

York University  
Faculty of

# SCIENCE

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## 2015

Annual Review



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## DEAN'S ROUNDUP OF SELECT HIGHLIGHTS

RAY JAYAWARDHANA

JAN Chemist Sergey Krylov and mathematician Jane Heffernan were appointed as York Research Chairs. The Neuroscience Lecture Series launched at Toronto Public Library branches.

FEB Janet Vertesi, Princeton University, headlined Science & Technology Studies Day. Two Biology students – David Kim and Michelle Binczyk – placed first and second in the Best Poster & Presentation category at York's Undergraduate Research Fair. Chemist Sergey Krylov received the President's Research Excellence Award.

MAR Paul Delaney received the Canadian Astronomical Society's Qilak Award for public education and outreach. Enrollment at [March Break Science Camp](#) more than doubled compared to last year.



The Faculty received a PromoScience grant from NSERC for QuantumGirl. The Faculty hosted #WomenInSTEM, an event that brought together students, alumni and faculty to discuss careers in STEM, life balance and more.

APR Science faculty members received nearly \$2.5M in NSERC grants. Associate Dean (Students) Peter Cribb and biologist Paula Wilson received Academic Innovation Fund grants to develop integrated science and early alert programs. Biology student Houman Tahmasebi won a Robert J. Tiffin Student Leadership Award.

MAY The Faculty celebrated its fiftieth anniversary with a gala and a major public event. Hundreds of kids and their families participated in our [Science Rendezvous](#) event at the Markham Farmers' Market.



JUN Mark Lievonen, president of Sanofi Pasteur, received an honorary doctor of laws degree at the convocation ceremony for science and engineering students. The Faculty's promotional video won a Silver Circle of Excellence award from the Council for Advancement and Support of Education. The International Astronomical Union named an asteroid (423097) "Richardjarrell" in honour of the late science historian and faculty member Richard Jarrell.

JUL Genome Canada awarded \$7.3M to honeybee research co-led by biologist Amro Zayed.

AUG Mathematician Jianhong Wu and biologist Jean-Paul Paluzzi spoke with *The Globe & Mail* about the spread of ticks and Lyme disease. Physics alumnus Gordon Drake received the Peter Kirkby Memorial Medal for his service to physics in Canada.

SEP The Faculty hosted the NSERC Undergrad Summer Research Awards Poster Day and BBQ.

OCT Chemist Barry Lever was elected as a Fellow of the Royal Society of Canada. More than 300 visitors came out to the Pan Am Stadium (now the York Lions Stadium) to watch the "Supermoon" total eclipse.

Physicist Matt Johnson discussed the scientific imagination on CBC Radio's *Ideas with Paul Kennedy*. The Science of Science Fiction lecture series launched at Toronto Public Library branches.

NOV Biologist Ken Davey received an honorary doctor of science degree from York and delivered a passionate and thought-provoking address at convocation.

DEC Chemist Demian Ifa won the Petro-Canada Young Innovator Award. The Department of Physics & Astronomy hosted more than 250 high school students and teachers for a special screening of *The Martian*, with Allan Carswell introducing the film and Paul Delaney and Chris Bergevin responding to audience questions.

Physicist Sampa Bhadra, as a member of the T2K collaboration, shared the Breakthrough Prize in Fundamental Physics.



Sun Kwok, dean of science at the University of Hong Kong, visited the Faculty and delivered two lectures.

Mathematician Tom Salisbury received the Canadian Mathematical Society's Graham Wright Award for Distinguished Service.

Physics PhD student George Conidis received the Mitacs PhD Award for Outstanding Innovation.

Dean Ray Jayawardhana commented on the Nobel Prize in Physics announcement for more than 20 media outlets, including *The Washington Post*, the *Toronto Star*, *CBC* and *Radio New Zealand*, and wrote related articles for *The Atlantic* and *The Wall Street Journal*.

DEC About 500 people attended the inaugural York Science Forum featuring renowned Harvard physicist and best-selling author Lisa Randall. York physicists Sean Tulin and Wendy Taylor joined her for a panel discussion. Randall also delivered the first Fields-York Lecture on the Physics & Mathematics of the Universe on campus. More than 50 media outlets reported on biologist Sapna Sharma's discovery of rising global lake temperatures.

**SCIENCE@50**

50

**CELEBRATING  
FIFTY YEARS**

1965 - 2015

Science@50. It was 50 years ago that the Faculty of Science at York University was created. We toasted five amazing decades of success and impact through a series of events, including an elegant gala, a public forum, department days, contests and a movie night. Thousands of past, present, and future students; faculty members and staff; and friends, donors and community members came out to celebrate with us.

**DISPATCHES FROM THE FRONTIERS OF SCIENCE**

The Science@50 public event, Dispatches from the Frontiers of Science, was held at the Appel Salon of the Toronto Reference Library. A crowd of more than 500 community members gathered to hear about five big questions for the next 50 years from professors Jane Heffernan (Mathematics & Statistics), Demian Ifa (Chemistry), Matt Johnson (Physics & Astronomy), Edward Jones-Imhotep (Science & Technology Studies) and Sapna Sharma (Biology). Anna Maria Tremonti, host of CBC Radio's *The Current*, moderated the discussion..

**THE MARTIAN: A PHYSICS & ASTRONOMY PRESENTATION**

The Department of Physics & Astronomy hosted more than 250 high school students and teachers for a special screening of *The Martian* at the Cineplex Colossus theatre in Vaughan. The film was introduced by Professor Emeritus Allan Carswell and was followed with a Q & A with Paul Delaney and Chris Bergevin about the science behind the movie.



△ Professor Emeritus Allan Carswell chats with a student about the film's connections to space exploration.



#### DEPARTMENT DAYS

Each department in the Faculty of Science—Biology, Chemistry, Mathematics & Statistics, Physics & Astronomy and Science & Technology Studies (STS)—organized a Department Day to showcase its milestones. Professor Janet Vertesi (Princeton University) headlined STS Day with a keynote address on “The Social Life of Spacecraft,” which was followed by a panel discussion.

△ Panel discussion at Science & Technology Studies (STS) Day. *Left to right:* Professors Kenton Kroker (STS) and Janet Vertesi (Princeton University), Aryn Martin (STS), Paul Delaney (Physics & Astronomy); and PhD candidate Jordan Bimm (STS).

#### YORK SCIENCE FORUM WITH LISA RANDALL

Five hundred guests gathered at the Appel Salon for the inaugural York Science Forum featuring renowned Harvard physicist and best-selling author Lisa Randall. Attendees enjoyed Randall speak about her new book *Dark Matter and the Dinosaurs*, followed by a panel discussion with Randall and Professors Sean Tulin and Wendy Taylor (Physics & Astronomy).

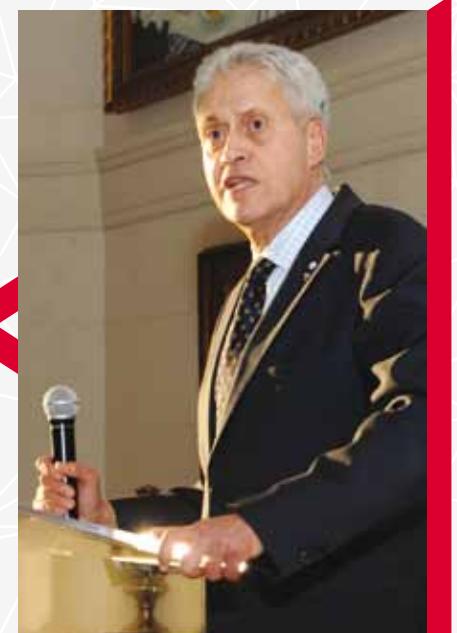
▽ Panel discussion at the York Science Forum. *Left to right:* Professor Sean Tulin (Physics & Astronomy); Lisa Randall (Harvard University); Ray Jayawardhana, dean of science and panel moderator; and Professor Wendy Taylor (Physics & Astronomy).



#### SCIENCE@50 GALA

The Faculty of Science’s many successes and achievements over the past 50 years were celebrated at the Science@50 gala with staff, faculty, retirees, students, alumni and friends. Award-winning journalist Piya Chattopadhyay from CBC Radio and TVO served as the master of ceremonies for the evening. York University President and Vice-Chancellor Mamdouh Shoukri and Vice President Academic & Provost Rhonda Lenton joined the celebration. Past deans and long-serving faculty and staff members were recognized with special awards, and the winners of a photography contest were announced.

△ *Left to right:* Sibonile Siyakatshana, Helena Brown, Janae Diaz, Monique Golding and Dimitra Markatas.



