



**Canadian excellence,
Global recognition:
Celebrating recent Canadian
winners of major international
research awards**



This booklet is also available in French.



THE GOVERNOR GENERAL · LE GOUVERNEUR GÉNÉRAL



IN OUR GLOBALIZED WORLD, where knowledge is vital, awards are important indicators of success. In fact, nothing attracts and retains talent and resources better than achievement and recognition at the international level. Canadians have so much knowledge to share, and we are doing so in multiple ways, in multiple areas.

Turning these pages, you can see that the world is recognizing our accomplishments. We have much to celebrate.

These 24 men and women are Canadian success stories. Their accomplishments in their chosen fields demonstrate clearly that Canada is an innovative and creative nation. These recipients of international awards are doing exceptional and leading edge research, and they have had a positive impact on society and on humanity.

Moreover, this just scratches the surface of what Canadians are doing nationally and globally to create a better world. The findings of researchers

in Canada will no doubt influence decision makers, artists, the research community, educators and so many more. We must continue to collaborate broadly and across borders, to strengthen a global network and to share our findings internationally.

I am proud of the work of our Canadian research community, the leadership they are showing, and how their efforts and achievements inform a smarter, more caring world.

David Johnston

January 2016

Chemistry

Artur Izmaylov, University of Toronto
Sloan Research Fellowship in Chemistry



Molly Shoichet, University to Toronto
L'Oréal-UNESCO Award for Women in Science

Computer Science

Natalie Enright Jerger, University of Toronto
Sloan Research Fellowship in Computer Science



Daniel Wigdor, University of Toronto
Sloan Research Fellowship in Computer Science

Creative Arts

Diane Landry
Guggenheim Fellowship in Creative Arts



Anne Michaels, University of Toronto
Guggenheim Fellowship in Creative Arts

History and Philosophy

**Dominic McIver Lopes,
University of British Columbia**
Guggenheim Fellowship in Humanities



James Retallack, University of Toronto
Guggenheim Fellowship in Humanities

Henderikus Stam, University of Calgary
Joseph B. Gittler Award

Charles M. Taylor, McGill University
John W. Kluge Prize

Jean Vanier, L'Arche Canada
Templeton Prize

Humanities

Thomas Keymer, University of Toronto
Guggenheim Fellowship in Humanities



Nikolai Kremontsov, University of Toronto
Guggenheim Fellowship in Humanities

Mathematics

James G. Arthur, University of Toronto
Wolf Prize in Mathematics



Jacob Tsimerman, University of Toronto
Sloan Research Fellowship in Mathematics

Hau-tieng Wu, University of Toronto
Sloan Research Fellowship in Mathematics

Medecine and Neurosciences

**Vanessa D'Costa, University of Toronto
and Hospital for Sick Children**
L'Oréal-UNESCO Women in Science Rising Talent Grant



**Julie Lefebvre, University of Toronto
and Hospital for Sick Children**
Sloan Research Fellowship in Neuroscience

Natural Sciences

**Michael Doebeli,
University of British Columbia**
Guggenheim Fellowship in Natural Sciences



Stephanie Waterman, University of British Columbia
Sloan Research Fellowship in Ocean Sciences

Physics

Pascal Audet, University of Ottawa
Sloan Research Fellowship in Physics



Arthur B. McDonald, Queen's University
Nobel Prize in Physics

Sudbury Neutrino Observatory
Breakthrough Prize in Fundamental Physics

Pedro Vieira, University of Waterloo
Sloan Research Fellowship in Physics



Canadian excellence, Global recognition: Celebrating the Canadian winners of major international research awards

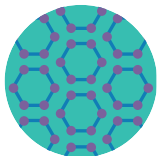
CANADIAN SCIENTISTS, artists and humanists are making their mark — not just in Canada, but internationally. They are advancing our understanding of the world and staking claim to top international awards.

When it comes to international research awards, Canada punches above its weight. Canadian researchers do exceptionally well in global award competitions — about one in five major international prizes goes to a researcher from Canada.

It is essential that we recognize and celebrate these achievements. Important indicators of success, each award shines a spotlight on the remarkable talent Canada produces and strengthens our reputation as home to world-leading research.

This booklet presents 24 Canadian winners of prestigious international research awards and fellowships in 2015. While they work in different fields, from the fine arts to pure mathematics, these researchers and scholars share key characteristics: curiosity, creativity, tenacity and passion. Together they are tackling problems and developing knowledge in science and engineering, health and medicine, and the social sciences and humanities. Their success is Canada's success.

Chemistry



Award

Sloan Research
Fellowship
in Chemistry

Recipient

Artur Izmaylov

University of Toronto



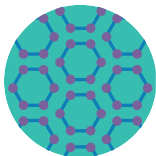
AN ASSISTANT PROFESSOR in the department of physical and environmental sciences at the University of Toronto Scarborough, Artur Izmaylov was awarded a Sloan Research Fellowship for his ground-breaking research to understand and model chemical dynamics involving multiple electronic states in molecules and materials. These processes are ubiquitous in solar energy harvesting, photoactive protein functioning — the key player in human vision — and catalytic reactions on metallic surfaces.

