

Academic History

DEGREES AND EDUCATION

Institut d'Optique (France): Postdoctoral Fellow, 2000–2003

Harvard University (Cambridge): MA 1997, PhD 2000, Applied Physics

Harvey Mudd College (Claremont): BS Physics, 1994, BS Engineering, 1994

EMPLOYMENT

Current: Department of Physics, University of Toronto

·Associate Chair, Graduate Studies, July 2021 – June 2024

·Professor, July 2015 –

·Associate Professor (with tenure), July 2008 – June 2015

·Assistant Professor, January 2003 – June 2008

Massey College (4 Devonshire Place, Toronto)

·Continuing Senior Fellow, 2019 –

·Senior Fellow on Corporation, 2009 – 2019

·Associate Senior Fellow, 2004 – 2009

Former: Institut d'Optique (Orsay, France): Postdoctoral Fellow & CNRS “Poste Rouge”, 2000–03

Graduate Fellow, Harvard University (Cambridge, MA), 1994 – 2000

Research Assistant, Princeton University (Princeton, NJ), 1994

Selected Publications

Among the 60 articles published in refereed journals, ~30 have been cited 50 times or more.

“Spin Rotations in a Bose-Einstein Condensate Driven by Counterflow and Spin-independent Interactions”, D. C. Spierings, J. H. Thywissen, A. M. Steinberg, *Physical Review Letters*, **132**, 173401 (2024).

“Emergent s-wave interactions between identical fermions in quasi-one-dimensional geometries”, K. G. Jackson, C. J. Dale, J. Maki, K. G. S. Xie, B. A. Olsen, D. J. M. Ahmed-Braun, Shizhong Zhang, J. H. Thywissen *Physical Review X* **13**, 201013 (2023).

“Unitary p-wave interactions between fermions in an optical lattice”, V. Venu, P. Xu, M. Mamaev, F. Corapi, T. Bilitewski, J. P. D’Incao, C. J. Fujiwara, A. M. Rey, J. H. Thywissen, *Nature* **613**, 262-267 (2023).

“Collective p-wave orbital dynamics of ultracold fermions”, M. Mamaev, P. He, T. Bilitewski, V. Venu, J. H. Thywissen, A. M. Rey, *Physical Review Letters* **127**, 143401 (2021).

“Probing open- and closed-channel p-wave resonances”, D. J. M. Ahmed-Braun, K. G. Jackson, S. Smale, C. J. Dale, B. A. Olsen, S. J. J. M. F. Kokkelmans, P. S. Julienne, J. H. Thywissen, *Physical Review Research* **3**, 033269 (2021).

“Quantum Computation Toolbox for Decoherence-Free Qubits Using Multi-Band Alkali Atoms,” M. Mamaev, J. H. Thywissen, A. M. Rey, *Advanced Quantum Technologies* **3**, 1900132 (2020).

“Observation of a Dynamical Phase Transition in the Collective Heisenberg Model Simulated with Ultracold Fermions,” S. Smale, P. Xu, B. Olsen, K. G. Jackson, H. Sharum, S. Trotzky, J. Marino, A. M. Rey, J. H. Thywissen, *Science Advances* **5**, eaax1568 (2019).

“Conductivity Spectrum of Ultracold Atoms in an Optical Lattice,” R. Anderson, F. Wang, V. Venu, P. Xu, S. Trotzky, F. Chevy, J. H. Thywissen *Physical Review Letters* **122**, 153602 (2019).

“Observation of quantum-limited spin transport in strongly interacting two-dimensional Fermi gases,” C. Luciuk, S. Smale, F. Böttcher, H. Sharum, B. A. Olsen, S. Trotzky, T. Enss, J. H. Thywissen, *Physical Review Letters* **118**, 130405 (2017).

“Evidence for universal relations describing a gas with p-wave interactions,” C. Luciuk, S. Trotzky, S. Smale, Zhenhua Yu, Shizhong Zhang, J. H. Thywissen, *Nature Physics* **12**, 019901 (2016).

“Universal Relations for a Fermi Gas Close to a p-Wave Interaction Resonance,” Zhenhua Yu, J. H. Thywissen, Shizhong Zhang, *Physical Review Letters* **115**, 035304 (2015); **117**, 019901 (2016).

“Imaging and addressing of individual fermionic atoms in an optical lattice,” G. J. A. Edge, R. Anderson, D. Jervis, D. C. McKay, R. Day, S. Trotzky, J. H. Thywissen, *Physical Review A* **92**, 063406 (2015), as 🏆 “Editor’s Suggestion”. (Fermi gas microscopes also chosen by *Physics World* as one of the top ten breakthroughs of 2015.)

“Observation of the Leggett-Rice effect in a unitary Fermi gas,” S. Trotzky, S. Beattie, C. Luciuk, S. Smale, A. B. Bardou, T. Enss, E. Taylor, Shizhong Zhang, and J. H. Thywissen, *Physical Review Letters* **114**, 015301 (2015), as 🏆 “Editor’s Suggestion”.

“Transverse Demagnetization Dynamics of a Unitary Fermi Gas,” A. B. Bardou, S. Beattie, C. Luciuk, W. Cairncross, N. S. Cheng, D. Fine, G. J. A. Edge, E. Taylor, Shizhong Zhang, S. Trotzky, and J. H. Thywissen, *Science* **344**, 722 (2014).

INVITED SCHOLARLY PRESENTATIONS

Invited presentations include ~93 invited conference talks and ~86 university colloquia or seminars.