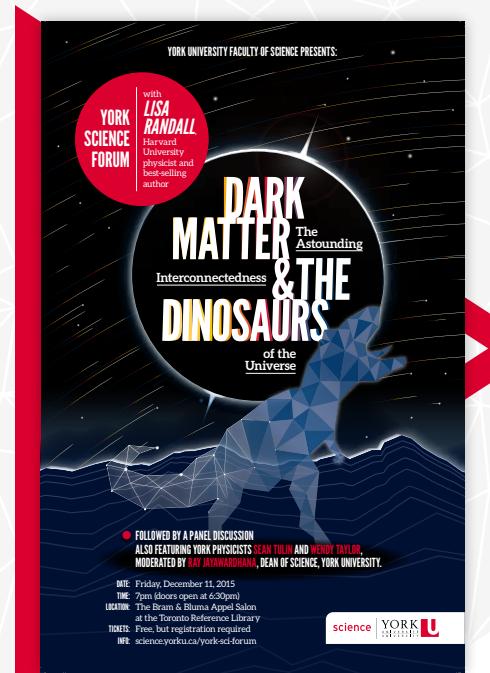
“I am delighted to celebrate the wonderful occasion of the fiftieth anniversary of the Faculty of Science. At the heart of any research-intensive institution is scientific discovery and York is no exception. The Faculty of Science is situated quite literally at the heart of our campus, and the innovations of this Faculty over the course of its history have given life to some of our most celebrated accomplishments as an institution.”

— York University President and Vice-Chancellor Mamdouh Shoukri

“This is a wonderful time of celebration and renewal for the Faculty of Science. As we raise a toast to five remarkable decades of discovery, learning, innovation, engagement and impact, we are inspired to reach for even greater heights in the years and decades ahead.”

— Faculty of Science Dean Ray Jayawardhana

△ President and Vice-Chancellor Mamdouh Shoukri



## RESEARCH BY THE NUMBERS

**100%**

Success rate of first-time applications  
to NSERC Discovery Grants program by  
new faculty members

**\$14.8M+**

Total new research funding in the Faculty of Science

**\$6.1M+**

Total new funds from NSERC

**\$5.0M+**

Total new funds from other sources

**\$3.0M+**

Total new  
funds from  
CIHR

**\$573K+**

Total new funds from Mitacs for student and postdoc internships

## RESEARCH FUNDING HIGHLIGHTS

Researchers Emanuel Rosonina **B**, Chun Peng **B** and Thilo Womelsdorf **B** were awarded CIHR operating grants totaling \$1.5M.

More than \$545K in CFI-JELF and ORF funding was awarded to Carol Bucking **B** for the Centre for Integrative Laboratory and Field Physiology and to Seyed Moghadas **MS** for his project "Quantitative methods and infrastructure for rapid, evidence-based decision-support in public health."

The Canadian Alpha-g team, of which Scott Menary **PA** is a member, received \$1M in CFI-IF and ORF funding to study antimatter gravity with cold-trapped antihydrogen.

The Canada Research Chairs program invested \$3.3M to support three chair positions: Jianhong Wu **MS**, NSERC Tier 1 CRC in Industrial and Applied Mathematics; Sean Tulin **PA**, NSERC Tier 2 CRC in Particle Physics and Cosmology; and Peter Backx **B**, CIHR Tier 1 CRC in Cardiovascular Biology.

Derek Wilson **C**, Chun Peng **B** and Sergey Krylov **C**, in partnership with Sanofi Pasteur, Sciex and Fluidigm, received a \$990K NSERC Collaborative Research Development Grant to advance technologies for biopharmaceutical development and manufacturing.

The NSERC Research Tools and Instruments Grants program awarded a total of nearly \$290K to Sergey Krylov **C** for instrumentation for functional cytometry, Jean Paul Paluzzi **B** and colleagues for an automated multi-channel fluorescence imaging system, and Emanuel Rosonina **B** for a tetrad dissection microscope.

Andrew White **B** was awarded an NSERC Discovery Grant and NSERC Discovery Accelerator Supplement totalling \$380K for his project "Riboregulation of RNA virus replication."

Amro Zayed **B** and Jianhong Wu **MS** received nearly \$1.35M in partnered funding from Genome Canada, the ORF and the Ontario Ministry of Agriculture and Food and Rural Affairs for the project "Sustaining and securing Canada's honey bees using 'omic' tools."

Jianhong Wu **MS**, in collaboration with Ali Agary (Faculty of Liberal Arts & Professional Studies) and Gunho Sohn (Lassonde School of Engineering), received \$1.45M from the ORF-LIF for the Advanced Disaster Emergency, Rapid Response Simulation Program.

Derek Wilson **C** was awarded \$330K from the Krembil Foundation for his project "Understanding the molecular origins of neurodegenerative disease." This is the first time the Faculty of Science has received funding from this Toronto-based Foundation.

Wendy Taylor **PA** and Sampa Bhadra **PA** received funding from the NSERC Subatomic Physics Project Research Grants program as co-investigators on the Canadian teams involved in the ATLAS experiment at CERN and the T2K neutrino oscillation experiment.

Huaxiong Huang **MS** received more than \$195K from the NSERC Engage Grant program and TMX group for his project "Analysis of exchange and over-the-counter asset prices: liquidity, volatility and optimal trading strategies."

Seyed Moghadas **MS**, in partnership with Sanofi Pasteur, received funding from the Mitacs Accelerate Cluster program to study the effect of high-dose influenza vaccination in a geriatric population.

Huaiping Zhu **MS** was awarded \$80K from the Ontario Ministry of the Environment for his project "Developing extreme climate indices for building code calculation in Ontario from the IPCC AR5 multi-model ensemble."

**B**

BIOLOGY

**C**

CHEMISTRY

**MS**

MATHEMATICS & STATISTICS

**PA**

PHYSICS & ASTRONOMY

**STS**

SCIENCE &  
TECHNOLOGY  
STUDIES

## SELECT RESEARCH FUNDING

Researcher	Project Name
<b>SELECT NSERC DISCOVERY</b>	
Laurence D. M. Packer	B Bees: biodiversity, biogeography
Chun Peng	B Endocrine control of fish reproduction
Michael P. Scheid	B Control of gene expression by protein phosphorylation
Amro Zayed	B From molecules to societies and back again: uncovering the missing links between social evolution and genome evolution
Yun Gao	MS Multi-affine Lie algebras and their representations
Neal N. Madras	MS Stochastic systems: theory and models
Walter John Whiteley	MS Geometry and combinatorics of rigidity and its applications
Dasantila Golemi-Kotra	C Elucidation of the molecular mechanism of <i>Staphylococcus aureus</i> response to cell wall damage
Cody H. Storry	PA Atomic physics of simple atoms of matter and antimatter
<b>SUBATOMIC PHYSICS PROJECT RESEARCH GRANT</b>	
Sampa Bhadra	PA Canadian participation in the T2K neutrino oscillation experiment
Wendy J. Taylor	PA The ATLAS experiment at the CERN LHC
<b>NSERC ENGAGE</b>	
Huaxiong Huang	MS Analysis of exchange and over-the-counter asset prices: liquidity, volatility and optimal trading strategies
Jane Heffernan	MS A computational modelling framework for identifying smart vaccination strategies
Seyed Moghadas	MS Developing a system biology algorithm for disease risk assessment
<b>MITACS ACCELERATE &amp; ACCELERATE CLUSTER</b>	
Alan C. Hopkinson	C Determination of stress-induced modifications to vaccine proteins by mass spectrometry
Ed Furman	MS Economic capital and capital allocation modelling
Jianhong Wu	MS Health economics and modelling collaboration between Sanofi Pasteur and York: pertussis study
Derek Wilson, Sergey Krylov, Yi Sheng, Logan Donaldson	C Biomolecular structure analysis to accelerate development of new vaccines and monoclonal antibodies
Seyed Moghadas	MS Effect of influenza vaccination with high-dose antigen on geriatric population
Honmei Zhu	MS Modelling default probabilities in a credit risk portfolio
<b>MITACS GLOBALINK</b>	
Gary Sweeney	B Investigation of adiponectin signalling mechanisms and the significance of adiponectin resistance in obesity and diabetes
<b>BURROUGHS-WELLCOME FUND</b>	
Mark Bayfield	B Bioinformatic analysis of Slr1p associated RNA transcripts
Logan Donaldson	B New protein structures and functions in a virulence cluster associated with pathogenic <i>E. coli</i> infection