In its simplest terms, his work focuses on understanding how shape affects chemistry. “It has been known for some time that topology may play a role in chemical dynamics,” says Izmaylov. “However, it was not clear when exactly it becomes important and how it affects dynamics of molecular systems.”

A graduate of Moscow State University, Izmaylov holds a PhD from Rice University in Texas and was a postdoctoral fellow at Yale University. He joined the University of Toronto in 2012.

The \$50,000 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.

Chemistry



Award

L'Oréal-UNESCO
Award for Women
in Science

Recipient

Molly Shoichet

University of Toronto



A PROFESSOR OF CHEMISTRY and biomaterials and biomedical engineering, Molly Shoichet was named North American winner of the L'Oréal-UNESCO Women in Science award for the development of new materials to regenerate damaged nerve tissue and for a new method that can deliver drugs directly to the spinal cord and brain.

An expert in the study of polymers for drug delivery and regeneration, Shoichet has been tackling the problem of the blood-brain barrier, a tightly interwoven network of cells that protects the central nervous system from toxins but can block helpful medications. Her novel solution is to deliver drugs in a gel-like polymer that can be injected directly into the cerebrospinal fluid and then remain near its injection point where the therapy is most effective. The team she leads has also created a polymer for the targeted delivery of drugs and antibodies in breast cancer treatment.

Holder of a bachelor of science from the Massachusetts Institute of Technology and a PhD from

the University of Massachusetts, Shoichet is a Tier 1 Canada Research Chair in Tissue Engineering and a university professor of chemical engineering and applied chemistry, chemistry and biomaterials and biomedical engineering at the University of Toronto. The recipient of many prestigious distinctions, she is the only person to be a fellow of Canada's three national academies.

The L'Oréal-UNESCO Women in Science awards aim to improve the position of women in science by recognizing outstanding women researchers who have contributed to scientific progress. A result of a partnership between the French cosmetics company L'Oréal and the United Nations Educational, Scientific and Cultural Organization, they are awarded annually to five female researchers, each representing a different geographic region.

Computer Science



Award

Sloan Research
Fellowship in
Computer Science



Recipient

Natalie Enright Jerger

University of Toronto

ONE OF THE TOP COMPUTER ARCHITECTURE researchers of her generation, Natalie Enright Jerger is an associate professor at the University of Toronto's Edward S. Rogers Sr. Department of Electrical and Computer Engineering. She was awarded a Sloan Research Fellowship for her vital work in finding more efficient ways for networks on computer processor chips to communicate. As computing systems grow larger and more complex and more processor cores continue to be crammed onto on a single chip, making those processors talk to each other has become a key impediment to future progress.

Enright Jerger's work focuses on tackling three challenges: improving communication between cores, caches and memory; streamlining caching protocols; and improving parallel programming.

Holder of a bachelor of science from Purdue University in Indiana, and a PhD in computer architecture from the University of Wisconsin-Madison, Enright Jerger joined the University of Toronto in 2009. Awarded the Ontario Ministry of Research and Innovation Early Researcher

Award in 2012, she also received the 2014 Professional Engineers Ontario Engineering Medal - Young Engineer for exceptional achievements in the field.

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Computer Science



Award

Sloan Research Fellowship in Computer Science

Recipient

Daniel Wigdor

University of Toronto



AN ASSISTANT PROFESSOR of computer science at the University of Toronto, Daniel Wigdor was awarded a Sloan Research Fellowship to further his research on human-computer interaction, specifically how to reduce the delay experienced when using smartphones and tablets.

Computing performance has improved significantly in recent decades, but the response time of touchscreens has stalled at 100 milliseconds. Wigdor wants to reduce that delay and make digital devices feel more like physical ones – like writing on real paper. “My general area of research is leveraging computing technology to enable users to live better lives,” he says.

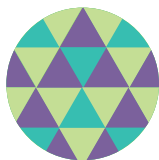
Wigdor’s work includes the development of user interface software, interaction methods, sensor hardware, new device form factors, development platforms and operating system enhancements.

After obtaining his PhD at the University of Toronto, Wigdor worked at Microsoft Research, notably as an expert in user interfaces for new technologies. Simultaneously, he served as an

affiliate assistant professor in both the department of computer science and engineering, and the Information School at the University of Washington, among other research positions. He joined the faculty at the University of Toronto in 2011. He was a recipient of an Ontario Early Researcher Award in 2014.

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Creative Arts



Award

Guggenheim
Fellowship
in Creative Arts

Recipient

Diane Landry



MULTIDISCIPLINARY ARTIST Diane Landry was awarded a Guggenheim Fellowship in Creative Arts to pursue her research and work on a project integrating performance, video and art installation.

For more than three decades, Landry has investigated the transformative properties of light, sound and motion. She creates works out of ordinary objects, gathered from everyday life, altering their meaning and value and our understanding of them. She also creates performances alongside her sculptural work.

