

Senate Research Report

VICE-PRINCIPAL (RESEARCH)

October 3, 2017

News

The Queen's Strategic Research Plan (SRP) is a foundational governing document that supports and guides the institutional research mission. The current iteration of the SRP will conclude at the end of 2017, and is now being updated to reflect the ongoing changes in our priorities. The Vice-Principal (Research) is engaged in consultations to help shape the new SRP, a draft of which will soon be delivered to an Advisory Writing Team who will discuss, consult and redraft. A list of the members of the Advisory Writing Team can be found on the [website of the Office of the Vice-Principal \(Research\)](#), along with other updates on the process. A more fulsome draft will be shared with the university community over the coming months.

The Office of the Vice-Principal (Research) has successfully completed the second round of its Queen's Research Opportunities Funds (QROF) Program. The third competition will be opening in the near future. [QROF information can be found on the website of the Office of the Vice-Principal \(Research\)](#).

The Honorable Reza Moridi, Minister of Research, Innovation and Science, announced \$28.8 million in provincial funding over the next five years to support the operation of the Queen's affiliated, SNOLAB, a world-class international facility for deep underground science.

Spectra Plasmonics, a student-founded venture that was created in the Dunin-Deshpande Queen's Innovation Centre (DDQIC) Summer Initiative program (QICSI), has won [first prize of \\$100,000 at the Lee Kuan Yew Global Business Plan Competition](#), topping 550 teams from 300 universities in 68 different countries. The team consists of Ryan Picard, Yusuf Ahmed, Christian Baldwin, Tyler Whitney, and Malcolm Eade. This venture demonstrates the success of the Foundry Program, developed together by the [Office of Partnerships and Innovation](#) and DDQIC, to provide the opportunity for researchers who have intellectual property with commercial potential to work with students who are interested in pursuing entrepreneurship. Spectra Plasmonics is building a venture around some of the surface-enhanced Raman spectroscopy IP that Hannah Dies, Aris Docoslis, Carlos Escobedo and Josh Raveendran (all of Chemical Engineering) have been developing.

The 10th annual Science Rendezvous Kingston drew thousands of visitors to the Rogers K-Rock Centre on Saturday, May 13, to watch demonstrations and take part in experiments offered by researchers and students from Queen's University, as well as from the Royal Military College of Canada, St. Lawrence College and a number of community science groups. This year's Heart and Stroke booth promised visitors a unique experience thanks to Amer Johri and his

ultrasound machine. Using volunteer student models, Dr. Johri, a Queen's professor, cardiologist and ultrasound specialist scanned and explained the different parts of the human heart. Each year, Queen's partners with the Heart and Stroke Foundation to engage the public in an event promoting heart health.

The *New Eyes on the Universe* exhibit — featuring the groundbreaking work of Queen's Professor Emeritus and Nobel Laureate Art McDonald, and his team at SNOLAB — was on display at the Agnes Etherington Art Centre from May 27 – July 7. The interactive exhibit highlighted the discoveries of the Sudbury Neutrino Observatory (SNO) project. Created by SNOLAB with Science North, this touring installation in the Agnes atrium featured a special component for the Queen's setting: a real-time cloud chamber that made visible some of the subatomic particles that continually bombard us. Additionally, video kiosks allowed visitors to explore themes and offered a virtual tour of SNOLAB, while, through a life-size virtual display, Dr. McDonald presented information about the work of SNO and SNOLAB and his perspective on the future. Queen's hosted this exhibit as part of our 175th anniversary celebrations.

September 11, 2017 marked [the official opening of the W.J. Henderson Centre for Patient-Oriented Research](#). The new centre positions Kingston Health Sciences Centre (KHSC), Queen's University and the KGH Research Institute (KGHRI) as international leaders in partnering with patients to improve health knowledge and outcomes. The centre's opening reflects a significant commitment by individuals and organizations. Dr. Roseann Runte, President and CEO of the Canada Foundation for Innovation (CFI), and Mr. Pierre Normand, Vice-President, External Relations and Communications at CFI, were in attendance at the event, and made several stops on Queen's campus to visit CFI-funded labs in action.