## GRADUATE AND UNDERGRADUATE NUMBERS

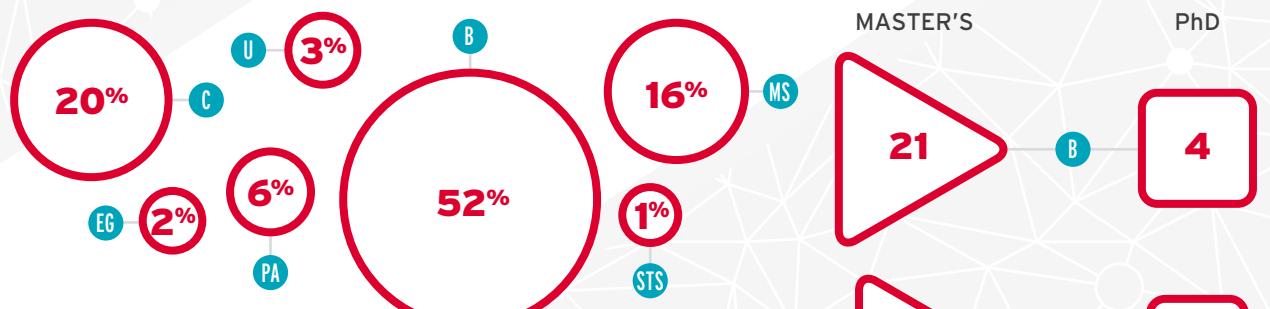
2015 UNDERGRADUATE APPLICANTS  
OF **6209** APPLICANTS, **1083** WERE ADMITTED



TOTAL UNDERGRADUATE DEGREES GRANTED IN 2015  
**445** (BA, BSc, BScT, iBSc)



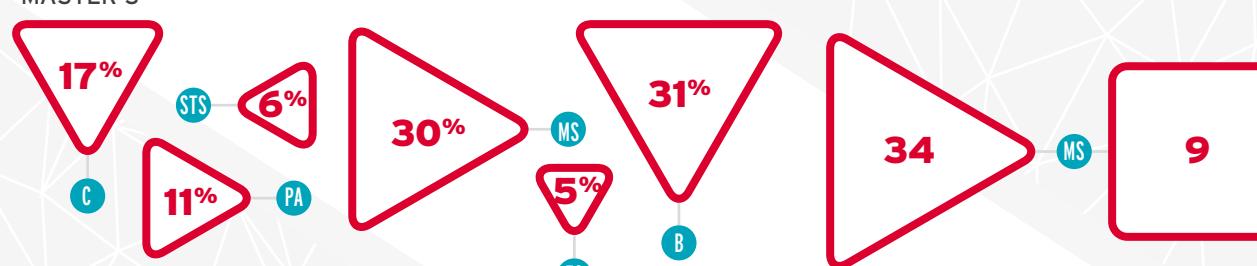
### UNDERGRADUATES BY MAJOR



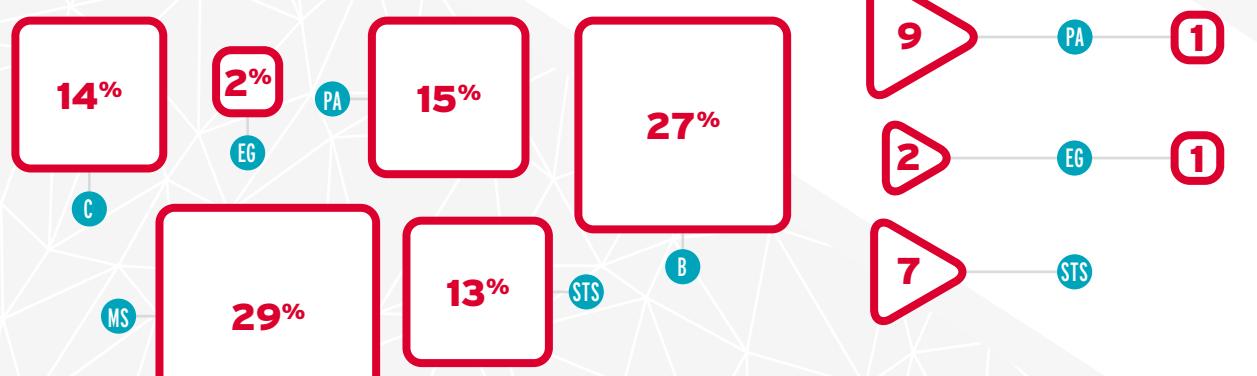
### DEGREES GRANTED IN 2015 BY MAJOR



TOTAL GRADUATE STUDENTS ENROLLED BY DEPARTMENT  
MASTER'S



### PhD



## SELECT INDIVIDUAL AWARDS & ACHIEVEMENTS

### SELECT FACULTY AWARDS

Breakthrough Prize in Physics	Sampa Bhadra
Petro Canada Young Investigator Award	Demian Ifa
FSc Early Career Research Award	Matthew Johnson
FSc Established Research Award	Norbert Bartel
FSc Excellence in Teaching Award	Scott Menary
FSc Graduate Mentorship Award	Christopher Lortie



3

### SELECT UNDERGRADUATE AWARDS

York University President's Scholarship ①	Nicholas Chrobok Joel George Natalia Pan	Shaili Perez Antonette Spagnuolo Catherine Spagnuolo
York University President's Honour Roll ②	Joshua Altman Boris Barron Brigida Bruno Danica Chaharlangi Christian Colavecchia Ashley Esteves Joshua Fletcher Joel George Yaakov Green	Daniel Ng Shaili Perez Kiarash Salehigilani Vijay Sandhu Erica Shenfeld Catherine Spagnuolo Danielle Stein Houman Tahmasebi Jonathan Tebbi
Embleton Award ③	Japjeet Toor	
Enbridge Scholarship ④	Stanislav Balchev	
Gold Medal	Emil Noordeh	
Silver Medal	Houman Tahmasebi	



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### SELECT GRADUATE AWARDS

Dalton Pharma Services/Dr. Douglas Butler Award in Organic Chemistry	Jennifer Farmer Sepideh Sharif
Charles Hantho Award in Atmospheric Chemistry	Baray Sabour Hassani Yasamin
Nestmann Scholarship	Eva DeRango-Adem David Miller
NSERC Alexander Graham Bell Canada Graduate Scholarship—Doctoral	Brock Harpur
NSERC Alexander Graham Bell Graduate Scholarship—Master's	Kathleen Dogantzis Antoine Dumont Alexander Klenov
Vanier Canada Graduate Scholarship	Alexandra Terrana (NSERC) Bretton Fosbrook (SSHRC)
CIHR Frederick Banting & Charles Best Canada Graduate Scholarship—Master's	Prabhjot Dhami
Joseph-Armand Bombardier CGS Doctoral Scholarship	Jason Grier Jeffrey Wajsberg
CIHR Fellowship	Heath McMillan
NSERC Alexander Graham Bell Canada Graduate Scholarship—Postgraduate	Laura Newburn Marlee Ng
SSHRC Elia Scholar	Anita Buragohain



#### 1. PAUL DELANEY

Paul Delaney, director of the York University Astronomical Observatory and the Division of Natural Science, is undoubtedly one of York's most sought-after spokespersons on astronomy. In 2015, he made more than 70 media appearances on TV and radio and was quoted in newspapers across the country and beyond. He commented on asteroid 2004BL86, the future of space exploration, liquid water on Mars, the landing of Space X's Falcon Rocket, the total lunar eclipse and much more. The public enjoys Delaney's personable and engaging style both live and through the airwaves.

#### 2. SAPNA SHARMA

Assistant Professor Sapna Sharma (Biology) published a headline-grabbing paper in *Geophysical Research Letters* that showed that lakes around the world are warming up quickly due to climate change. The research was covered extensively by more than 50 media outlets nationally and internationally, including *National Geographic*, *CBC*, the *Toronto Star*, *Discovery News* and *Yahoo News*.

#### 3. BRIDGET STUTCHBURY

Professor Bridget Stutchbury (Biology) was featured in various media speaking about why songbirds are slowly vanishing from forests, fields and gardens and what we need to do to save them. She appeared in the "SongbirdSOS" episode on CBC's *The Nature of Things*, in the documentary film *The Messenger*, which premiered at the Hot Docs Canadian International Documentary Festival, and on CP24's *Animal House Calls*. She also highlighted the importance of protecting the continental "bird nursery" in an op-ed piece for the *Toronto Star* and commented on the decline of biodiversity in the *Guelph Mercury*.

#### 4. AMRO ZAYED

A honeybee genomics project that Associate Professor Amro Zayed (Biology) is co-leading with Professor Leonard Foster (University of British Columbia) generated widespread media coverage. Zayed was interviewed by CBC Radio's *The Current*, *CTV News*, the *Toronto Star*, *Metro News* and many other outlets about the project. He also authored a short piece in the *Toronto Star* about his favourite home-made tree ornament, a dung beetle, which represents a symbol of the ancient Egyptian god of rebirth, Khepri.

