

EDUCATION

BSc (Honours Physics)	1977 – 1981	University of Alberta	Edmonton, Alberta
MSc (Physics)	1981 – 1984	Cornell University	Ithaca, New York
PhD (Physics)	1984 – 1988	Cornell University	Ithaca, New York
Thesis Title: <i>Size Effects in ³He Films</i> , Supervisor: Robert C Richardson (1996 Nobel Laureate)			

WORK EXPERIENCE

Postdoctoral Fellow	1988 – 1990	IBM Research Division	Yorktown Heights, NY
Research Staff Member, Physical Sciences	1990 – 1994	IBM Research Division	Yorktown Heights
Associate Professor of Physics	1994 – 1999	University of Alberta	Edmonton, AB
Professor of Physics	1999 – 2001	University of Alberta	Edmonton
CIFAR Associate/Fellow	1999-2006/13	Cdn. Inst. for Adv. Res.	Toronto ON
iCORE Professor	2001 – 2010	informatics Circ. Res.	Calgary AB
Canada Research Chair in Condensed Matter Physics	2001 – present	University of Alberta	Edmonton
Principal Research Officer (sabbatical)	2004 – 2005	National Institute for Nanotechnology	Edmonton
Visiting Associate in Physics (sabbatical)	2005	California Institute of Technology	Pasadena CA
Group Leader	2011 – 2014	National Institute for Nanotechnology	Edmonton
Principal Research Officer	2006 – present	National Institute for Nanotechnology	Edmonton

AWARDS AND DISTINCTIONS

1981	Lieutenant-Governor's Gold Medal, University of Alberta
1981-1983	AD White Fellowship (Cornell University)
1981-1985	NSERC Postgraduate Scholarship (Canada)
1984-1986	Sir James Lougheed Award (Province of Alberta)
1992	Invention Achievement Award (IBM)
1998	Faculty of Science Research Award (University of Alberta)
1998	(Inaugural) Martha Cook Piper Research Prize (University of Alberta)
1999-2001	EWR Steacie Memorial Fellow (NSERC)

1999	CIFAR Associate (Nanoelectronics program)
2001-2010	iCORE Professor (renewed 2006)
2001-2022	Canada Research Chair (renewed 2008, 2015)
2002	University of Alberta Alumni Association Honour Award
2006-2013	CIFAR Fellow (Nanoelectronics program)
2015	APS Fellow

RESEARCH INTERESTS AND SIGNIFICANT RESEARCH CONTRIBUTIONS

Experimental condensed matter physics and materials science, with a focus on mesoscopic properties of geometrically-confined systems (spatial extent restricted on physically relevant length scales, in one or more dimensions). Equal emphases on the development of experiment methods (laser, scanning probe microscopy, cryogenic, and nanofabrication) and on the application of new methods to the elucidation of physics questions. Magnetic properties of matter, especially spin dynamics, are topical a thread connecting most of the research across the decades.

Nanomagnetism ‘lab on a chip’. A) "Nanocavity optomechanical torque magnetometry and radiofrequency susceptometry", *Nature Nanotechnology*, in press (Oct. 2016). This work incorporates the extraordinary sensitivity of cavity optomechanics (the technology that made the gravitational wave observatories successful) into a nanomechanical torque sensor. It is one of the first examples of nanocavity optomechanics applied to a routine physical measurement. Operating in air at room temperature, the device has already yielded new functionality, an unanticipated elucidation of RF magnetic susceptibility. B) "Torque-mixing magnetic resonance spectroscopy", *Science* **350**, 798-801 (2015). A mechanical torque method for detecting the precessing transverse component of magnetic dipole moment in a continuous-wave magnetic resonance experiment has been developed and is reported in this paper. The greatest significance of the new method stems from it being highly complementary to the conventional method of detection via Faraday induction: it is naturally suited for coupling to small specimens, and does not suffer from a roll-off of signal strength at low frequencies (in analogy to detecting an electromotive force with a superconducting loop). The method was demonstrated through simultaneous, optomechanically-detected observations of spin resonance and DC moment in a yttrium iron garnet microdisk, including resonantly-assisted spin texture transitions. "Quantitative magneto-mechanical detection and control of the Barkhausen effect", *Science* **339**, 1051-1054 (2013). The Barkhausen effect is a kind of stick-slip friction for magnetism, discovered by Barkhausen in 1919 and acknowledged as the first experimental evidence of magnetic domains. For the first 93 years of Barkhausen physics, it was only possible to describe qualitatively the variation of domain wall energy with position that gives rise to the Barkhausen effect. Sensitive nanomechanical torque magnetometry on a single micromagnetic disk changed this. Tiny variations in net magnetic moment when a single magnetic vortex core interacts with individual pinning sites in a magnetic film form the basis of quantitative 2D mapping of magnetic potential landscapes with high spatial and energy resolution. We also demonstrated artificial 2D nanoscale energy landscapes, delicately painted with a fine-pointed Ga ion "brush" and lending new capabilities to the design of nanomagnetic devices. [141], and [121, 124, 129,131,133,134,140].