Awards

Queen's electrical engineering professor Dr. Praveen Jain received the Phoivos Ziogas Electric Power Medal from the Canadian arm of the Institute of Electrical and Electronics Engineers (IEEE Canada). The award recognizes outstanding Canadian engineers who have made important contributions to the field of electric power engineering.

Dr. Arthur B. McDonald (Physics) was formally inducted as a foreign associate of the National Academy of Sciences at the Academy's 154th annual meeting.

Dr. Margaret Moore (Political Studies) received the 2017 Canadian Philosophical Association Book Prize for her work *A Political Theory of Territory*.

Dr. Cathleen Crudden (Chemistry) has been named the new Tier 1 Canada Research Chair in Metal Organic Chemistry. She is joined by Dr. Peter Davies (Biomedical & Molecular Sciences, Tier 1 Canada Research Chair in Protein Engineering) and Dr. Mohammad Zulkernine (School of Computing, Tier 2 Canada Research Chair in Software Reliability and Security) who saw their Canada Research Chairs renewed.

Nicolle Domnik (Medicine) and Sarah Yakimowski (Biology) received Banting Postdoctoral Fellowships. Seventy fellowships were offered across Canada this year.

Four Queen's National Scholars (QNS) have been recruited to Queen's:

- Dr. Thohahoken Michael Doxtater, QNS in Indigenous Studies: Land and Language based Pedagogies and Practices (Languages, Literatures and Cultures; Global Development Studies)
- Dr. Lisa Guenther, QNS in Political Philosophy and Critical Prison Studies (Philosophy)
- Dr. Anna Harrison, QNS in Environmental Geochemistry (Geological Sciences and Geological Engineering; School of Environmental Studies)
- Dr. Isabelle St-Amand, QNS in Aboriginal and Migrant Literatures (French Studies; Languages, Literatures and Cultures)

Queen's University Professor Paula James (Medicine and Pathology & Molecular Medicine), one of Canada's leading researchers in inherited bleeding disorders, has been honoured with the Cecil Harris Award by the Canadian Hemophilia Society.

Queen's University professor and also a leading researcher in common inherited bleeding disorders, Dr. David Lillicrap, has received a \$3.55 million Canadian Institutes of Health Research (CIHR) Foundation Grant.

Dr. Andrew Pollard (Mechanical and Materials Engineering) and Dr. Christopher Pickles (Robert M. Buchan Department of Mining) have been named Fellows of the Canadian Academy of Engineering in recognition of their career achievements.

Dr. Heather Jamieson (Geological Sciences and Geological Engineering) earned the Peacock Medal from the Mineralogical Association of Canada.

Dr. Anne Croy (Biomedical & Molecular Sciences) and Dr. Robert Morrison (English) were granted the honour of being elected to the Royal Society of Canada (RSC), one of the highest honours for Canadian academics in the arts, humanities, social sciences, and natural sciences. Dr. Croy is the first woman veterinarian elected to the fellowship. Also recognized is Dr. Richard Bathurst of the Royal Military College, who is cross-appointed to the Queen's Civil Engineering Department and a member of the GeoEngineering Centre at Queen's-RMC.

Dr. Katherine McKittrick (Gender Studies) and Dr. Karen Yeates (Medicine) have been named to the Royal Society of Canada's (RSC) College of New Scholars, Artists and Scientists.

Research Funding

Over \$45 million in research funding has been announced since April, and the details of these funds have been outlined in a separate funding table.