The Faculty of Science enjoyed tremendous media coverage locally, nationally and internationally throughout 2015. Our researchers were profiled for their discoveries and accomplishments, and they provided expert commentary on numerous stories and events in the media, raising the profile of science at York University.



AM900 CHML Hamilton

Ben Quine

1

Ben Quine

2

Ben Quine

3

Ben Quine

4

**B**

## DEFEATING DESTRUCTIVE PLANT VIRUSES

BIOLOGY

ANDREW WHITE



Some plant viruses can have ravaging effects on agriculture, reducing crop growth, yield, and quality and in turn causing economic losses. But by studying how these viruses function and reproduce, scientists can uncover critical clues on how to combat and prevent infections.

Professor Andrew White (Biology) explores how disease-causing plant viruses infect and reproduce in important agricultural crops. His lab uses the tomato bushy stunt virus as a model to understand how viral genomes, particularly those comprised of ribonucleic acid (RNA), regulate processes essential to their infection, such as gene expression and replication. RNA viruses make up the largest group of crop-damaging viruses.

White has already identified several RNA sequences that control these processes and developed comprehensive molecular models to explain how they work. His team is currently looking at how these sequences are spatially organized within viral genomes and coordinate their functions.

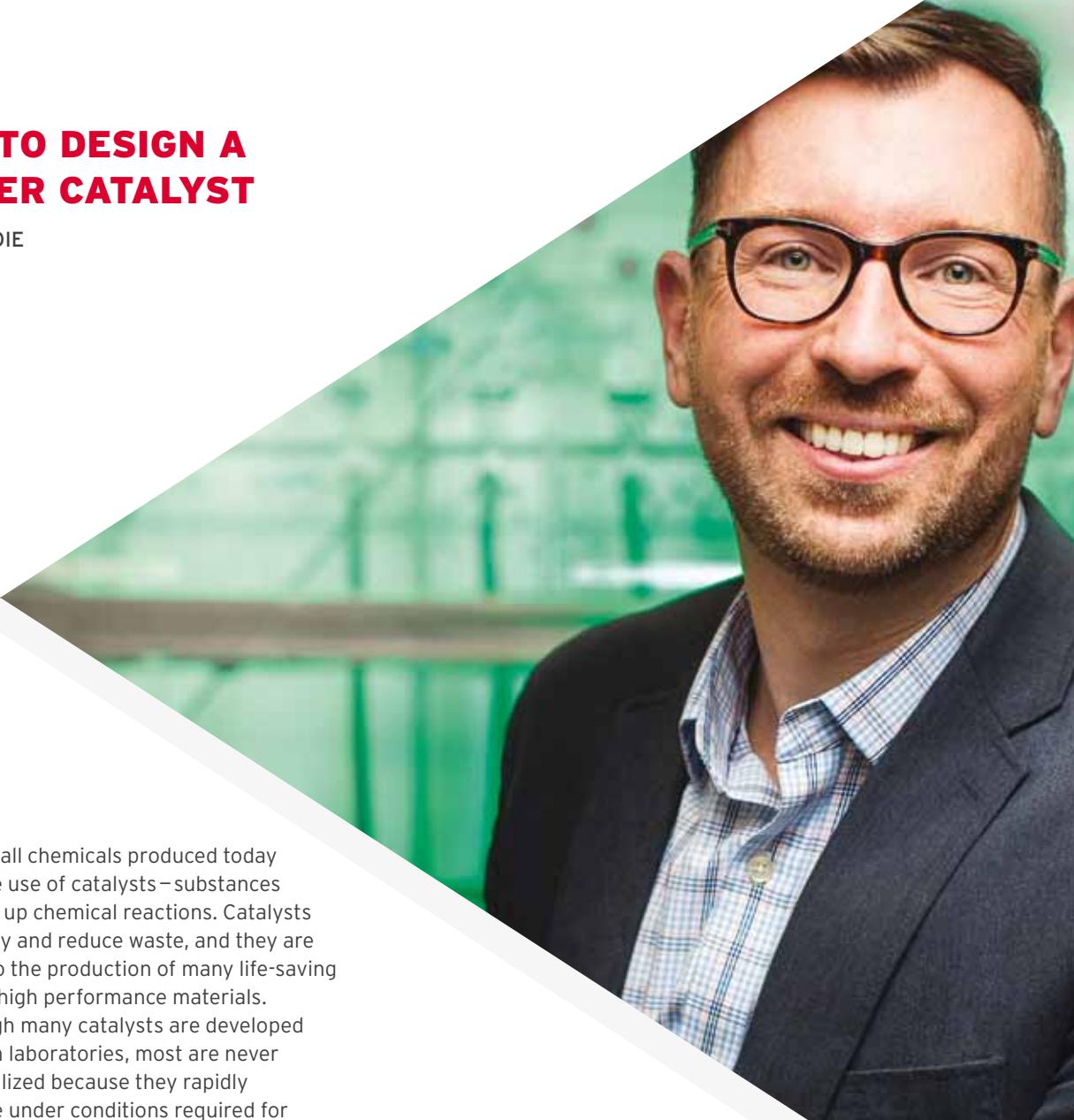
"Our research is providing insights into how plant viruses establish and maintain their infections and will help us develop anti-viral strategies that can specifically inhibit virus activities and prevent infections," says White.

**C**

## HOW TO DESIGN A BETTER CATALYST

CHEMISTRY

GINO LAVOIE



Almost all chemicals produced today require the use of catalysts—substances that speed up chemical reactions. Catalysts save energy and reduce waste, and they are essential to the production of many life-saving drugs and high performance materials.

Although many catalysts are developed in research laboratories, most are never commercialized because they rapidly deteriorate under conditions required for large-scale manufacturing, such as high temperatures. Gino Lavoie's research group is focused on addressing this problem. Lavoie, associate professor (Chemistry), and his team are designing new catalysts that are more robust and more versatile.

"The production of almost every material used in our daily lives depends on catalysts, including high-energy fuels, medicines, polymers, fertilizers, and pretty much everything in between," says Lavoie. "Finding ways to improve catalysts will allow us to produce these materials more efficiently and economically."

Lavoie is particularly interested in using "organometallic complexes" as catalysts to leverage the distinctive properties of metal-carbon bonds. Recent findings by his team

uncovered why some of these catalysts break down at high temperatures, providing insights as to how to make them more stable and suitable for commercial reactors. Catalysts with new structural features are currently being developed and tested in his lab.

Lavoie received his PhD from the Massachusetts Institute of Technology, working under the supervision of Nobel Laureate Dr. Richard R. Schrock. After completing a post-doctoral fellowship at the University of California at Berkeley, he worked for several years as an industrial research chemist before coming to York University.

MATHEMATICS  
& STATISTICS

## PLAYING WITH SYMMETRY

ASIA IVIĆ WEISS



In her more than 30 years at York University, Professor Asia Ivić Weiss (Mathematics & Statistics) has been immersed in studying geometric figures and how they can be combined, disassembled and arranged in different ways to create new objects.

Ivić Weiss studies objects called polytopes, which are shapes made up of points, lines, and polygons that can extend into any mathematical dimension. She is particularly interested in the symmetry of these figures, which can get quite complex and beautiful. Picture the shapes you might see when looking through a two- or three-dimensional kaleidoscope.

She became fascinated by polytopes and symmetry during her PhD training, which she completed with one of the world's greatest geometers Harold Scott MacDonald Coxeter.

"Once you get into a problem, you just want to keep going," says Ivić Weiss. "Symmetry is the central theme of my work. It's beautiful and there's so much to explore about it."

Her recent research has been on "chiral" polytopes, which are very symmetrical, yet lack mirror symmetry. You can think of

them as having a "right" and "left" version of themselves, like our hands for instance. Chirality is important in several branches of science, including crystallography, physics and biology, in which a molecule and its mirror image can have vastly different effects.

Ivić Weiss has written countless articles and expository articles, as well as edited books, on her area of research. Her expertise has been sought out internationally, with numerous invitations to deliver lectures. She has also inspired the work of artists.

PHYSICS &  
ASTRONOMY

## PUTTING EINSTEIN TO THE TEST

NORBERT BARTEL



One hundred years ago Einstein published his theory of general relativity, which has shaped how we understand the Universe. The theory explains that what we perceive as gravity is actually a geometric property of space and time, or spacetime. A massive body like Earth curves spacetime and its daily rotation even twists it. The problem is that the rulebook for general relativity conflicts with another important concept that explains how nature works, quantum theory.

