014).

P-2. CIFAR Quantum Materials Meeting, (Montréal, QC) Simulating gauge fields in ultracold quantum gases (08 May 2014).

P-1. CIFAR Cold Atoms Workshop, The Banff Centre, (Banff, AB) Exploring the dynamics of ultracold systems in artificial gauge fields (20 Feb 2014).

Supervised research

PS-31. Department of Physics, College of William and Mary, (Williamsburg, VA) Engineered dispersion relationships using atom-light interactions (27 June 2013).

PS-30. Department of Physics, University of Nevada, Reno (Reno, NV) Artificial gauge fields for quantum simulation with ultracold atoms (15 March 2013).

PS-29. Focus workshop on Flat Bands: Design, Topology, and Correlations, Max Planck Institute for the Physics of Complex Systems (Dresden, Germany) Engineering dispersion relationships for ultracold atoms with Raman transitions (08 March 2013).

PS-28. Department of Physics, University of Illinois, Urbana-Champaign (Champaign, IL) Engineering dispersion relationships for ultracold atoms (04 March 2013).

PS-27. Department of Physics, University of Alberta (Edmonton, AB) Quantum emulation with ultracold atomic gases (28 February 2013).

PS-26. Department of Physics, Wellesley College (Wellesley, MA) Simulating magnetic fields with ultracold atoms (25 February 2013).

PS-25. Department of Physics, Temple University (Philadelphia, PA) Ultracold atomic gases and quantum simulation (22 February 2013).

PS-24. Department of Physics, Brown University (Providence, RI) Using ultracold atoms for quantum simulation (19 February 2013).

PS-23. Department of Physics, California State University, East Bay (Hayward, CA) Using artificial fields for quantum simulation with ultracold atoms (08 February 2013).

PS-22. Department of Physics, Washington University in St. Louis (St. Louis, MO) Quantum simulation with ultracold atoms and artificial fields (04 February 2013).

PS-21. School of Physics, Astronomy and Computational Sciences Colloquium, George Mason University (Fairfax, VA) Exploring atom-light interactions for quantum simulation (31 January 2013).

PS-20. Institute for Quantum Computing Colloquium, University of Waterloo (Waterloo, ON) Quantum simulation and artificial fields with ultracold neutral atoms (24 January 2013).

PS-19. Department of Physics, Florida International University (Miami, FL) Simulating magnetic fields with ultracold atoms (09 January 2013).

PS-18. Department of Physics, Smith College (Northampton, MA) (28 November 2012).

PS-17. Joint Quantum Institute Seminar, University of Maryland (College Park, MD) Measuring the superfluid Hall effect in a Bose-Einstein condensate (09 April 2012).

PS-16. Quantum Optics Seminar, University of Toronto (Toronto, ON) Superfluid Hall effect for a BEC in a synthetic magnetic field (25 March 2012).

PS-15. Frontiers of quantum condensed matter physics: light, matter and unusual devices out of equilibrium workshop, Graduate Centre of the City University, New York (New York, NY) The superfluid Hall effect, and other recent experiments with synthetic fields (07 March 2012).

PS-14. Institute for Quantum Information Science seminar, University of Calgary (Calgary, AB) Measuring the Hall effect for ultracold atoms in a synthetic magnetic field (26 October 2011).

PS-13. Quantum information and BEC seminar, National Institute of Standards and Technology (Gaithersburg, MD) Exploring the Hall effect in a BEC of 87Rb atoms (03 August 2011).

PS-12. Ludwig-Maximilians-Universität München (Munich, Germany) The Hall effect and other consequences of artificial gauge fields among ultracold atoms (30 June 2011).

PS-11. Technische Universität Kaiserslautern (Kaiserslautern, Germany) Studying the Hall effect and other manifestations of artificial gauge fields in ultracold atoms (28 June 2011).

PS-10. Universität Stuttgart (Stuttgart, Germany) Two experiments in the dynamics of ultracold ^{87}Rb: a tunable double well and artificial gauge fields. (27 June 2011).

PS-9. DFG Research Unit - FOR 801 International Workshop, Strong Correlations in Multiflavor Ultracold Quantum Gases, Universität Hamburg Center for Optical Quantum Technologies (Hamburg-Bahrenfeld, Germany) Transport phenomena of ultracold atoms in artificial gauge fields (23 June 2011).