VICE-PRINCIPAL (RESEARCH)

Funding Table to accompany the September 19, 2017 Research Report to Senate

Researcher	Department	Project Title	Amount
Banting Postdoctoral Fellowship			
Yakimowski, Sarah Supervisor: Colautti, Robert	Biology	"The evolution of herbicide resistance & sexuality in crop invader"	\$140,000
Domnik, Nicolle Supervisor: O'Donnell, Denis	Medicine	"Nighttime lung function, respiratory mechanics and early morning symptoms in COPD: Impact of bronchodilator therapy"	\$140,000
Burroughs Welcome Fund — Collaborative Research Travel Grant			
Mousavi, Parvin	School of Computing	Prostate Cancer Detection Using Multi-modality Imaging and Deep Learning	\$8,000
Canada Research Chair (CRC)			

This research report is meant to be an illustration of research activity at Queen's University and is based on information provided to the Office of the Vice-Principal (Research) by University Research Services as of September 11, 2017.

Crudden, Cathleen	Chemistry	Canada Research Chair in Metal Organic Chemistry (New)	\$1,400,000
Davies, Peter	Biomedical & Molecular Sciences	Canada Research Chair in Protein Engineering (Renewal)	\$1,400,000
Zulkernine, Mohamad	School of Computing	Canada Research Chair in Software Dependability (Renewal)	\$500,000
CFI – JELF			
Dancey, Janet	CCTG	Digital pathology in support of cancer clinical trials	\$197,065
Davies, Peter	Biomedical & Molecular Sciences	Investigation of Large Protein Complexes	\$100,192
Frauscher, Birgit	Medicine, CNS	Evaluation of the role of sleep for novel non-invasive EEG biomarkers for improved diagnosis and prognosis in epilepsy	\$139,914
Lord, Susan	Film & Media	Social Ecology of Vulnerable Media: Preservation, Migration, Remediation of Women's and Indigenous Audiovisual Archives	\$400,000

Mulligan, Lois	Queen’s Cancer Research Institute	Real-time imaging platforms for monitoring cancer cell motility and metastasis	\$124,040
Orihel, Diane	Biology, School of Environmental Studies	A Hybrid Mesocosm-Ecosystem Facility for Aquatic Ecotoxicology	\$167,602
Rainbow, Michael	Mechanical & Materials Engineering	Subject-Specific Biomechanics of Human Joint Systems	\$400,000
Rival, David	Mechanical & Materials Engineering	Hemodynamics and Energy Mobility (HEMo) laboratory	\$76,520
Smith, Graeme	Obstetrics & Gynaecology	Reproductive Sciences Vascular Study Lab	\$63,540
Yao, Zhongwen	Mechanical & Materials Engineering	Innovative cladding materials of next nuclear generation materials	\$167,400
MITACS — Accelerate			

Beogman, Leon	Civil Engineering	Development of a numerical wave uprush prediction tool for the Cataraqui Region Conservation Authority Lake Ontario and St. Lawrence River shoreline	\$15,000
Ji, Li-Jun	Psychology	Fostering Corporate Productivity through Creativity and Intuition	\$15,000
Kim, Il Yong	Mechanical & Materials Engineering	Design, Analysis and Optimization of an Aircraft Seat	\$30,000
Lai, Yongjun	Mechanical & Materials Engineering	Development of a machine condition monitoring platform using a wireless sensor network	\$60,000
Lloyd-Ellis, Huw	Economics	Identification, cost-benefit analysis, and evaluation of international development projects	\$30,000
Lloyd-Ellis, Huw	Economics	Development of a theoretical and practical model for assessing the socioeconomic feasibility of small-growing businesses	\$15,000
McAuley, Kim	Chemical Engineering	Mathematical Modelling of Carbon Dioxide Removal Using Micron-sized Water Droplets in C-3 Module Process	\$30,000

Noureldin, Aboelmagd	Electrical & Computer Engineering	Integration of GNSS Precise Point Positioning and Inertial Sensing Technologies for Lane-Level Car Navigation	\$90,000
Redfearn, Damian	Medicine	Signal parameter estimation and tracking during atrial fibrillation using a Bayesian Time-Delay Estimator	\$45,000
Surgenor, Brian	Mechanical & Materials Engineering	Implementation of a Machine Vision-based System for the Recognition of Indian Coins	\$15,000
MITACS – Globalink Research Award			
Filion, Yves	Civil Engineering	Comparative analysis of reliability-surrogate measures using an ensemble of realistic water distribution networks	\$5,000
Jerkiewicz Gregory	Chemistry	Nanostructured nickel materials for clean and renewable energy	\$3,500
MRIS – Ontario Research Fund			
Smith, Nigel	Physics, Engineering Physics & Astronomy	SNOLAB Facility Operations	\$28,809,614

