

**Canadian excellence,
Global recognition:
Celebrating Canada's 2016
winners of major international
research awards**



**Universities
Canada.**



Cette brochure est aussi disponible en français.



THE GOVERNOR GENERAL · LE GOUVERNEUR GÉNÉRAL



GREAT NATIONS ARE BUILT on great challenges, and the same can be said of Canada's award-winning researchers and innovators, who view challenges as opportunities for discovery and learning.

The past year was another strong one for Canadian researchers, and the individuals featured in the pages of this booklet are among the world's leading minds in their respective fields. As the recipients of some of the international research community's top awards and prizes, they have broken new ground.

Their accomplishments are the combined result of exceptional talent, dedication, collaboration and support, and we are all the beneficiaries of their breakthrough discoveries.

It's so important that we celebrate the achievements of our leading thinkers and research teams. By doing so, we attract talent and resources from around the world, and we help tell the story of why learning and innovation matter for all of us. That's why it's so critical that Canada's learning institutions pursue recognition for their leading researchers, nominating them for the top international awards and prizes and enhancing our global performance as a result.

As the stories within this booklet demonstrate, Canadian excellence is global excellence. Together, let's continue to tell the world about the great things that are happening in research and innovation in this country.

David Johnston
January 2017

Photo: Sgt Ronald Duchesne, Rideau Hall
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Table of Contents

4 | Louise Arbour
Tang Prize in Rule of Law

5 | Asimina Arvanitaki
Perimeter Institute | New Horizons in Physics
Prize from the Breakthrough Foundation

6 | Jo Bovy
University of Toronto | Sloan Fellowship in Physics

7 | Deanna Bowen
Guggenheim Fellowship in Creative Arts

8 | Leonid Chindelevitch
Simon Fraser University | Sloan Fellowship in
Computational & Evolutionary Molecular Biology

9 | Christopher J. Honey
University of Toronto | Sloan Fellowship
in Neuroscience

10 | Phyllis Lambert
Wolf Prize for the Arts

11 | Arthur McDonald
Queen's University | 2016 Breakthrough Prize
in Fundamental Physics

12 | Louie Palu
Guggenheim Fellowship in Creative Arts

13 | Katherine Ryan
University of British Columbia | Sloan Fellowship
in Chemistry

14 | Charles Taylor
McGill University | Berggruen Prize

15 | Daniel Wise
McGill University | Guggenheim Fellowship
in Mathematics



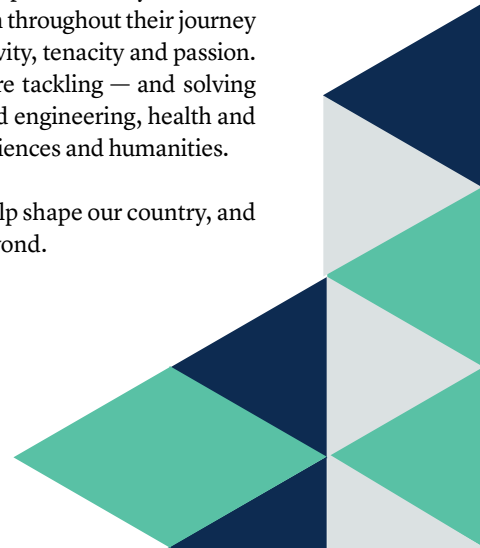
**Canadian excellence,
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THIS IS CANADA'S big year. It's a time for Canadians to reflect on our heritage, our successes, our identity and our place in the world. As the country celebrates its 150th anniversary in 2017 and sets its sights on the next 50 years, we can take pride in the remarkable achievements made by Canadian scientists, scholars, artists and humanitarians over the past year.

It is essential to recognize their incredible work, unparalleled dedication and impressive accomplishments. Not only do they exemplify Canada's extraordinary talent, but they advance our understanding of the world, strengthen Canada's reputation as home to world-leading research, and help foster a country that is a key player in bettering society.

Twelve outstanding Canadian researchers are profiled in this booklet, all winners of prestigious international research awards and fellowships in 2016. Although their fields of research range broadly from the fine arts to physics, each possesses key characteristics that have driven them throughout their journey to success: curiosity, creativity, tenacity and passion. Together, these scholars are tackling — and solving — challenges in science and engineering, health and medicine, and the social sciences and humanities.

Their contributions will help shape our country, and our world, to 2067 and beyond.