Time-resolved scanning Kerr effect microscopy. *Phys Rev Lett* (1997), *Science* (2001) [52,70], and [45,47,65,72,83,90,95,97,108]. Spatio-temporal mapping of field-driven magnetic resonance and magnetic switching in geometrically-confined ferromagnets, on short enough time scales to capture all of the physics, and with high enough spatial resolution to capture much of the physics. The experimental work emerged contemporaneously with numerical simulations powerful enough to model some of the same systems, and helped "close the loop" between the two. Extensive characterizations of magnetic flux risetime in prototype recording devices were performed for seven different storage industry companies.

Picosecond scanning tunneling microscopy using junction mixing. *Science* (1993) [41], and

[39,40,46,50,51,58,76,96,102,142]. Development of approaches to extend ultrafast time resolution to scanning tunneling microscopy. The spatial resolution limitation of optics for stroboscopic microscopy is thereby overcome. The key is exploiting the intrinsic nonlinearity of the tunnel junction to mix high-speed signals down to the bandwidth of slow detectors (in analogy with optical pump-probe studies in ultrafast science).

Finite size effects in superfluid ^3He films. A simultaneous hydrodynamic and nuclear magnetic resonance study of superfluid ^3He confined to a thin film geometry. The work elucidated the nature of this anisotropic superfluid (and prototypical condensed matter system) in a planar configuration, and showed how to tune the boundary condition for quasiparticle scattering from diffuse to almost fully specular. *Phys Rev Lett* 1988 [16], and [14,18]. PhD research also included the first implementation of cryogenic pulsed NMR preamplifier based on a DC SQUID [13].

PROFESSIONAL MEMBERSHIPS, ACTIVITIES AND SERVICE

- * Co-chair, Spin Mechanics 4, Lake Louise 2017.
- * Advisory committee, Int'l Conf. on Magnetism, San Francisco 2018.
- * American Association of Physics Teachers, Alberta Section Executive, 2015-present.
- * International advisory, program committees, Int'l Conf. on Magnetism, Barcelona 2015.
- * Academic Program Review Committee member, Dept. of Physics and Astronomy, Univ. of Victoria (2013).
- * Co-organizer, Magnetic North III, June 8-10 2012, Banff.
- * Frank Isakson Prize Selection Committee, American Physical Society, 2009, 2011.
- * Unit review, Department of Physics and Atmospheric Science, Dalhousie University, November 2008.
- * Experimental exam convenor, Western Canada High School Physics Olympiad.
- * Selection Committee, Gerhard-Herzberg Canada Gold Medal for Science and Engineering/Brockhouse Canada Prize (2008).
- * Canadian Institute for Advanced Research Program in Nanoelectronics (Assoc. 1999-2006; Fellow 2006 -).
- * Chair, Division of Condensed Matter and Materials Physics, Canadian Association of Physicists (2001-2002).
- * Member, NSERC GSC28 (2001-2004; Chair, 2003-2004).
- * Member, International Union of Pure and Applied Physics Commission 9 (Magnetism) (2003-09).
- * International Advisory Committee, International Conference on Magnetic Materials 2007,2010.
- * Associate Editor, *IEEE Transactions on Nanotechnology*, 2006-2007.
- * Member, Program Committee, 2006 International Conference on Magnetism.
- * Co-organizer, MRS symposium on Magnetic Nanostructures, 2005.
- * Member, Program Committee, 2004 Joint MMM/Intermag Conference.
- * Session chairing at meetings of the Materials Research Society, American Physical Society, the Canadian Association of Physicists, the Microscopical Society of Canada, the Optical Society of America, and at a workshop of the Institute for Complex Adaptive Matter at Los Alamos. Organizer of two Sunday symposia for the CAP Congress and of the 2002 Condensed Matter and Materials Physics program of the CAP Congress.