NCE – ArcticNet			
Smol, John	Biology	Paleolimnology of Lake Hazen	\$10,000
NSERC – Collaborative Research Development			
Beauchemin, Diane	Chemistry	Development of methods to improve the robustness of inductively coupled plasma mass spectrometry while also improving detection limits	\$236,000
Rival, Dave	Mechanical & Materials Engineering	Experimental characterization of pit-turbine hydrodynamics Industrial Partner: Canadian Hydro Componenets Ltd. - \$50,000	\$100,000
Rowe, R Kerry	Civil Engineering	Performance of bituminous geomembrane in mining applications Industrial Partner: The Environmental Containment Ltd. - \$11,200	\$22,100
NSERC – Connect Grant			
Oleschuk, Richard	Chemistry	Regional industry networking event with Queen's micro and nano focused researchers	\$959

Prakash, Ravi	Electrical & Computer Engineering	Bio-electronic organic semiconductor based programmable drug delivery systems	\$3,720
NSERC – Discovery Accelerator Supplement Grant			
Boegman, Leon	Civil Engineering	Internal solitary wave-induced sediment resuspension and offshore infrastructure loading	\$120,000
NSERC – Discovery Grant			
Andrew, R David	Biomedical & Molecular Sciences	Converting the sodium-potassium pump into a shutdown channel	\$130,000
Banfield, Bruce	Biomedical & Molecular Sciences	Remodeling of the nuclear membrane during herpesvirus assembly	\$28,000
Barthelme, Thomas	Mathematics & Statistics	Geometry and dynamics of systems with a hyperbolic flavor	\$70,000
Boegman, Leon	Civil Engineering	Internal solitary wave-induced sediment resuspension and offshore infrastructure loading	\$205,000
Dean, Thomas	Electrical & Computer Engineering	Language based analysis of software and security	\$100,000

Evans, P Andrew	Chemistry	New metal-catalyzed reactions for the synthesis of bioactive agents	\$530,000
Fam, Amir	Civil Engineering	Realistic laboratory rolling loading of bridge superstructure built using novel technologies combined with environmental exposure	\$255,000
Gallivan, Jason	Psychology	Mechanisms underlying the control and generalization of sensorimotor learning	\$150,000
Gee, Katrina	Biomedical & Molecular Sciences	Innate immune responses and IL-27: novel regulatory mechanisms of TLR7 expression and signaling	\$170,000
Genikomsou, Aikaterini	Civil Engineering	Performance evaluation of high-performance fibre-reinforced cementitious composite slab-column connections	\$110,000
Ghasemlou, Nader	Biomedical & Molecular Sciences	The chronobiology of somatosensation	\$155,000
Green, Mark	Civil Engineering	Holistic fire performance of buildings with sustainable concrete and fibre reinforced polymers	\$170,000
Hollenstein, Tom	Psychology	Emotion system regulation: Concordance, dynamics, and time scales	\$160,000
Hudon, Nicolas	Chemical Engineering	Distributed control and estimation of sustainable chemical process systems	\$110,000