INVITED PRESENTATIONS AT INTERNATIONAL CONFERENCES (SELECTED)

EMMI Rapid Reaction Task Force (Heidelberg, 19 March 2024): “Caesar’s last breath”

University of Heidelberg, Seminar (18 March 2024): “Controlling and measuring dissipation at the atomic scale”

30 Years of ultracold quantum gases, (University of Hong Kong, 4 December 2023): “Orbital interactions between strongly confined fermions”

Bose-Einstein Condensation 2023 – Frontiers in Quantum Gases (Sant Feliu de Guixols, 9-15 Sept 2023): “Orbital Interactions between Strongly Confined Fermions”

DAMOP'23 – 54th Meeting of the APS Division of Atomic, Molecular, and Optical Physics (Spokane, June 2023): “Orbital Interactions between Strongly Confined Fermions”

Ultracold Atoms Japan Conference (OIST, Okinawa; 12 April 2022): “Orbital interactions in a spin-polarized Fermi gas”

Large-scale Entangled Matter (LaScEM) seminar series (7 June 2021): “p-wave interactions”

CIFAR Quantum Information Science Program Meeting (Virtual; 17 March 2021): “New approaches in ultracold quantum simulators”

Quantum Fluids and Solids (QFS2019, Edmonton, August 2019): “Quantum-limited spin transport in strongly interacting Fermi gases”

Workshop on Quantum Mixtures (Trento, July 2019): “Sum rules in the transport dynamics of interacting fermions”

KITS program for ultracold atoms (Beijing, June 2019): “p-wave interactions in 3D, 2D, and 1D”

CAP Congress (Vancouver, June 2019): “Conductivity of a perfect crystal”

CIFAR Quantum Information Science Program Meeting (Montreal, May 2019): “Quantum bounds on dissipation rates”

SEMINARS AND COLLOQUIA (SELECTED)

C. N. Yang Visiting Professorship Lecture, Chinese University of Hong Kong (December 2023)

Joint Quantum Institute (JQI) at the University of Maryland (13 November 2023)

Yale University, AMO Seminar (27 October 2023)

Harvard-MIT Centre for Ultracold Atoms (3 October 2023)

Virtual AMO Seminar, run by the American Physical Society (17 March 2023)

Colloquium of the International Centre for Theoretical Physics (São Paulo, Brazil, 15 March 2023)

Lecturer, School on Light and Cold Atoms, ICTP-SAIFR (São Paulo, 6-17 March 2023)

Cavendish Laboratories, Cambridge University (14 October 2022)

Physics Colloquium, Lehigh University (5 May 2022)

Institut d’Optique, Université Paris-Saclay (Palaiseau, 15 November 2021)

Center for Quantum Research and Technology, University of Oklahoma (5 October 2021)

Physics Colloquium & Manitoba Quantum Institute Seminar (21 October 2020)

Physics Colloquium, University of Colorado (Boulder 19 February 2020)

Professional Activities

CONFERENCE ORGANIZATION AND PROFESSIONAL SOCIETY LEADERSHIP

Chair, 27th International Conference on Atomic Physics (Toronto, July 2022)

DAMOP Executive Committee Member 2017–20, Division of Atomic, Molecular, and Optical Physics of the American Physical Society (elected position)

Co-chair, Exploring nuclear physics with ultracold atoms (ECT*, Trento, 18–22 June 2018)

Chair (2012–13) and Vice-chair (2011–12), Division of Atomic, Molecular, and Optical Physics, Canadian Association of Physics

EDITORIAL POSITIONS

Guest Editor, *European Physical Journal D*, “Quantum Optics of Light and Matter: Honouring Alain Aspect” (2022)
Editorial Board Member, *Physical Review A* (2018–2023)
Editorial Board Member, *New Journal of Physics* (2017–2019)
Guest Editor, *Journal of Physics B*, for the *Special issue on Addressing Many-body Problems with Atoms, Ions, and Molecules* (2015–17)

Honours and Fellowships

Visiting Fellow, JILA (UC Boulder), February 2020 & April 2023
CNRS Invited Researcher, Laboratoire Kastler Brossel (ENS/UPMC/CdF), March 2017
Dean’s Excellence Award, Faculty of Arts & Sciences, 2016, 2022, & 2023
Fellow of the American Physical Society, 2014
Canadian Institute for Advanced Research: Associate 2006; Scholar 2008; Fellow 2012–19
Canada Research Chair, Tier II, 2003 – 2013
Yale University: Visiting Faculty, 2013
MIT-Harvard Center for Ultracold Atoms: Visiting Scientist 2009
Dean’s Excellence Award, Faculty of Arts & Sciences, 2005
Premier’s Research Excellence Award, 2004
John Charles Polanyi Prize, 2003
Ontario Distinguished Researcher Award, 2003
Ludwig-Maximilians-Universität (München, Germany): Visiting Researcher, 2002
Fannie and John Hertz Foundation Thesis Prize, 2000
Chateaubriand Postdoctoral Fellowship, 2000, 2001
Hertz Foundation Graduate Fellowship, 1994 – 2000
American Physical Society Sigma Pi Sigma Award, 1993
American Mathematical Society Award, 1991
Honours awarded to research group members:
Dimitris N. Chorafas Foundation Award to Graham Edge, 2017
CAP DAMOPC Doctoral Thesis Prize for A. Bardon, 2015
CAP DAMPhi Doctoral Thesis Prize for L. J. LeBlanc, 2011
Centennial Thesis Prize for B. Shuve, 2007
NSERC graduate scholarship awards to 12 group members
CQIQC Prize postdoctoral fellowships to 3 group members