"Quantum theory accounts for what happens on a small scale, at the particle level," says Norbert Bartel, distinguished research professor (Physics & Astronomy), "and it has been tested over and over and is super solid. General relativity, however, as beautiful as it is, could break down at some level. Can we perhaps find deviations from predictions that could lead to new insights about the physical world—or is Einstein always right?"

This question inspired Bartel to take an interest in testing Einstein's theory. More than a decade ago, NASA, Stanford University and the Harvard-Smithsonian Center for Astrophysics invited Bartel to collaborate

with them on the Gravity Probe B (GP-B) mission. GP-B aimed to measure the curving and twisting of spacetime around Earth and ultimately test Einstein's theory. And Bartel and his team, with their expertise in a technique called "very-long-baseline interferometry," provided a reference frame for measuring the shape of spacetime. In the end, GP-B showed that spacetime is curved and twisted as predicted; Einstein was right. The team published the landmark experiment in November 2015 in a focus issue of *Classical and Quantum Gravity*, the world's leading journal in the field.

**THE POWER OF KNOWLEDGE**

HÉLÈNE MIALET



Understanding how scientific knowledge is made and shared and what it means to society is an area of great interest to anthropologists like Hélène Mialet, who was recently appointed as an assistant professor (Science & Technology Studies).

"Showing the complex social and material ramifications that allow science to function is fascinating to study," says Mialet. "Science is in no way cold and detached, rather it is intimately entangled in our social fabric, reconfiguring our ways of thinking, producing knowledge, interacting, trading, socializing, and loving."

Mialet is currently focused on understanding how lay and expert knowledge impact chronic disease management and how prosthetics and electronic medical devices are created and used. In addition, she is exploring the relationships among caregivers, patients and machines and how health is understood and managed within these networks.

One of her interests also lies in unpacking the concept of the "scientific genius." This brought her to study the brilliant cosmologist Stephen Hawking who has lived with Lou

Gehrig's disease for about 50 years and communicates today through a machine. For years Mialet followed Hawking as he worked, interviewing him and the people around him, including nurses, assistants, students, colleagues and journalists. She documented how Hawking's "genius"—which is often portrayed as the product of his mind alone—is actually the result of complex networks of humans and machines. Her findings emphasize how science relies on a collective effort and not necessarily on one person's brilliance. The book that resulted from her research is entitled *Hawking Incorporated* (University of Chicago Press, 2012).

**HOW'S A GOOD CHOICE DIFFERENT FROM A BAD ONE?**

THILO WOMELSDORF



Humans and other primates are capable of rapidly adapting to new situations and learning to make good choices. Millions of cells across the brain work together to make this happen, but how the brain pulls it off in such a decentralized, coordinated way is still much of a scientific mystery.

Thilo Womelsdorf's research aims to solve this puzzle. In 2015, Womelsdorf, associate professor (Biology), received more than \$800K from the Canadian Institutes of Health Research to study the areas of the brain that contribute to fast and flexible learning. With the new grant, he and his team are observing the sequence of cell activities unfolding within and between three key areas in the brain (the hippocampal complex, the anterior cingulate cortex, and the lateral prefrontal cortex). They hope to better understand not only how brain cells coordinate to produce flexible learning,

but also how weak links in the network relate to a number of psychiatric syndromes, including attention disorders and depression.

"Our everyday experiences depend on functioning networks of brain cells," says Womelsdorf. "My research on the mechanisms behind fast learning and adaptive behaviour will lead to a better understanding of various mental illnesses that affect the health and well-being of Canadians."

**B**

## DECIPHERING THE FLIP SWITCHES FOR OUR GENES

EMANUEL ROSONINA

BIOLOGY



Human cells contain about 20,000 genes, and being able to control which ones are active at the right time and place is critical to functioning normally.

Assistant Professor Emanuel Rosonina (Biology) has taken a keen interest in understanding how our cells control gene expression—under normal conditions, as well as under stress and in cancer. One area of focus in his lab is to explore the role of a protein called “small ubiquitin-like modifier,” or SUMO. Research has shown that SUMO binds to and modifies dozens of proteins that activate, repress and co-regulate gene expression; what’s unclear, though, is why SUMO does this and how it affects protein function.

Understanding these effects is the focus of a \$500K grant Rosonina recently received from the Canadian Institutes of Health Research. The funded research will aim to identify the overall role of SUMO in controlling gene activity. Rosonina is using yeast cells

as his experimental model. His lab has also developed a yeast strain in which virtually all SUMO modifications can be stopped. With this unprecedented tool, he will explore why organisms, including humans, need SUMO to survive.

“By examining how SUMO regulates gene activity, our work will provide important insights into the normal functions of the protein as well as the consequences of the abnormal SUMO modifications commonly observed in cancer,” says Rosonina.

**B**

## KEEPING PREGNANT WOMEN HEALTHY

CHUN PENG

BIOLOGY



Worldwide, over 75,000 pregnant women and 500,000 infants die each year from preeclampsia (PE)—a condition of high blood pressure in pregnancy. Those who survive are at a high risk of developing cardiovascular disease later in life. Unfortunately, there isn’t a known cure or a way for doctors to prevent or diagnose the disease early.

Part of the issue is that PE is not well understood. During pregnancy, placental cells invade deeply into the uterus, replacing the cells on the walls of blood vessels and causing the vessels to dilate. Experts believe that PE occurs when this process doesn’t happen sufficiently.

Professor Chun Peng (Biology) conducts research on women’s reproductive health, and one focus of her program is to better understand PE and to identify biomarkers that could be used to help diagnose and prevent the disorder.

“One of the major challenges for maternal and perinatal health programs is to develop effective early diagnostic and preventive

strategies that will minimize the burden of PE,” says Peng. “We hope that our research can uncover easy and effective screening tools.”

Peng’s lab recently took an interest in the role of a type of microRNA called “miR-218”. Her team discovered that miR-218 promotes the proper development of the placenta and transformation of blood vessels, and that miR-218 levels are lower in the placentas of women with PE. With a recent bridging grant from the Canadian Institutes of Health Research, Peng is now taking a closer look to figure out how miR-218 might be carrying out its beneficial effects.

PA

PHYSICS &  
ASTRONOMY

## DOES ANTIMATTER FALL UP OR DOWN?

SCOTT MENARY



To most people, antimatter is exotic stuff, primarily because there isn't much of it around. But to Professor Scott Menary (Physics & Astronomy), antimatter (or its lack thereof) is a puzzle of fundamental importance.

Antimatter particles are similar to their matter counterparts except, for example, that they have an opposite electrical charge. And when matter and antimatter come into contact, they annihilate, creating pure energy.

"In the Big Bang, antimatter and matter were created in equal amounts," says Menary. "So the question is, what happened to all that primordial antimatter?"

Menary and his multi-national collaborators on the ALPHA (Antihydrogen Laser Physics Apparatus) experiment are seeking an answer to that question by comparing an antimatter system—antihydrogen—to the most precisely measured matter system that exists—hydrogen. The experiment is being performed at the European Centre for Particle Physics (or CERN) in Geneva, Switzerland, as it

is the only lab in the world that can supply the antiprotons needed to make antihydrogen.

Menary and the Canadian team collaborating on the ALPHA experiment have been particularly involved in developing the detectors used in the research. In 2015 they received funding from the Canadian Foundation for Innovation to build a new device called ALPHA-g that aims to test whether or not antihydrogen "falls" in Earth's gravitational field like matter does. This is one more attempt to find a window to the physics underlying the matter-antimatter asymmetry in our universe.

B

BIOLOGY

## YOU ARE WHAT YOU EAT

CAROL BUCKING



An organism's physiology is shaped by what, where and how often it eats. Digestion can induce imbalances—such as in salt, water and pH, among others—and an animal tries to correct those imbalances, in turn changing the physiology of its entire body. How is all of this connected?

This is a question explored in Carol Bucking's lab. Her organism of interest: fish. Bucking, assistant professor (Biology), studies how fish digest their meals and what happens to their bodies when they eat. She also examines how fluctuations in the environment—related to temperature and salinity, for instance—impact fish digestion. In 2015, she received nearly \$320K from the Canadian Foundation for Innovation's John R. Evans Leaders Fund, the Ontario Research Fund and matching funds from various companies to advance her research in this field.

"My research aims to seek an understanding of how animals cope with challenges associated with feeding and starvation to ultimately answer the question, why do animals have the digestive physiology they do?" explains Bucking.