Jerkiewicz, Gregory	Chemistry	Interfacial electrochemistry and electrocatalysis: Understanding and directing electrochemical phenomena at the molecular level	\$300,000
Jessop, Philip	Chemistry	The chemistry of CO ₂ and nitrogen-containing bases	\$619,400
Lai, Yongjun	Mechanical & Materials Engineering	Microsensing system for real-time pathogen detection	\$125,000
Levin, Yuri	Smith School of Business	Game theoretic models for revenue management in the presence of networks	\$140,000
MacDougall Colin	Civil Engineering	Durability of low-carbon structures	\$105,000
Mosey, Nicholas	Chemistry	Development and application of simulations methods to study friction and wear	\$225,000
Oko, Richard	Biomedical & Molecular Sciences	The origin and compartmentalization of core somatic histones and GSTO2 in sperm and their role in fertilization	\$200,000
Oteafy, Sharief	Computing	Leveraging big sensed data over ubiquitous networks	\$100,000

Peppley, Brant	Chemical Engineering	A multiscale approach to catalyst development for hydrogen production and conversion systems	\$140,000
Robertson, Robert	Biology	Neural responses to abiotic stress in insects	\$345,000
Rowe, R Kerry	Civil Engineering	Long-term performance of geosynthetic barrier systems for groundwater protection	\$355,000
Scott, Neal	Geography & Planning	Biological and landscape controls on the net greenhouse gas balance of High Arctic ecosystems	\$110,000
Smol, John	Biology	Lakes in the Anthropocene: Studying lake ecosystem changes across broad spatial and temporal scales	\$540,000
Surgenor, Brian	Mechanical & Materials Engineering	Advances in Machine Vision and Manufacturing Automation	\$110,000
Taylor, Peter	Mathematics & Statistics	Evolutionary modeling of behaviour in sociobiology and psychology	\$165,000
NSERC – Discovery Northern Supplement Grant			

Smol, John	Biology	Northern lakes in the Anthropocene: Studying lake ecosystem changes across broad spatial and temporal scales	\$120,000
NSERC – Engage Grant			
Braun, Alexander	Geological Sciences & Geological Engineering	Detectability of asteroid density distribution and boulder mass from spacecraft orbital data and asteroid surface gravimetry	\$25,000
Kontopoulou, Marianna	Chemical Engineering	Use of micron-sized exfoliated graphite as reinforcing filler to enhance the mechanical, thermal and electrostatic dissipative capacity properties of polypropylene composites	\$25,000
Mechefske, Chris	Mechanical & Materials Engineering	Cutting Tool Wear and Performance Estimation Using Acoustic Emission	\$25,000
NSERC – Idea to Innovation			
Wang, Suning	Chemistry	I2I Phase 1: tetradentate blue pt(II) phosphorescent emitters for OLEDs	\$125,000
NSERC – Research Tools and Instruments			

Amsden, Brian	Chemical Engineering	A micro-mechanical testing instrument	\$137,624
Cunningham, Michael	Chemical Engineering	Water-soluble polymers for use in stimuli-responsive materials, water treatment and flocculation of oil sands tailings	\$150,000
Davies, T. Claire	Mechanical & Materials Engineering	Detecting brain signals using electroencephalography and functional near infrared spectroscopy	\$150,000
Fichtinger, Gabor	Computing	Research platform for medical education informatics	\$149,992
Hassanein, Hossam	Computing	UAV-based system for monitoring and tracking of oil and gas infrastructure	\$149,720
Jessop, Philip	Chemistry	Process gas chromatography system for reactions and separations	\$149,406
Lafreniere, Melissa	Geography and Planning	Advanced ion chromatography for assessing permafrost degradation impacts on water quality and organic carbon composition and dynamics	\$147,815
Lougheed, Stephen	Biology	Operation and maintenance support to enhance research and highly qualified personnel training at the Queen's University Biological Station	\$284,176
Plaxton, William	Biology	FRENCH Press	\$39,741