TEACHING (2005 - PRESENT)

Year	Fall Term	Winter Term	Topics
2005	PHYS 362		Physical optics; lasers
2006	PHYS 292, 294, 295	PHYS 230	Experimental and Statistical Methods; Electricity&Magnetism
2007-09	PHYS 292, 294, 295	PHYS 292,297	Experimental and Statistical Methods;

2010		PHYS 292,297	Classic Experiments Classic Experiments in Physics
2011		PHYS 230	Electricity&Magnetism
2012	Sabbatical		
2013-15		PHYS 230	Electricity&Magnetism
2015	PHYS 294,295		Experimental Physics
2016	PHYS 297,397	PHYS 295	Experimental Physics

RESEARCH FUNDING CURRENTLY HELD

Applicants	Funding Source	Amt per year	Years of Tenure
Freeman, MR	NSERC Discovery Grant	\$ 106,173	2015-2020
Barclay, PE and 2 others	NSERC Strategic Partnership	\$ 192,000	2016-2019
Freeman, MR and 9 others	University of Alberta Teaching and Learning Enhancement Fund	\$ 50,000	2015-2018
Freeman, MR	Canada Foundation for Innovation JELF and Alberta AET-RCP	\$ 158,332	2016-2018
Freeman, MR	Canada Research Chair, Tier 1 Condensed Matter Physics	\$ 200,000 <i>to the U of A</i>	2015-2022
Freeman, MR and 3 others	National Institute for Nanotechnology	\$ 50,000	2016-2017

RESEARCH FUNDING PREVIOUSLY HELD

Applicants	Funding Source	Amount per year	Years of Tenure
Freeman, MR and 2 others	Alberta Innovates Youth Technopreneurship	\$ 75,000	2015
Freeman, MR	NSERC Discovery Grant	\$ 71,000	2010-2015
Freeman, MR	NSERC Discovery Accelerator	\$ 40,000	2010-2013
Brett, MJ and 9 others	Major Resources Support Fund Nanofabrication Facility, NSERC	\$ 218,300	2008-2013
Cadien, K and 9 others	CFI and ASRIP	\$ 7,972,326	2013-2014
Freeman, MR	Canada Research Chair, Tier 1 Condensed Matter Physics	\$ 200,000 <i>to U of A</i>	2008-2015
Freeman, MR	Postdoc support, CIFAR	\$ 30,000	1999-2013
Freeman, MR	NRC National Institute for Nanotechnology	\$ 20,000	2012-2013

Freeman, MR	NSERC RTI (UHF lockin)	\$ 39,357	2013-2014
Hegmann, F and 9 others	AITF iCORE	\$ 300,000	2013-2015
Hegmann, F and 8 others	ASRIP – Infrastructure	\$ 975,000	2007
Hegmann, F and 8 others	CFI – Infrastructure	\$ 1,200,000	2007
Brett, M and 9 others	ASRIP – Nanofab Facility Expansion	\$ 2,000,000	2007
Freeman, MR, Brett, M	iCORE (Horn von-Hoegen)	\$ 47,000	2004-2008
Brett, MJ and 2 others	Nanofabrication Facility Access NSERC, MFA	\$ 245,000	2006-2008
Hegmann, F. and 4 others	NSERC, NanoIP	\$ 100,000	2004-2006
Akinaga, H. and 2 others	NEDO (Japan)	\$ 60,000	2005-2006
Freeman, MR, and Brett, MJ	Nanoscale engineering physics initiative, iCORE	\$ 500,000	2001-2005
Freeman, MR	Ultrafast dynamics of surfaces and nano-structures, NSERC Individual Research Grant	\$ 73,500	1999-2005
Dew, S and 10 others	Integrated nanosystem research facility CFI Infrastructure project	\$ 5,890,431	2005
Brett, MJ and 7 others	Microfabrication Facility Access, NSERC	\$ 122,000	2002-2004
Meldrum, A and 4 others	Nanophotonics microscopy unit, ASRIP Research Infrastructure	\$ 152,000	2004
Brett, MJ and 8 others	Nanofabrication facility, Canada Foundation for Innovation and ISRIP (Alberta)	\$ 6,164,920	2002
Freeman, MR	Atom Manipulation Facility Phase II: ultrahigh vacuum, low temperature scanning tunneling microscope, Canada Foundation for Innovation	\$ 406,118	2002-2003
Freeman, MR, Marsiglio, F and Sydora, R	Equipment for 2 nd generation ultrafast microscope, Seagate, Infrastructure Partnership Program	\$ 335,267	1999-2000
Freeman, MR	Ultrafast microscopy of recording heads and materials, National Storage Industry Consortium (US), Infrastructure Partnership Program	\$ 46,000 US	1999-2001
Freeman, MR	Next generation ultrafast microscope, NSERC SMFSU	\$ 110,500	1999-2001
Freeman, MR	Equipment for next generation ultrafast microscopy, NSERC SMF	\$ 84,000	1999-2000
Freeman, Harrison, Hegmann, McMullin, Brett, Egerton	Equipment for advanced photo- lithography, NSERC Equipment	\$ 20,037	1999-2000