As a comparative physiologist, she studies a number of different fish species. She also combines laboratory studies with field studies, examining everything from gene regulation to whole animal responses. Her research is shedding light on not only fish physiology, but also the effects of environmental stressors, such as pollution and climate change, on fish and how they adapt and survive to these stressors. This work could potentially influence environmental policies.

Bucking received the 2016 President's Medal from the Society for Experimental Biology for her outstanding research and accomplishments in her field.



## USING COMPUTERS TO FIGHT DISEASES

SEYED MOGHADAS



Every year, infectious disease epidemics—the latest being the vector-borne Zika virus infection—inflict a substantial health and socio-economic burden worldwide. Often times, health officials are caught off guard and may not have specific policies and intervention strategies in place to manage these threats in a timely manner.

Associate Professor Seyed Moghadas (Mathematics & Statistics) aims to help with this. His research program develops computer simulation models that can be used to inform public health policies on how to reduce the burden of infectious diseases. His research is important in the event of an outbreak, such as influenza, when policy makers strive to make informed decisions under substantial uncertainty.

"Our goal is to develop models that can inform evidence-based decision-making in public health," says Moghadas.

To this end, the Canadian Foundation for Innovation and the Ontario Research Fund awarded Moghadas \$265K to develop computer infrastructure that will allow his

team to create data-driven disease models and decision-support tools more efficiently. His lab is the first in Canada to acquire such infrastructure.

With the new funding, his team will be better equipped to assess the risk of impending epidemics, provide population health indicators based on the latest available data, and identify optimal management strategies. The impacts could be substantial. With better models and tools, more lives could be saved and illness and hospitalizations could be minimized during an epidemic. Not to mention the resulting economic benefits.

## COLLABORATING WITH SANOFI PASTEUR FOR IMPROVED HEALTH OUTCOMES

York University has collaborated with Sanofi Pasteur for the past three years on several major projects. The pharmaceutical company contributes to three major areas of research at York: disease math modelling for health outcomes, analytical biochemistry and community outreach.

Sanofi's philanthropic support and contributions to York total nearly \$880K, including more than \$670K of ongoing investments and \$208K in cash sponsorships, donations and in-kind gifts of equipment. Overall, projects are valued at more than \$2.6M.

### KEY YORK-SANOFI COLLABORATIONS

#### Developing and testing the pertussis booster vaccine

Professor Jianhong Wu (Mathematics & Statistics) and Ayman Chit, Sanofi, are developing and testing the comparative age structure and cost-effective economic models for distributing a pertussis booster vaccine in Canada. The program represents a timely response to understanding the introduction of different acellular vaccine recommendations on the transmission dynamics of *B. pertussis* and is critical to Sanofi Pasteur's production plan of a cellular pertussis vaccine.

#### Evaluating the seasonal influenza vaccine

Associate Professor Seyed Moghadas (Mathematics & Statistics), and Ayman Chit, Sanofi, are evaluating the health benefits and costs associated with Sanofi's new seasonal influenza vaccine for a geriatric population. The results will determine whether administering the vaccine in nursing homes would be beneficial, given that the production costs are higher than standard seasonal vaccines.

#### Analyzing biomolecular structures for vaccine and antibody development

Professors Derek Wilson (Chemistry), Sergey Krylov (Chemistry), and Yi Sheng

(Biology), and several Sanofi scientists, including Bruce Carpick, Eric Yang, and Andrew James, are analyzing biomolecular structures for vaccine and antibody development, improving biomolecule characterization and developing new testing methods to ensure safe and effective products.

#### Developing a platform for characterizing early stage candidate biologics

York University, Sciox and Fluidigm are developing a platform for rapid, detailed characterization of early stage candidate biologics. Biological macromolecules present a "characterization gap," a critical bottleneck in biopharmaceutical development and a significant risk for pharmaceutical companies who must make decisions on sparse data. A concerted effort to transfer new bioanalytical approaches from academic settings to the pharmaceuticals industry is needed.

#### Team members

**York:**  
Professors Derek Wilson (Chemistry), Chun Peng (Biology), Sergey Krylov (Chemistry)

**Sanofi Pasteur:**  
Eric Yang, Andrew James

**Sciox:**  
Yves LeBlanc

**Fluidigm:**  
Vladimir Baranov

#### SANOFI BIOGENEUS CHALLENGE

The Sanofi Biogenius Challenge is a research competition that encourages students from across Canada to pursue studies and careers in biotechnology. It is designed to increase innovation, grow the economy and maintain quality of life in Canada. York University is the only national academic sponsor of the challenge and the host of the 2016 awards ceremony.

## MANAGING DISEASE OUTBREAKS THROUGH EFFECTIVE GLOBAL PARTNERSHIPS

JIANHONG WU

Professor Jianhong Wu is the Canada Research Chair in Industrial and Applied Mathematics (Tier 1) and a global expert in the development of cutting-edge mathematical models to help predict and control infectious disease outbreaks.

He has modelled and analyzed many types of infections, including SARS, drug-resistant bacteria and the flu virus. He established the Laboratory for Industrial and Applied Mathematics in 2001 and founded the Centre for Disease Modelling at York University during the SARS outbreak in 2004. In addition, Wu spearheads national and international networks of scientists from other institutions and government agencies to tackle various disease management challenges. For instance, his collaboration with the Chinese Center for Disease Control and Prevention led to major policy changes and government investments in HIV/AIDS epidemic control.

National and international partnerships and funding supports have been vital to Wu's research and impact. His collaborations with the UN Food and Agriculture Organization, US Geological Survey, Public Health Agency of Canada and Environment Canada have allowed him to address public health issues both in Canada (e.g., Lyme disease) and internationally (e.g., Avian influenza). In addition, support from organizations abroad, like the Alexander von Humboldt Foundation (Germany), Embassy of France, and Brazilian National Council for Scientific and Technological Development, has brought a number of distinguished international scientists to York to collaborate with Wu.

"My global connections are helping build Canada's capacity, as well as that of other countries, to make science-based policy decisions that will have the greatest impact



on preventing and tackling the spread of diseases when they strike," says Wu.

His Canadian funding has also fueled his research success. In 2015 alone, he received \$1.4M in renewed funding from the Canada Research Chair Program, \$125K from the Fields Institute, and \$1.6M from the Natural Sciences and Engineering Research Council.

Wu was recently profiled in the *Toronto Star* as one of 15 professionals who demonstrate that Canada is succeeding in reversing the country's "brain drain" and retaining top scientific talent. Indeed, York University and Canada as a whole benefit enormously from the contributions of leading researchers like Wu.

## PARTNERSHIP WITH TORONTO PUBLIC LIBRARY IGNITES SCIENCE INTEREST IN THE COMMUNITY

In 2015, York's Faculty of Science began a fruitful partnership with the Toronto Public Library.

Together, the two organizations introduced science-inspired events and lecture series for the public at library branches across Toronto. The goal was to excite students and communities about science and showcase the excellent research happening at York University.

### NEUROSCIENCE LECTURE SERIES

The Neuroscience Lecture Series featured six public lectures on recent advances in neuroscience. Professors from the Faculties of Health and Science presented on a range of topics including movement control, visual senses, mental illness and more.

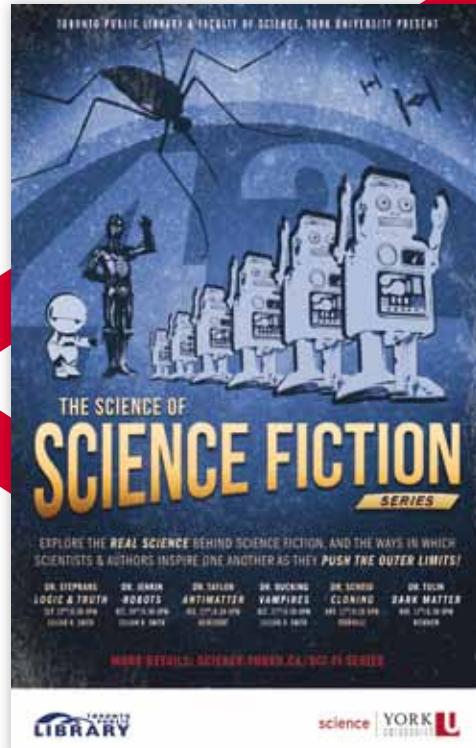
### DISPATCHES FROM THE FRONTIERS OF SCIENCE

The Faculty hosted a conversation on five big questions for the next 50 years: Is our universe the only one? How do we prevent a zombie plague? Will biometrics eliminate privacy altogether? Will climate change put fish in hot water? Should we trust the machines?

Professors from all departments in the Faculty of Science presented and participated in a panel discussion moderated by Anna Maria Tremonti, host of CBC Radio's *The Current*.