Smith, Steven	Biomedical & Molecular Sciences	Centrifuge suite for protein structure/function studies	\$149,390
Take, William	Civil Engineering	An ultrahigh-speed camera to unlock the behaviour of rapid landslides, impulse waves, fracture propagation, and superhydrophobic surfaces	\$142,546
NSERC – Subatomic Physics Equipment			
Di Stefano, Philippe	Physics	KDK: Potassium for Dark Matter	\$20,545
QROF – Arts Fund			
Renders, Kim	Dan School of Drama and Music	Rhinoceros or What's Different About Me	\$5,000
Rogalsky, Matthew	Dan School of Drama and Music	Purchase of specialized loudspeakers for investigation and experimentation on an Indigenous language sound installation project	\$2,742
Anweiler, Rebecca	Fine Art (Visual Art) Program	Animal/Séance: exhibition at Modern Fuel Artist-Run Centre's State of Flux Gallery, Kingston, Ontario	\$4,900
Wanless, Gregory	Dan School of Drama and Music	Support for The Eliza Show	\$5,000

QROF — International Fund			
Cramm, Heidi	Rehabilitation Therapy/CIMVHR	Military & veteran family health research: a global alliance	\$20,000
Aldersey, Heather Michelle	School of Rehabilitation Therapy	Setting priorities for sex and relationship education for women with intellectual disabilities (ID) in the Democratic Republic of the Congo (DRC) and their families	\$20,000
Mousavi, Parvin	School of Computing	Improved diagnosis and prognosis of prostate cancer using deep learning and multi-parametric medical imaging	\$15,000
Cunningham, Michael	Chemical Engineering	Sustainable materials derived from natural polymers as substitutes for petroleum-based synthetic polymers	\$20,000
Ross, Robert	Kinesiology and Health Studies	Exercise and metabolomics – a novel approach to understanding the mechanisms by which exercise improves cardiometabolic health	\$16,750
Fichtinger, Gabor	School of Computing	The integration of the Dartmouth electrical impedance imaging technology with the Queen's NaviKnife real-time electromagnetic breast surgery navigation system	\$4,100
QROF — Post-Doctoral Fellow Fund			

Mousavi, Parvin - Anas, Emran Mohammad Abu	School of Computing	No Title	\$45,000
Mulligan, Lois - Moodley, Serisha	Cancer Biology & Genetics	Evaluating RET-inhibitors in lung cancer growth and metastasis	\$45,000
French, Simon - Auais, Mohammad	Rehabilitation Therapy	No Title	\$45,000
QROF — Research Leaders' Fund			
Crudden, Cathleen	Chemistry	Carbon-based ligands for metal surfaces: a revolution in biosensing	\$50,000
Jessop, Philip	Chemistry	Application of green chemistry concepts to CMF derived biofuels	\$50,000
Lai, Yongjun	Mechanical and Materials Engineering	Novel wearable technology for better vision	\$49,112
Renwick, Neil	Pathology and Molecular Medicine	Accelerating RNA-guided diagnostics through accurate RNA detection in neuroendocrine tumor liquid samples and cell lines	\$50,000
Bertrand, Karine	Film and Media	From Arnait Video Productions (Nunavut) to Video in the Villages (Brazil): developing a network of the Americas for Indigenous women filmmakers	\$50,000

QROF – Visiting Artist Residency			
McKegney, Sam	English	“Conversation over co-existence: The limitless possibilities of poetic practice.” A writer’s Residency featuring Karen Solie	\$13,000
Kibbins, Gary	Film and Media	Richard Ibghy and Marilou Lemmens: The golden USB	\$9,401
SSHRC – Connection Grant			
Hanniman, Kyle	Political Studies	Canada 150: Canada at 150, federalism and democratic renewal	\$20,922
Mackenzie, Scott	Film & Media	Visualizing climate change: connecting art, media, science, technology, and activism	\$45,260
Meligrana, John	Geography & Planning	Canada-China symposium on environmental management, sustainability and land use planning	\$19,676
Salzmann, Ariel	History	The Middle East unbound/rebound	\$9,994
The Association of Commonwealth Universities – Titular Fellowship 2017			

Aldersey, Heather	Rehabilitation Therapy	Gordon and Jean Southam Fellowship	5,000 (GBP)
Transport Canada — Research Grant			
Hoult, Neil	Civil Engineering	Dynamic Distributed Monitoring for Track Support Evaluation	\$25,000