PS-8. Canadian Association of Physicists Congress (St. John's, NL) Using ultracold atoms to study many-body physics (13 June 2011) (DAMOPC Thesis Prize talk).

PS-7. Workshop on Topological Matter, Princeton Center for Theoretical Sciences (Princeton, NJ) Implementing synthetic gauge fields for ultracold atoms (22 April 2011).

PS-6. University of Chicago (Chicago, IL) Population dynamics in a double-well BEC (19 May 2010).

PS-5. National Instiute for Standards and Technology (Gaithersburg, MD) Transport dynamics of a ^{87}Rb BEC in a double well potential (11 May 2010).

PS-4. Vienna University of Technology (Vienna, Austria). Schmiedmayer group seminar. Searching for many-body physics on an atom chip. (10 June 2009)

PS-3. Universität Innsbruck (Innsbruck, Austria). Grimm group seminar. Ferromagnetism and ultracold Fermi gases. (28 May 2009)

PS-2. Simon Fraser University (Burnaby, BC), Condensed matter seminar. Understanding many-body phenomena with ultracold bosons and fermions. (15 October 2007)

PS-1. York University (Toronto, ON) Student seminar. Finding Fermi: Progress towards a degenerate Fermi gas. (18 March 2005)

Contributed presentations

Independent research

C-5. DAMOP 2025 (Portland, OR) "Exploiting atomic superradiance as a mechanism for enhanced quantum memory performance." (19 June 2025). [Conference presentation]

C-4. DAMOP 2025 (Portland, OR) "Vector magnetometry using cavity-enhanced microwave-optical double resonance in an atomic vapour." (18 June 2025). [Poster presentation]

C-3. Canadian Association of Physicists (CAP) Congress (Halifax, NS) "Autler-Townes quantum memory for broadband light storage and manipulation" (13 June 2018). [Conference presentation]

C-2. Canadian Association of Physicists (CAP) Congress (Ottawa, ON) Vortex formation in spin-orbit coupled Bose-Einstein condensates (14 June 2016). [Conference presentation]

C-1. DAMOP 2014 Meeting (Madison, WI) Observing artificial-field-driven vortex nucleation in a BEC via bulk response. (04 June 2014)

Supervised research

CS-9. Joint Meeting of Division of Atomic Molecular and Optical Physics (DAMOP) Meeting of the American Physical Society (APS) and Division of Atomic Molecular and Optical Physics, Canada (DAMOPC) (Québec, QC) A direct measurement of zitterbewegung in a BEC. (04 June 2013)

CS-8. Canadian Association of Physicists (CAP) Congress (Calgary, AB) A superfluid Hall effect measured in a Bose-Einstein condensate. (14 June 2012)

CS-7. Division of Atomic Molecular and Optical Physics (DAMOP) Meeting of the American Physical Society (APS) (Anaheim, CA) Observing a superfluid Hall effect in a Bose-Einstein condensate. (06 June 2012)

CS-6. DAMOP Meeting (Atlanta, GA) Transport dynamics of a 87Rb BEC in an artificial gauge field. (17 June 2011)

CS-5. DAMOP Meeting (Houston, TX) Two-frequency population dynamics in a low-barrier double-well BEC. (28 May 2010)

CS-4. APS March Meeting (Portland, OR) Hydrodynamic to Josephson transition in a double-well BEC. (15 March 2010)

CS-3. DAMOP Meeting (State College, PA) Ferromagnetic coherence in ultracold fermions. (30 May 2008)

CS-2. CAP Congress (Saskatoon, SK) Exploring quantum statistics with ultracold neutral atoms. (19 June 2007)

CS-1. DAMOP Meeting (Calgary, AB) Species-specific optical lattices. (8 June 2007)

Media & Press

M-12. Isabelle Kirkwood. “Canadian telecom is gearing up for a quantum leap” Betakit, Canada’s Startup News & Tech Innovation, 01 August 2024. Available at https://betakit.com/canadian-telecom-is-gearing-up-for-a-quantum-leap/. [Sponsored content presented by TELUS.]

M-11. M. Harris. “Machine learning takes hassle out of cold-atom experiments” Physics World, 31 January 2024. Available at https://physicsworld.com/a/machine-learning-takes-hassle-out-of-cold-atom-experiments/.