Law



Tang Prize in
Rule of Law

Louise Arbour Promoting rule of law at home and abroad

THE HONOURABLE LOUISE ARBOUR was awarded the Tang Prize in Rule of Law “for her enduring contributions to international criminal justice and the protection of human rights, to promoting peace, justice and security at home and abroad, and to working within the law to expand the frontiers of freedom for all.”

Madame Justice Arbour has been a leading figure in the global constitutional and legal protection of human rights, civil liberties and rights of victims of war crimes. Among other positions, she has been a law professor, a former justice on the Supreme Court of Canada, Chief Prosecutor of major international tribunals and the UN High Commissioner for Human Rights.

More recently, as the leader of the non-governmental International Crisis Group in Brussels, she has been a high-level advocate for peace and security, and conflict prevention. In this role, she has issued early warnings to bring the world’s attention to forgotten conflicts in countries such as Colombia, Sri Lanka and Darfur, Sudan. She is currently counsel and jurist in residence in the Montreal office of BLG, a Canadian law firm.

The Tang Prize was established in 2012 by Dr. Samuel Yin to recognize the revolutionary efforts of individuals in the four major fields of sustainable development, biopharmaceutical science, sinology and rule of law. Rooted in the long-standing cultural traditions of Chinese philosophical thought, the Tang Prize aims to provide fresh impetus to first-class research in the 21st century, bring about positive change to the global community and to create a brighter future for all humanity.



Physics



Perimeter Institute | New Horizons in Physics
Prize from the Breakthrough Foundation

Asimina Arvanitaki

Asking big questions
through small-scale
experiments

ASIMINA ARVANITAKI WAS awarded the New Horizons in Physics Prize from the Breakthrough Foundation for pioneering a wide range of new experimental probes of fundamental physics. “I think I was pre-wired for physics,” says Dr. Arvanitaki, who grew up in a small village in Greece. “As a kid, I once taught myself to calculate how much time it took for the light to come from the sun to us. It’s the ‘why’ that drove me to physics, and still drives me.”

Dr. Arvanitaki draws on technologies and techniques from other fields of physics to explore the nature of dark matter, black holes, extra dimensions and other fundamental questions of the universe. Her small-scale experiments are a relatively new approach in particle physics. Much research in this field is typically concerned with the “high energy frontier,” which requires huge colliders to smash particles. Dr. Arvanitaki focuses on tests at the so-called “precision frontier.” To that end, she uses high-precision measurements in experiments that can be small enough to fit on a table top.

Dr. Arvanitaki holds the inaugural Stavros Niarchos Foundation Aristarchus Chair in Theoretical Physics at Perimeter Institute in Waterloo, Ontario. This fund supports pioneering research into the universe and fosters ties between the Institute and Greece. She joined the Institute in 2014 after earning an undergraduate degree from the University of Athens and a PhD from Stanford University.

The New Horizons in Physics Prize of \$100,000 USD is awarded to promising junior researchers who have already produced important work. The prize is funded by a grant from the Milner Foundation.



Physics



University of Toronto |
Sloan Fellowship in Physics

Jo Bovy

Exploring the Milky Way galaxy

AN ASSISTANT PROFESSOR of astronomy and astrophysics at the University of Toronto and Canada Research Chair in Galactic Astrophysics, Jo Bovy received a Sloan Fellowship in Physics to further his research into the structure, formation and evolution of the Milky Way galaxy.

“A lot of the most exciting new measurements being made in physics today are in the night sky,” says Bovy, who was the Science Working Group Chair for the Apache Point Observatory Galactic Evolution Experiment (APOGEE-1). Using data from APOGEE-1, Bovy worked with colleagues to perform the first detailed measurements of the Milky Way’s “disk” — the pancake-shaped region that surrounds the bulge in our galaxy.

Bovy earned his PhD from the Department of Physics, New York University, and held a postdoctoral position at the Institute for Advanced Study at Princeton University before joining the University of Toronto in July 2015. Over the next two years, Bovy will use his Sloan grant to study data from the European Space Agency’s Gaia spacecraft, which is mapping the locations and movement of some one billion objects throughout the Milky Way.

The \$60,000 USD Sloan Research Fellowships are given annually to early-career scientists and scholars whose achievements and potential identify them as rising stars and influential leaders. They are one of the oldest awards conferred by the Alfred P. Sloan Foundation, a philanthropic, not-for-profit grant-making institution based in New York City. The foundation makes grants in support of original research and education in science, technology, engineering, mathematics and economic performance.