Harrison, Brett, Dew, Elezzabi, Freeman, McMullin	Microfabrication facilities access, NSERC Major Facilities Access	\$ 55,000	1999-2002
Mar, Cavell, Takats, Freeman, Brett	AC Susceptometer/DC Magneto- meter, NSERC Equip/Alberta IIPP, Alberta Science and Research Authority	\$ 183,113	1999-2000
Freeman, MR	Postdoc support, Canadian Institute for Advanced Research	\$ 30,000	1999-2002
Freeman, Hegmann, Mar, Marsiglio, Meldrum	Atom Manipulation Facility Phase 1 ASRA (ultrahigh vacuum thin film growth cluster)	\$ 425,000	2000-2001

CONTRIBUTIONS TO TRAINING OF PERSONNEL

Graduate Students

A total of twenty-two graduate students have trained in the lab since 1995.

Postdoctoral Fellows

A total of seventeen postdoctoral fellows have trained in the lab since 1995.

Undergraduate Students

A total of forty undergraduate students have trained in the lab since 1999.

PUBLICATIONS

<http://www.ualberta.ca/~freemanm/pubs.htm>

PATENTS

M.R. Freeman, Fiber optic probe with a magneto-optic film on an end surface for detecting a current in an integrated circuit, US Patent #5,451,863 (1995).

M.R. Freeman, Method for measuring current distribution in an integrated circuit by detecting magneto-optic polarization rotation in an adjacent magneto-optic film, US Patent #5,663,652 (1997).

INVITED TALKS

American Vacuum Society, Nashville (Nov. 2016)

Physics Colloquium, Colorado State Univ. Ft. Collins (Sep. 2016)

Seminar, NIST Boulder (Sep. 2016)

Int'l Conf. on Superconductivity and Magnetism, Fethiye (Apr. 2016)

3rd Int'l Workshop on Spin Mechanics, Munich (June 2015)
Canadian Association of Physics Congress, Edmonton (June 2015)
2nd Int'l Workshop on Spin Mechanics, Sendai (June 2014)
Magnetic North IV, Victoria (May 2014)
APS Northwest Section meeting, Seattle (plenary; May 2014)
AAAS Annual Meeting, Chicago (Feb. 2014)
Spintech 7, Chicago (August 2013)
9th Int'l. Wkshp on Nanomagnetism and Superconductivity, Coma-Ruga, Spain (July 2013)
McGill University Centre for the Physics of Materials Seminar (April 2013)
American Physical Society March Meeting, Baltimore (March 2013)
1st Int'l Workshop on Spin Mechanics, Tokai, Japan (February 2013)
12th Int'l. Conf. on Superconductivity and Magnetism, Istanbul (May 3, 2012)
Physics Colloquium, University of Delaware, Oct. 5, 2011
Physics Colloquium, University of Waterloo, Sept. 29, 2011
7th Int'l. Wkshp on Nanomagnetism and Superconductivity, Coma-Ruga, Spain (July 2011)
23rd Entretien Jacques Cartier, Grenoble, France (Nov. 2010)
55th Conference on Magnetism and Magnetic Materials, Atlanta, GA (Nov. 2010).
International Conference on Electromagnetics in Advanced Applications, Sydney, Australia (Sept. 2010).
Nanomagnetomechanical resonators applied to vortex physics, at Magnetic North I: Dynamics of Magnetic Materials, London, ON, 7th June, 2010.
International Workshop on Nanomechanical Cantilever Sensors, Banff, May, 2010.
Nanomagnetomechanical resonators applied to vortex physics, MEMS and Magnetism Workshop, Argonne National Labs, April 17, 2010.
Nanomagnetomechanics, Photoelectron Emission Microscopy Workshop, Banff, Sept. 15, 2009.
From silicon dimers to nanomagnets: microscopy of small structures away from equilibrium, Physics Colloquium, University of Texas, Austin, Feb. 6, 2009.
Dynamics in Individual Nanoscale Magnetic Structures, International Colloquium on Ultrafast Magnetization Processes, Irsee, Germany, Sept, 2008.
Nanomagnetism: A Case History of Nanoscience and Technology, AAPT Summer Meeting, Physics from the Ground Up, University of Alberta, July, 2008.
Nanomagnetism: A case history of nanoscience and technology, Royal Society of Canada, Edmonton (Nov. 2007).
How can we Control Single Electrons? Public Forum and Debate for CIFAR 25th Anniversary in Calgary, (Nov. 2007).
Dynamics of Individual Small Spin Structures, ICEAA '07 Torino, September 2007.
Dynamics of an Ising Chain Under Local Excitation, International Conference on Magnetism, Kyoto, August 2006.
Dynamics of an Ising Chain Under Local Excitation, CAP Congress, Brock University, St. Catharines, June 2006.
Using an STM to Connect Silicon and Magnetism: Dynamics of an Ising Chain Studied at a Semiconductor Surface, Ohio State University, Department of Physics, June 2006.
Using an STM to connect silicon and magnetism: dynamics of an Ising chain studied at a semiconductor surface, University of Victoria, 8 Feb. 2006.