### THE SCIENCE OF SCIENCE FICTION SERIES

This innovative lecture series explored the real science behind great science fiction and



the ways in which scientists and authors inspire one another to push the outer limits. Six talks were delivered by professors in the Faculty of Science and Lassonde School of Engineering on topics ranging from the Universe to robot uprisings and vampires.

### YORK SCIENCE FORUM

Bestselling author and renowned particle physicist Lisa Randall presented her latest book *Dark Matter and the Dinosaurs: The Astounding Interconnectedness of the Universe*, which examines the intriguing possibility that a comet might have caused the extinction of the dinosaurs. Following her talk, York physicists joined her for a panel discussion moderated by Ray Jayawardhana, dean of the Faculty of Science.

All of these events attracted a full house and were tremendously received by the public. Given this success, York's Faculty of Science and the Toronto Public Library are continuing their partnership.

Congratulations and thank you to Associate Dean (Students) Peter Cribb for spearheading the organization of these events.

To learn more about these and other future happenings, visit <http://science.yorku.ca/community-alumni/>

**B**

## GROWING THE WORLD'S BEST BEE COLLECTION

LAURENCE PACKER



BIOLOGY

Professor Laurence Packer (Biology) has spent his career researching wild bees. His fascination has taken him camping across North and South America to study bees in their natural habitat and to discover unknown species. His latest trip was to the Atacama in Chile—the world's driest desert—where he collected thousands of specimens.

One of his major undertakings is to continue growing his bee collection at York University—one of the most diverse in the world and the largest in Canada. So far his lab includes more than 300,000 specimens representing more than 90 percent of the world's known bee genera from more than 100 countries.

Why the attention on bees? Bees are essential pollinators, helping to keep our natural world intact. But they are vulnerable.

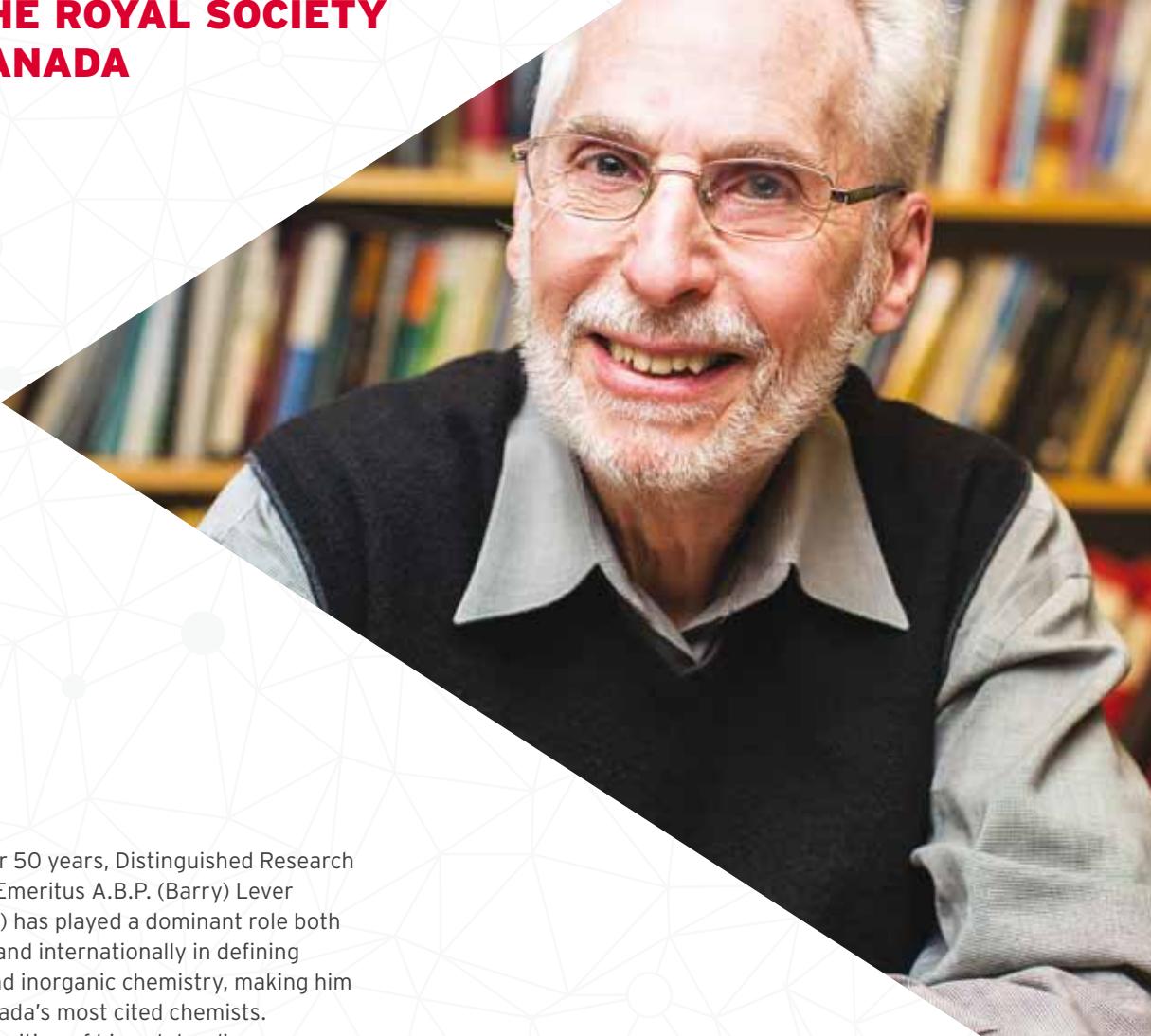
"Climate change, agricultural practices and habitat fragmentation have been reducing bee populations and their geographic ranges," says Packer. "The more that people understand and appreciate bees, the more compassion they will have for them."

In 2015, he co-authored a book with photographer Sam Droege that showcases more than 100 of the most eye-catching bees from around the world. The book, *Bees: An Up-Close Look at Pollinators Around the World* (Voyageur Press, 2015), provides spectacular images and explores how bees make their living, as well as their characteristic adornments, body modifications and habits. It also showcases some of the "hairstyles" different bees wear.

**C**

## EMERITUS PROFESSOR BARRY LEVER RECOGNIZED BY THE ROYAL SOCIETY OF CANADA

CHEMISTRY



For over 50 years, Distinguished Research Professor Emeritus A.B.P. (Barry) Lever (Chemistry) has played a dominant role both nationally and internationally in defining physical and inorganic chemistry, making him one of Canada's most cited chemists.

In recognition of his outstanding achievements, he was elected as a Fellow of the Royal Society of Canada in 2015—the highest honour a Canadian scholar can receive.

Lever received this prestigious acclaim for his research and developments, which include establishing an important synergy between electrochemistry and spectroscopy. He has published some 300 research articles and his research books have been used to train generations of chemists and spectroscopists. He is also the founding and continuing editor of *Coordination Chemistry Reviews*, and he established the very successful "Inorganic Discussion Weekend," a meeting that brings together chemists from across Ontario.

"With most of my Canadian career, some 47 years spent at York University, this award attests to the high quality of the undergrads, grads and postdoctoral fellows who have worked with me over this long stretch of time," says Lever.

Lever's other awards include the E.W.R. Steacie Award and Alcan Award from the Canadian Society for Chemistry, a Killam Foundation Fellowship, and the Linstead Career Award from the Society of Porphyrins and Phthalocyanines.

## USING BIG DATA TO CHALLENGE THEORIES OF THE UNIVERSE

GEORGE CONIDIS

The way we view the Universe has changed, thanks to a discovery by PhD candidate George Conidis (Physics & Astronomy).

Conidis was inspired by his supervisor, Professor Marshall McCall, to understand why and how galaxies spin and are tilted in relation to other galaxies. McCall previously discovered that all galaxies in our cosmic neighbourhood, which includes our very own Milky Way, do not spin according to the pattern predicted by current theory, but rather follow a different one.

Keen on understanding why galaxies have this peculiar organization, Conidis designed pattern recognition software and used it to sift through a database of more than a million galaxies. He found over 170 groups of galaxies that are similar to our own cosmic neighbourhood and observed them more closely with a telescope in an observatory high up in the Sierra de San Pedro Martir Mountains of Mexico. He made nine trips to the observatory and collaborated with Professor Michael Richer (University of Mexico) to collect the data.

Conidis and his colleagues discovered that galaxies spin at an angle to each other that is not predicted by theory. Furthermore,

they inferred that the Milky Way and its closest major galaxy, Andromeda, have had a significant influence on the way galaxies are aligned in our cosmic neighbourhood.