M-10. Invited for weekly "Science column" for CBC Radio’s “Edmonton AM," broadcast live “Rare quantum computer developed in Edmonton.” (18 January 2024), available at www.cbc.ca/listen/live-radio/1-17-edmonton-am/clip/16036207-rare-quantum-computer-developed-edmonton. Also re-edited for CBC Edmonton Television news as “What can quantum computing do for you?” (broadcast 18 January 2024), available at www.cbc.ca/player/play/2301267523588

M-9. A. McPherson, “Building better quantum networks” Folio (UAlberta publication), 20 April 2023. Available at www.ualberta.ca/folio/2023/04/building-better-quantum-networks.html

M-8. *Featured in* A. McPherson, “What Quantum Computing Means for You” New Trail (University of Alberta Alumni Magazine) 19 April 2023. Available at www.ualberta.ca/newtrail/research/whats-small-and-cold-and-filled-with-promise.html

M-7. A. McPherson, “New quantum technology hub brings together Alberta’s world-leading expertise.” Folio (UAlberta publication), 09 June 2022 . Available at www.ualberta.ca/folio/2022/06/new-quantum-technology-hub-brings-together-albertas-world-leading-expertise.html

M-6. Invited expert on CBC Radio’s “Edmonton AM," broadcast live (12 February 2021), discussing ultracold matter.

M-5. *Featured in* J. Pruden “Cold is dangerous and deadly, yet it defines us. Can we embrace this winter of discontent?”, Globe and Mail, 02 January 2021. Available at www.theglobeandmail.com/canada/article-cold-is-dangerous-and-deadly-yet-it-defines-us-can-we-embrace-this/

M-4. Invited expert on BBC Radio Cambridgeshire’s "The Naked Scientists" episode "The Fifth State of Matter," broadcast live (07 June 2020) and for the weekly podcast (released 09 June 2020). Available at www.thenakedscientists.com/podcasts/naked-scientists-podcast/fifth-state-matter.

M-3. C. Lee, “Rough-and-ready quantum memory may link disparate quantum systems.” (9 November 2018) arstechnica.com/science/2018/11/rough-and-ready-quantum-memory-may-link-disparate-quantum-systems/

M-2. C. Griwkowsky, “Cool U of A physicists sought to work with coldest gas” (28 January 2017) Edmonton Journal, pA8. Available at: edmontonjournal.com/news/local-news/cool-physicists-sought-to-work-with-coldest-gas

M-1. L. J. LeBlanc. Physics is beauty, The Globe and Mail (11 June 2009)
Available at: www.theglobeandmail.com/life/facts-and-arguments/physics-is-beauty/article4278610/

Teaching experience

2013 - present **University of Alberta Department of Physics**

PHYS 146: Fluids and Waves (2021, 2022, 2023, 2024)

PHYS 292: Experiments in Physics (2015-16, 2016-17, 2018-19, 2019-20)

PHYS 294: General Physics Laboratory (2025)

PHYS 295: Experimental Physics I (2025)

PHYS 362: Optics and Lasers (2013, 2014, 2015, 2016)

PHYS 495/595: Quantum Atomic and Optical Physics (2018, 2020, 2022, 2024, 2026)