What's up in Optics? Some background to the 2005 Nobel Prize in Physics, Physics Teachers Meeting, University of Alberta, Dept of Physics, 9 Dec. 2005.

Dynamics of an Ising Chain under Local Excitation, Materials Research Society, Boston, 28 Nov 2005

Dynamics of Small Spin Systems, Dept of Physics and Atmospheric Science, Dalhousie University, 24 Nov 2005.

Dynamics of Small Spin Systems, Dept of Physics & Physical Oceanography, Memorial Univ., 25 Nov 2005.

California Institute of Technology nanomechanics seminar, March 2005.

University of Florida Physics colloquium, Dec. 2004.

Canadian Light Source seminar, Saskatoon, Nov. 2004.

Workshop on Nanomagnetism using X-ray techniques, Lake Geneva WI, August 2004.

CIAR "Appetite for Discovery", Edmonton, May 2004.

Edmonton Association of Bright Children, Edmonton, December 2003

American Vacuum Society, 50th Anniversary Meeting, Baltimore, November 2003

Executive Committee of the International Union of Pure and Applied Physics, Vancouver, October 2003

Ultrafast Surface Dynamics, Telluride, June 2003

Materials Research Society, Boston, December 2002

University of Minnesota, School of Physics and Astronomy Colloquium, Minneapolis, October 2002

University of Minnesota, School of Physics and Astronomy Condensed Matter Physics seminar, Minneapolis, October 2002

iCORE Distinguished Lecture Series, University of Calgary, September 2002

APS Northwest Section meeting, May 2002 (plenary talk)

Intermag Europe 2002, Amsterdam, April 29, (conference opening talk)

Symposium on Scanning Probe Microscopy in Biology, Chemistry and Physics, Santa Fe Dec. 2001

46th Magnetism and Magnetic Materials Conference, Seattle, Nov. 2001

Symposium on 40 Years of Superfluidity, Cornell University, Ithaca, May 2001

University of Waterloo Physics Colloquium, February 2001

Physics Seminar, NRC Steacie Institute, Ottawa February 2001

2nd Seagate University Conclave, Minneapolis December 2000

University of Calgary Physics Colloquium, Dec 2000

University of Victoria Physics Colloquium, Nov. 2000

CIAR Nanoelectronics Meeting, Banff May 2000.

John Hopkins University Physics Colloquium, Baltimore Feb. 2000.

Ohio State University CME Seminar, Columbus Nov. 1999.

McMaster University Brockhouse Institute Seminar, Hamilton Nov. 1999.

Society of the Sigma Xi, University of Alberta, Edmonton, Oct. 1999.

Summer school on mesomagnetism, spin dynamics, and spin electronics, Rhodes, Sept. 1999.

MRS Spring meeting, San Francisco, April 1999.

APS Centennial meeting, Atlanta, March 1999.