Creative Arts



Guggenheim Fellowship
in Creative Arts

Deanna Bowen

Tracing the history of black settlement on the Canadian prairies

DEANNA BOWEN, a Toronto-based interdisciplinary artist and educator, was awarded a 2016 Guggenheim Fellowship in the Film-Video category for a program of field research and artistic creation that will culminate with the production of *An Exoduster's Archive*. This “expanded road movie”

explores Bowen’s maternal great-great-grandparents’ migration from the Southern U.S. to Canada in 1908.

A descendant of the Alabama- and Kentucky-born Black Prairie pioneers of Amber Valley and Campsie, Alberta, Ms. Bowen has been drawing on her family history as the central pivot of her work since the early 1990s. Her broader practice examines history, historical writing and the ways in which artistic and technological advancements impact individual and collective authorship.

Ms. Bowen holds a master’s degree in visual studies from University of Toronto and diplomas of fine art from Emily Carr College of Art and Design and Langara Community College. Her work has been exhibited internationally in numerous film festivals and museums, including the Institute of Contemporary Art at the University of Pennsylvania, UnionDocs Centre for Documentary Art, the Images Festival, Flux Projects, the Kassel Documentary Film and Video Festival, the Nasher Museum of Art at Duke University, and the Canadian Museum of Immigration at Pier 21, Halifax.

In addition to exhibitions and festivals, her writings and art works have appeared in numerous publications.

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Medicine and
Neuroscience



Simon Fraser University | Sloan Fellowship in
Computational & Evolutionary Molecular Biology

Leonid Chindelevitch

Predicting the dynamics of infectious diseases

LEONID CHINDELEVITCH, an assistant professor of computer science at Simon Fraser University, has been awarded a Sloan Fellowship in Computational & Evolutionary Molecular Biology for his work in predicting the development of infectious diseases such as HIV, tuberculosis and Lyme disease.

Dr. Chindelevitch, who spent time working at the Massachusetts General Hospital and Clinton Health Access Initiative between his PhD and postdoctoral fellowship, is intrigued by how the intersection of the sciences, medicine and public policy could improve patient outcomes. Using big data, coming primarily from the genomes of infectious organisms, he develops mathematical models to predict the spread and evolution of epidemics. Ultimately, this can help public health authorities to anticipate and respond to serious outbreaks of disease.

Following a bachelor of science in mathematics and computer science at McGill University, Dr. Chindelevitch completed a PhD in applied mathematics from Massachusetts Institute of Technology on metabolic models for diseases such as TB. His postdoctoral work at the Harvard Institute of Public Health continued his interest in TB, focusing specifically on high-burden countries. In particular, he has developed a joint model on the TB and HIV epidemics in South Africa.

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Medicine and
Neuroscience



University of Toronto |
Sloan Fellowship in Neuroscience

Christopher J. Honey Mapping the timescales of the brain

CHRISTOPHER J. HONEY was awarded a Sloan Fellowship in Neuroscience for his work at the University of Toronto in understanding how the brain integrates information in both space and time. “While having a conversation, for example, we continuously perceive not only each spoken word, but also the emerging meaning of that word within a larger sentence, and the meaning of each sentence in the context of the conversation,” says Dr. Honey.

Recent studies suggest that brain regions are organized in a hierarchy according to the timescale on which they process information. At the lower end, the brain retains sensory information like word acoustics over a short period. At the higher end, it maintains more abstract information over seconds and minutes. As part of his research into the brain’s timescales, Dr. Honey has studied how people make sense of the temporal structure of movie clips and graphic novels. He has noted that many brain regions with long timescales, linking information over minutes of time, appear to be strongly connected to one another via “highways” of fibers.

Dr. Honey received his PhD from Indiana University in 2009, and pursued postdoctoral research at Princeton University. He was a member of University of Toronto’s Department of Psychology between 2014-16. Currently, he is an assistant professor in the Department of Psychological & Brain Services at Johns Hopkins University in Baltimore, U.S.

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Arts and
Humanities



Wolf Prize
for the Arts

Phyllis Lambert

Creating innovative buildings and revitalizing urban space

PHYLLIS LAMBERT, Founding Director Emeritus of the Canadian Centre for Architecture in Montreal, Quebec, was awarded a Wolf Prize for her vigorous involvement in the realization of seminal innovative buildings, exemplary urban regeneration projects and leading research institutes.