Service activities

Extra-institutional academic committees & activities

2026 - 2030	**Vice-Chair, Division of Atomic, Molecular and Optical Phyiscs (DAMOP-C)** Canadian Association of Physicists (CAP)
2025 - 2029	**Conference Co-Vice-Chair (2027) and Co-Chair (2029)**, Gordon Research Conference in Quantum Control of Light and Matter (Newport, RI)
2026	**Commitee Member** Division of Laser Science, American Physical Society Thesis Prize Adjudication
2025 - 2026	**Conference Co-Chair**, Photonics for Quantum 2026 (SPIE conference, Waterloo, ON)
2023 - 2026	**Member, National Quantum Advisory Council.** The mandate of the eleven-member Council is to provide independent, expert advice to the Deputy Minister of Innovation, Science and Economic Development Canada (ISED), and the Government of Canada more broadly, to inform the implementation of the National Quantum Strategy.
2023 - 2027	**Program Committee Member**, NSERC CREATE in Quantum Computing Program (Advisory role for UBC-based graduate training program)
2022 - 2024	**Conference Chair (2024) and Day-One Chair (2023)**, Quantum Days (Canada-wide conference for industry and academia)
2022 - present	**Committee Chair**, Diversity, Inclusion, and Equity (DEI) Committee for Division of Atomic, Molecular, and Optical Physics (DAMOP) of the American Physical Society (APS), a division with worldwide membership of over 3200 physicists.
2022- present	**Committee Member**, NSERC Alliance Quantum Evaluation Committee, reviewing applications to NSERC Quantum Alliance programs quarterly.
2021 - 2024	**Program Committee Member**, Conference on Lasers and Electro-Optics (CLEO) "FS1 (Fundamental Science 1) Subcommittee: Quantum Optics of Atoms, Molecules and Solids" (International committee)
2021 - present	**Chair (2022-3) & Committee Member (2021-2)** Virtual Atomic, Molecular, and Optical Physics (VAMOS) Seminar Series, American Physical Society (APS) Organizing and hosting biweekly online seminars in atomic, molecular, and optical physics. https://sites.google.com/stanford.edu/virtual-amo-seminar/home
2020 - present	**International Program Advisory Committee Member** for Quantum Fluids and Solids (QFS) 2021 (International committee)
2018 - present	**Steering Committee Member and Workpackage Leader**, Quantum Technologies Major Innovation Fund Project, "Quantum Computing" workpackage leader (collaborative project funded by Alberta Economic Development and Trade, now Ministry of Technology and Innovation)
2021 - present	**Editorial Board Member**, Journal of Physics Communications
2014 - present	**Director (2022-present) and Executive Committee Member (2014-2022)** of *Quantum Alberta* (quantumalberta.ca)
2019 - 2022	**Program Committee Member (2019-22) and subcommitee chair (2022-3)** for APS-DAMOP meeting (3-year term; chair for Cold Gases Subcommittee for 2021-2022)

2018 - 2022	**"Local" Organizing Committee Member**, International Conference on Atomic Physics (ICAP) 2020 (held in Toronto, ON, in 2022, postponed from 2020 due to COVID-19)
2021	**Program Committee Member**, Photonics North Conference special symposium "Quantum light-matter interactions: sensing, communications, and information processing" (International committee)
2019 - 2021	**Research and Development Working Group Member** of the *Quantum Canada* Steering Committee (National committee)
2018 - 2019	**Local Organizing Committee Member**, International Conference on Quantum Fluids and Solids (QFS) 2019 (held in Edmonton, AB)
2015 - 2016	**Secretary-Treasurer**, Division of Atomic, Molecular, and Optical Physics in Canada (DAMOPC), Canadian Association of Physicists (CAP)
2015	**Local Organizing Committee Member**, Canadian Association of Physicists (CAP) Congress 2015
ongoing	**Referee activities** **Publications:** Science, Nature, Nature Physics, Nature Communications, Scientific Reports, Physical Review X, Physical Review Letters, Physical Review A, New Journal of Physics, Applied Physics Letters, Optics Express, Optics Letters, Physica A, Journal of Physics B, National Science Review **Funding**: NSERC Discovery Grants, NSERC Alliance, Canada Research Chairs, New Frontiers Research Fund, Mitacs, National Science Foundation (USA)
ongoing	**Conference session chair**: APS March Meeting, APS DAMOP Meeting, CAP Congress, International Conference on Atomic Physics, Gordon Research Conference in Atomic Physics

Institutional activities (academic)

2025 - 2026	**Committee member**, Quantum Engineering (ECE) Faculty Search
2025 - 2026	**Committee member**, Experimental Quantum Matter (Physics) Faculty Search
2025 - 2026	**Committee member**, Quantum Horizons Alberta (Physics) Faculty Search
2025 - 2029	**Committee member**, Department of Physics Graduate Awards
2025	**Committee member**, Quantum Horizons Alberta Director Search
2023	**Committee member**, University of Alberta PetroCanada Emerging Innovator Award
2022	**Committee member**, University of Alberta Black Academic Excellence cohort hire
2021	**Chair**, Hiring committee for Canada Research Chair position in Astroparticle Physics
2020 - present	**Chair (2022-present) and Member (2020-2022)**, Department of Physics EDI committee
2021 - 2023	**Chair,** Department of Physics Graduate Recruiting Committee
2020 - 2021	**Member**, Chair Selection Committee, Department of Physics
2019 - 2022	**Faculty advisor and team member** for Department of Physics "UAP-JEDI (University of Alberta Physicists for Justice, Equity, Diversity, and Inclusion" community; lead involvement in APS-IDEA program for Department of Physics
2019 - 2020	**Member**, Hiring committee for Condensed Matter Physics Theory
2015 - 2017	**Seminar organizer**, Department of Physics Condensed Matter Seminar (one of two)