"Our research shows that the current theory of how galaxies spin is in need of revision," says Conidis. "This work also sheds new light on the origin of galaxies, suggesting that the Milky Way played a larger role than we thought in the structure and alignment of the nearby cosmic web."

Conidis's discovery garnered global attention and earned him the 2015 Mitacs PhD Award for Outstanding Innovation. He is now using 3D computer simulations to better understand the behaviour of galaxies and their influence on each other.



## OPENING YOUNG MINDS TO SCIENCE

York's Science Engagement Programs prepare elementary and high school students for a world that demands scientific, mathematical, and technological literacy. Students grow their knowledge, learn scientific thinking, and make friends for life. All programs inspire participants to pursue an education and career in science, technology, engineering and math (STEM).

### SCIENCE EXPLORATIONS CAMPS

The flagship Science Explorations Summer Camps offer a variety of options for kids in grades three to eight. From July to the end of August, kids engage in fun and educational hands-on and engrossing small-group projects that help develop their problem solving and critical thinking skills. Topics support the Ontario science curriculum and include

- To infinity and beyond: science and superheroes
- Codemakers (computer coding for kids)
- Camper vs wild: survivor week
- Fact or fiction: myth busting
- Biomechanics: the science of Pan Am sports (to celebrate the Pan Am games on the York campus)
- Physics of flight

In 2015, camp enrollment increased by more than 25 percent compared to the previous year, and of the 450 campers, nearly 60 percent were new participants.

### Expansion to Mississauga

Thanks to a generous donation from AMGEN, for the first time Science Explorations Camps were offered in Mississauga in summer 2015 and Saturday workshops were offered at Mississauga Library branches throughout the fall. AMGEN has generously agreed to subsidize camps and workshops in Mississauga in 2016.

### March Break Science Camps

The March Break Science Camps are a one-week version of the Summer Explorations Camps and offer children in grades three to eight enriching STEM programs. In 2015, enrollment totaled 75 campers—more than double compared to the previous year.

### HELIX SUMMER SCIENCE INSTITUTE

The Helix Summer Science Institute provides high achieving future scientists exposure to scientific practice and research beyond what they receive in secondary school. An enrichment program designed for students in grades nine to twelve, the institute offers a series of week-long intensive courses in streams such as human and animal biology, biomedical sciences, physics and astronomy, and applied mathematics.

York professors, post-doctoral fellows, visiting scholars, and graduate students design and teach the courses. Students are exposed to advanced and interdisciplinary science topics drawn from research conducted in the Faculty of Science.

The Faculty's commitment to igniting a passion for scientific inquiry in students has made Helix one of its highest priorities for community engagement.



△ Students in the Biology Stream of the Helix Summer Science Institute experience field work and learn how to collect specimens.

## SCIENCE EMPLOYEES RECOGNIZED WITH YORK UNIVERSITY PRESIDENT'S AWARDS

Every year, York University honours and celebrates the achievements of its dedicated employees with the President's Staff Recognition Awards. The Faculty of Science is proud to announce that two of its staff members received awards in 2015.

### CRISTALINA DEL BIONDO—THE VOICE OF YORK AWARD

The Voice of York Award for 2015 was awarded to Cristalina Del Biondo, graduate program assistant in the Department of Biology. She was recognized for her exceptional interpersonal skills, going beyond the call of duty, dealing effectively with difficult situations and exemplifying the positive spirit of York.

The Biology department has a large graduate program, and Del Biondo plays a key role in seeing graduate students through the completion of their degrees. Students seek her advice on matters that are often sensitive and difficult. She always listens patiently and diplomatically explains and advises on options.

"Cristal has been at York for 25 years, and her extensive knowledge of the University,

sincere desire to help and sense of duty have assisted hundreds of prospective and current students and supervisors to make informed decisions," says Ming Jiang, operations manager in the Department of Biology and Del Biondo's manager. "Many students have come to York and completed their degrees because of her effort."

"Cristal always has a smile and sincere words of encouragement for our 160-plus current graduate students, who often arrive in her office stressed," says Bridget Stutchbury, professor and graduate program director in the Department of Biology. "Cristal is highly professional and courteous, even when dealing with difficult situations."

### HOWARD HUNTER—THE RONALD KENT MEDAL

Howard Hunter, nuclear magnetic resonance (NMR) technologist in the Department of Chemistry, received the Ronald Kent Medal for 2015. Hunter was recognized for consistently going above and beyond the requirements of his position to promote the collegiality, spirit, and goals of the University, as well as his commitment to the highest levels of service.

Hunter has been instrumental in establishing research partnerships with York colleagues and external academic and industry scientists. He approaches all projects with the highest level of integrity and professionalism. His openness, pursuit of the highest standards

and respectful manner have gone a long way to promote and strengthen an atmosphere of collaborative excellence in the Faculty of Science and across the University.

"Howard exemplifies a commitment to York with his infectious enthusiasm, collegiality, willingness to lean in and a hands-on approach to getting things done," says Margaret Hough, director of research and partnerships in the Faculty of Science and Hunter's manager.

"Howard plays a critical role in the Faculty of Science and beyond, managing the institution's NMR infrastructure," says Derek Wilson, associate professor in the Department of Chemistry and director of the Centre for Research in Mass Spectrometry. "From a researcher's perspective, it is difficult to sufficiently stress how important it is to have such a skilled person in charge of this technically complex and expensive facility."



**CONGRATULATIONS  
TO DEL BIONDO AND  
HUNTER! YORK SCIENCE  
IS FORTUNATE TO HAVE  
THEM ON THE TEAM.**

## CREATIVE CHEMISTRY LEADING TO NEW TECHNOLOGIES



Scott Tanner (BSc '76; PhD '80) is a scientist and entrepreneur who found a place to innovate and thrive at York University. His first question on arrival at York was, "Where is my lab?" It was no surprise when his passion for research led to a 25-year career with leading mass spectrometry company MDS Sciex. As principal scientist at the company, Tanner led the development of atomic spectrometry instruments that captured nearly half of the world's market.

Tanner's distinguished career at MDS Sciex was only the first leg of an exciting journey. He went on to co-found DVS Sciences, where he and his partners creatively fused mass spectrometry and flow cytometry into an entirely novel technology called mass cytometry. From its base in Markham, Ontario, DVS Sciences brought to market its novel CyTOF® single-cell protein analysis instrumentation.

When global powerhouse Fluidigm acquired DVS Sciences and its revolutionary technology, mass cytometry had already begun changing the world of immunological analytics. Tanner

retired as Fluidigm's chief technology officer last year, and is now an adjunct professor in York's Department of Chemistry, among other active involvements.

Today, CyTOF machines are installed in hospitals, research centres and diagnostic research clinics around the world, contributing to the development of personalized therapies for cancers, HIV-AIDS, MS, diabetes and other diseases.

Tanner is a Fellow of the Royal Society of Chemistry (UK) and the American Institute for Medical and Biological Engineering. He received the 2011 University of Toronto Inventor of the Year Award for Biomedical and Life Sciences and the 2011 ThermoFisher Scientific Spectroscopy Award, among others.

## PROMOTING EQUAL ACCESS FOR PEOPLE WITH MENTAL ILLNESS

Dr. Catherine Zahn (BSc '74) is president and CEO of the Centre for Addiction and Mental Health (CAMH), Canada's leading mental health hospital. A champion for the integration of psychiatry and neuroscience, Zahn has worked tirelessly to situate mental illness and addictions in the mainstream of healthcare. She is a passionate public advocate for equitable access to healthcare resources for people with mental illness. She has made many contributions to healthcare through her leadership in health education, hospital integration, technology assessment, chronic disease management, stroke care coordination and mental healthcare system improvement.

In 2015, Zahn received the Order of Canada for her contributions in neuroscience and in mental health. On receiving this honour, she remarked, "People with mental illness don't always have their rights respected. We've made some great strides and this honour motivates me to redouble my efforts to carry forward the work that earned me this recognition."

Zahn is a professor of medicine at the University of Toronto (U of T) and a Fellow of

the Royal College of Physicians and Surgeons of Canada, and she serves on several key sector boards and committees. She spearheaded a collaborative program among CAMH, SickKids and U of T to improve access to mental healthcare for youth and children. She also helped create the Medical Psychiatry Alliance, a joint partnership among CAMH, SickKids, Trillium Health Partners and U of T, to address the challenging integration of mental and physical health.

Zahn has received honorary degrees from Western University and Ryerson University, and was named Communicator of the Year by the International Association of Business Communicators. She was also named one of Canada's 100 most powerful women by the Women's Executive Network, and one of Canada's 25 Women of Influence.





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