As her first project, in the mid-1950s, Lambert commissioned Ludwig Mies van der Rohe to design the Seagram Building in New York under her supervision as director of planning. During the 1960s, she designed the Saidye Bronfman Centre in Montreal and consulted on the Toronto-Dominion Centre. In the 1970s, Lambert worked as architect-developer with Gene Summers for the renovation of the landmark Biltmore Hotel in Los Angeles, a project that won the National Honor Award of the American Institute of Architects.

In 1979, Lambert founded the Canadian Centre for Architecture to increase public awareness of the role of architecture in contemporary society and promote scholarly research in the field. “We’re not a museum that puts things out and says, ‘This is architecture’” she says. “We try to make people think.” The museum, which opened in 1989, houses an extensive collection of architectural drawings, archives, books and photographs, and hosts conferences and exhibitions to provoke a conversation about architecture.

Known as “Citizen Lambert” for her dedication to civic activism in Montreal, Lambert was instrumental in founding several groups in the city, including Heritage Montreal, the Montreal Institute of Policy Alternatives and the Investment Fund of Montreal for social housing.

The Wolf Foundation was established in Israel in 1976 to award prizes to outstanding scientists and artists, irrespective of nationality, race, colour, religion, sex or political views, for achievements in the interest of mankind and friendly relations among peoples.



Physics



Queen's University | 2016 Breakthrough
Prize in Fundamental Physics

Arthur McDonald

Unravelling the mysteries of the universe

DR. ARTHUR MCDONALD and the Sudbury Neutrino Observatory (SNO) received the 2016 Breakthrough Prize in Fundamental Physics “for the fundamental discovery and exploration of neutrino oscillations, revealing a new frontier beyond, and possibly far beyond, the standard model of particle physics.” The award was one of five given to experiments investigating neutrino oscillation.

Dr. McDonald is the Director of the SNO Collaboration that began researching the mysteries of neutrinos at the Sudbury site in 1984. The cavern that housed SNO has since expanded and morphed into a multipurpose underground physics facility called SNOLAB.

Sometimes called “ghost particles,” neutrinos are fundamental to the make-up of the universe, but relatively little has been known about them. Dr. McDonald’s team discovered the transformation of electron-type neutrinos to other types en route from the core of the sun to the Earth — a finding that expands our understanding of the sun and exhibits neutrino properties that go beyond the predictions of the Standard Model of Elementary Particles.

Dr. McDonald earned his PhD in 1969 from the California Institute of Technology. He began his career at Queen’s University in 1989, and has been a professor emeritus since 2013. Among many awards and recognition for his research into neutrinos, he was a co-winner of the Nobel Prize in physics in 2015 alongside Dr. Takaaki Kajita, a leader of the Super-Kamiokande collaboration that observed a similar transformation for muon neutrinos produced in the atmosphere.

The Breakthrough Prize in Fundamental Physics was founded in 2012 by Russian entrepreneur, venture capitalist and physicist Yuri Milner to recognize those individuals who have made profound contributions to human knowledge. It is open to all physicists — theoretical, mathematical, experimental — working on the deepest mysteries of the Universe.



Guggenheim Fellowship in
Creative Arts

Louie Palu

Documenting human rights abuse and conflict

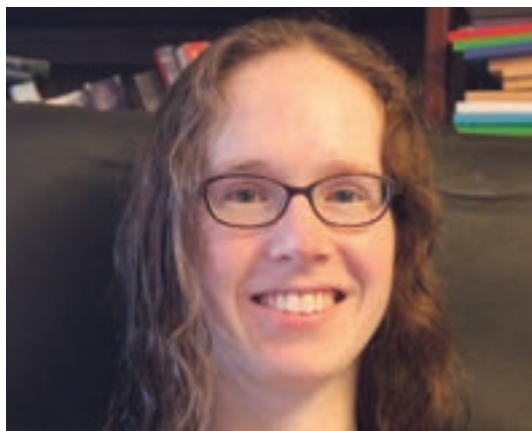
LOUIE PALU, an independent documentary photographer and filmmaker, was awarded a Guggenheim Fellowship in Creative Arts (Photography) for his unflinching portrayal of socio-political issues relating to human rights, poverty and conflict. “I grew up hearing stories of trauma and poverty in my family, and was taught to always be in touch with your roots,” says Mr. Palu. “This became the

basis of all my choices of subject matter as a documentary photographer.”

Mr. Palu’s 12-year study of hard mining communities in Canada’s North was selected for the Critical Mass Book award in 2006, and subsequently resulted in the book *Cage Call: Life and Death in the Hard Rock Mining Belt*. Other accolades include a Pulitzer Center on Crisis Reporting Grant and a 2011-12 Bernard L. Schwartz Fellowship from the New America Foundation to document the effects of organized crime and drugs in Mexico. He is best known for his five-year coverage of the war in Kandahar, Afghanistan, resulting in his award-winning film *Kandahar Journals*.