2015 - 2017	**Member** Department of Physics Undergraduate Laboratory Committee
2014 - present	Department of Physics, Graduate student recruiting activities (attending undergraduate conference career fairs, CUPC 2014, 2018, 2021 and CCUWiP 2018, 2019, 2022, CUWIP 2020)
2014 - 2016	**Co-organizer** (1/3) for "Hands-on Physics," a one-week high-school workshop
2013 - 2017	**Member** Department of Physics Outreach Committee
2013 - 2015	**Member**, Department of Physics Safety Committee, Faculty representative
2013 - 2016	**Member**, Department of Physics Graduate Admissions Committee, CMP representative

Community outreach and activities

2025	**Panelist**: IEEE Smart World Congress 2025 "Industry Day: Quantum Computing Panel" Calgary, AB (19 Aug 2025).
2024	**Panelist**: Innovation Week Calgary 2024 "Emerging Tech - Scanning the Horizons: What's Happening in Space, Quantum & AI?" Calgary, AB (20 Nov 2024).
2024	**Presenter:** Alexis First Nation School. Organized and presented six 40-minute hands-on workshops on "Light and Optics" for elementary participants in each of the school's classrooms (K-6), with team of four lab members, at the invitation of University of Alberta's Indigenous Outreach Coordinator. (Alexis Nakota Sioux First Nation, Treaty 6/AB, 14 May 2024)
2023	**Presenter:** Northern Alberta Division, American Association of Physics Teachers, Annual Workshop "Making and making use of the coldest stuff in the universe: ultracold atoms for quantum technologies" Edmonton, AB (08 Dec 2023)
2023	**Presenter:** "Women in Math: From Stories to Solutions" event, "UAlberta Department of Physics Census 2021: Overview" Edmonton, AB (31 Mar 2023)
2023	**Presenter and Panelist:** "The 2022 Nobel Prize Panel" (UAlberta Physics Colloquium), "Entanglement: the reality and the resource" Edmonton, AB (03 Feb 2023)
2022 - present	**Presenter:** High school outreach talks "Exploring Quantum Technologies with Atoms" Edmonton, AB (15 Nov 2022, 12 Dec 2022, 14 Dec 2023)
2022	**Presenter** Canadian Association of Physicists Student Advisory Committee "Physics Hour" Presentation: "Exploring Quantum Technologies with Atoms" (online event) (02 Aug 2022)
2021	**Panel member**, University of Alberta Pride Week 2021 "Perspectives and Paths of 2SLGBTQ+ Professionals in STEM" (online event) (11 Mar 2021)
2020	**Presenter:** Faculty of Science Alumni event: Science Connects Webinar: "Taking Control of the Quantum World: Developing new technologies using ultracold atoms. Public outreach talk to 150 online participants." (03 Dec 2020)
2020	**Presenter**: (Virtual) Seminar for Grade 11 & 12 physics students at St. John's Ravenscourt High School (Winnipeg, MB) "Quantum technologies with atoms" (08 Jun 2020).
2020	**Panelist**: "Parenting in Physics" Conference for Undergraduate Women in Physics (CUWIP), Washington State University (Pullman, WA: Jan 2020) **Discussion leader**: "LGBTQ+ in Physics" Conference for Undergraduate Women in Physics (CUWIP), Washington State University (Pullman, WA: Jan 2020)

2019 - present	**USchool volunteer,** Leading hands-on presentations (with group members) for school groups visiting the UofA (one or two times per semester)
2019	**Panelist**: Canadian Conference for Undergraduate Women in Physics (CCUWiP) “LGBTQ+ Roundtable” (Ottawa, ON: Jan 2019)
	Panelist: "Faire carrière dans le monde académique; perspective d’une physicienne queer” Diversity in Physics Committee, Université de Montréal (Montréal, QC: Mar 2019)
	Panelist: Université de Sherbrooke “Réalités LGBTQ+ en Sciences” (Sherbrooke, QC: Mar 2019)
2018	**Presenter:** General interest talk at “When Worlds Collide: a Festival for Readers and Writers” (Calgary, AB)
2014	**Presenter:** Community outreach: two presentations at “Nerd Nite” events (Edmonton, AB)