University of Toronto, Photonics Research Ontario Seminar Nov. 1998.

ETH Zurich, Condensed Matter Physics Seminar Sept. 1998.

McGill University, Condensed Matter Seminar Nov. 1998.

Queen's University Physics Colloquium Nov. 1998.

PHASDOM'98, Neuchatel Sept. 1998.
CERION Workshop, Neuchatel Sept. 1998.
The Magnetic Recording Conference, Boulder CO Aug. 1998.
Symposium on Microscopy and Microstructure of Magnetic Materials, Ames IA May 1998.
International Quantum Electronics Conference, San Francisco May 1998.
Naval Research Lab, Washington Feb. 1998.
IEEE Magnetics Society, Shrewsbury MA Feb. 1998.
Gordon Conference on Magnetic Nanostructures, Ventura CA Jan. 1998.
Joint Magnetism and Magnetic Materials – Intermag Conf., San Francisco, Jan. 1998.
University of British Columbia Physics colloquium, Nov. 1997.
IEEE Lasers and Electro-optics Society, San Francisco, Nov. 1997.
Seagate Corp., Minneapolis, Oct. 1997.
Int. Conf. on Material and Life Sciences in Harima, Hyogo, Japan, Oct. 1997.
Interdisciplinary Laser Science '97, Long Beach, Oct. 1997.
Canadian Association of Physicists, Calgary, June 1997.
Int. RIKEN Symposium on Atomic Scale Sciengineering in Surfaces and Interfaces, Waka, Japan, Nov. 1996.
Toyota Conference on Atom., Mol., and Electr. Dynamic Processes on Solid Surfaces, Shizuoka, Japan, Nov. 1996.
Canadian Association of Physicists, Ottawa, June 1996.
IBM Storage Division, San Jose, Feb. 1996.
University of California, San Diego CMRR Seminar, Feb. 1996.
IBM Research Division, Almaden, Feb. 1996.
3rd Int. Symposium on Atomically Controlled Surfaces and Interfaces, Raleigh NC, Oct. 1995.
University of Alabama, MINT Seminar Oct. 1995.
Florida State University, National High Magnetic Field Laboratory Seminar, Oct. 1995.
8th Int. Conf. on Scanning Tunneling Microscopy/Spectroscopy and Related Techniques, Snowmass, CO, July 1995.
CAP lecture tour: University of Saskatchewan, Lakehead University, March 1995; University of Calgary, University of Alberta, April 1995; University of Manitoba, Sept. 1995.
National Institute for Standards and Technology, Boulder, CO, Oct. 1994.
Colorado State University Physics Seminar, Fort Collins, Oct. 1994.
Optical Society of America, Dallas, Oct. 1994.
American Physical Society, Pittsburgh, March 1994.
Plus 23 other invited talks at conferences, universities, and industrial labs, prior to joining the University of Alberta.

TALKS BY GROUP MEMBERS

The group submits contributions to the APS March Meeting, the Magnetism and Magnetic Materials conference, the CAP Congress, CIFAR workshops, and other specialty meetings. We have presented on average about six talks per year of this nature.

In addition, group members have given invited conference and workshop talks to the Canadian Association of Physicists, the American Physical Society (March Meeting), the SPIE, Magnetic North.

Additional notes

The group has interacted significantly with industry over the years, contributing a unique device characterization capability to seven major data storage companies (five from the Fortune 500). For several years we participated in the U.S. National Storage Industry Consortium's Extremely High Density Recording Project as the only foreign associate.

OUTREACH, 2009...

Nanomagnetism: A case history of nanoscience and technology", *The Physics Teacher* **47**, 206-211 (2009).

Co-guest editor (with Paul Corkum), *Physics in Canada* **65**, Apr-Jun (2009), issue on ultrafast science.

Presentation to Edmonton Laserfest, in celebration of 50th anniv. of operation of the first laser (May 17, 2010).

University of Alberta Career Centre, Natural Sciences Undergrad Research Panel (March 2011; Nov 2011).

"Nanomagnetism", JH Picard High School, Edmonton (October 2009, March 2012).

Canada-India Workshop on Nanofabrication and Characterization, NINT (May 2013).

"Let's Talk Nanoscience" presentation, Feb. 2014.

Hands-on Physics workshops, 2014 – present.

"smallTalk" presentation, Feb. 2015

The Science Hardware Space, 2015 – present.