Mr. Palu is well known for his long-term projects. His work has been exhibited at numerous museums, including the Baltimore Museum of Art, National Gallery of Canada, and Smithsonian National Portrait Gallery. His work is held in numerous collections including the Harry Ransom Center, National Gallery of Art in Washington D.C., Library and Archives of Canada, Museum of Fine Arts Houston, Australian War Memorial and Museum of Fine Arts Boston. His work has been featured in *TIME Magazine*, *The New York Times*, CBC, NPR, PBS and BBC.

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University of British Columbia |
Sloan Research Fellowship in Chemistry

Katherine Ryan

Exploring how natural products are made

DR. KATHERINE RYAN, a chemist at the University of British Columbia, was awarded a Sloan Fellowship in Chemistry for her research into how living organisms synthesize complex molecules.

Dr. Ryan, who works in the field of chemical biology, investigates how complex organic molecules, such as antibiotics, are assembled by bacteria. Such naturally produced molecules are among the most chemically complex and medicinally relevant molecules ever isolated. The goal of her research group is to employ genomics, biochemistry, organic chemistry and structural biology to understand the assembly of these molecules.

After completing her bachelor of science in biological chemistry at the University of Chicago, she earned her PhD at the Massachusetts Institute of Technology. She then carried out postdoctoral research at the Scripps Institution of Oceanography, before joining the Department of Chemistry at the University of British Columbia as an assistant professor in 2011.

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Philosophy



McGill University |
Berggruen Prize

Charles Taylor

Changing the way people think about life

ONE OF THE WORLD'S foremost philosophers, Charles Taylor was awarded the first annual award from the Berggruen Institute for changing the way people all over the world think about some of the most basic questions in human life. After earning a bachelor of arts from McGill University in 1952, Taylor went on to complete three degrees at Oxford, culminating in a PhD in philosophy in 1961. He taught at McGill between 1961 and 1997, and is now professor emeritus.

Taylor's writings have been translated into 20 languages, covering subjects that range from artificial intelligence and multiculturalism to language, social behaviour and morality. Among the most influential of his works are *Explanation of Behaviour*, *Sources of the Self* and *A Secular Age*. His most recent book is *The Language Animal*.

A global leader in deepening understanding among different intellectual traditions, Taylor's work resonates particularly in his native land where he has been a leading voice for the unity of Canada and the preservation of the distinctive identity of Quebec.

The Berggruen Prize is awarded annually to a thinker whose ideas are of broad significance for shaping human self-understanding and the advancement of humanity. It seeks to recognize and encourage philosophy in the ancient sense of the love of wisdom and in the 18th century sense of intellectual inquiry into all the basic questions of human knowledge. It rewards thinkers whose ideas are intellectually profound, but also able to inform practical and public life across the range of world civilizations.



McGill University | Guggenheim
Fellowship in Mathematics

Daniel Wise

Exploring groups as geometric objects

DR. DANIEL WISE, who grew up in New York, has received a Guggenheim Fellowship in Mathematics for his studies of groups as geometric objects. Wise received his PhD in 1996 from Princeton University and joined the McGill University's Department of Mathematics and Statistics in 2001, where he is currently James McGill Professor.

Dr. Wise is widely recognized as one of the top geometric group theorists in the world, particularly for the applications of his work in three-dimensional manifold topology and hyperbolic geometry. Over the past 40 years, the works of Thurston and Waldhausen were central to the development of this field. The work of Wise, however, followed an entirely different direction over the past 15 years.

Ultimately, Dr. Wise's approach played a central role in the proof of Thurston's virtually fibered conjecture for hyperbolic three-manifolds. This is considered the most important development in geometry and topology since Perelman's celebrated proof of the Poincaré Conjecture.

The originality of Dr. Wise's work has been recognized through several major awards. He received the 2013 Veblen Prize of the American Mathematical Society. In 2014, he was elected a Fellow of the Royal Society of Canada. In 2015, he was Henri Poincaré Chair at the Institute Henri Poincaré. In 2016, he received the CRM-Fields-PIMS Prize and the Jeffery-Williams Prize of the Canadian Mathematical Society.

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École nationale d'administration publique
Emily Carr University of Art + Design
First Nations University of Canada
HEC Montréal
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