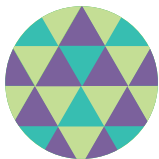
Landry has been artist in residence in New York, Montreal, at the Banff Centre, in Buenos Aires, Marseille and Utica (New York). Her work has been exposed in Canada and the United States, as well as in Australia, China and Europe. It was recently featured in the internationally touring exhibition, *Oh Canada*, organized by the Massachusetts Museum of Contemporary Art.

A fine arts graduate of Laval University and Stanford University, Landry has also received the Jean-Paul Riopelle career grant from the

Conseil des arts et des lettres du Québec in 2014, among other awards.

U.S. Senator Simon Guggenheim and his wife established the John Simon Guggenheim Memorial Foundation in 1925. The foundation offers fellowships to further the development of scholars and artists by assisting them to engage in research in any field of knowledge and creation in any of the arts, under the freest possible conditions. Guggenheim Fellowships are intended for men and women who have already demonstrated exceptional capacity for productive scholarship or creative ability in the arts.

Creative Arts



Award

Guggenheim
Fellowship
in Creative Arts



Recipient

Anne Michaels

University of Toronto

AN ADJUNCT PROFESSOR of English and former Barker Fairley Distinguished Visitor in Canadian Studies at University College, University of Toronto, Anne Michaels was awarded a Guggenheim Fellowship in Creative Arts for fiction. The author of five acclaimed poetry collections and two novels was also named poet laureate of Toronto in 2015.

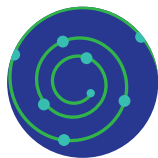
Michaels is an alumna of the University of Toronto where she later founded the long-distance creative writing program at the School of Continuing Studies. Her first book, *The Weight of Oranges* (1986), a volume of poetry, was awarded the Commonwealth Prize. She received the National Magazine Award, the Canadian Authors Association Award for Poetry and a nomination for the Governor General's Award for her second collection, *Miner's Pond* (1991).

Michaels has written two novels. *Fugitive Pieces* was awarded the Books in Canada First Novel Award, the Trillium Book Award, Orange Prize for Fiction, the Guardian Fiction Prize and

America's Lannan Literary Award for Fiction. It was adapted into a feature film in 2007.

Her second novel, *The Winter Vault*, was a finalist for the Scotiabank Giller prize, the Commonwealth Writer's Prize for Best Book and the Trillium Book Award.

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Guggenheim Fellowship in Humanities

Recipient

Dominic McIver Lopes

University of British Columbia



ONE OF THE FOREMOST contemporary philosophers of art, Dominic McIver Lopes is a distinguished university scholar and professor in the department of philosophy at the University of British Columbia. His work focuses on the nature and significance of art and the aesthetic.

McIver Lopes has traced the value of images to how they extend the powers of human perception. His ground-breaking book *Philosophy of Computer Art*, for example, argued that computer art challenges some of the basic tenets of traditional ways of thinking about art and its creation. He is developing a theory of how aesthetic values guide agents engaged in a variety of aesthetic projects. The elements of his theory could yield novel insights into the origins of aesthetic practices and the foundations of aesthetic education. He is currently working on a book titled *Being for Beauty: Aesthetic Agency and Value*.

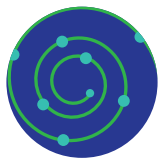
McIver Lopes holds a bachelor of arts from McGill University and a DPhil from Oxford University. He has been a fellow of the National Humanities Center and a Leverhulme Trust

Visiting Research Professor at the University of Warwick. His awards include an American Society for Aesthetics Outstanding Monograph Prize and a Killam Research Prize.

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History and Philosophy

Award



Guggenheim
Fellowship
in Humanities

Recipient

James Retallack

University of Toronto



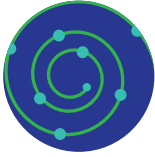
A PROFESSOR OF HISTORY and German studies, James Retallack was awarded a Guggenheim Fellowship in Humanities and a Killam Research Fellowship in 2015. These distinctions will enable him to further research on pre-First World War Germany, a crucial moment in German and world history.

Retallack's research into pre-First World War Germany illuminates a time when the promise of democratic reform and social justice had not yet been derailed by fascism and communism. He is now writing a biography of Ferdinand August Bebel, one of the founders of the Social Democratic Workers' Party of Germany and a leading figure of the social democratic movement. The book will offer a life-and-times account of the country's missed opportunities to implement liberalism and democracy and steer away from Nazism.

After graduating from Trent University, Retallack was a Rhodes Scholar at Oxford University where he received a DPhil. He has held grants, fellowships and research prizes from numerous foundations and has held visiting professorships

at Germany's the Free University Berlin and the University of Göttingen and most recently was a visiting scholar at the Bergische Universität Wuppertal, also in Germany. He was inducted as a fellow of the Royal Society of Canada in 2011.

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Joseph B. Gittler Award

Recipient

Henderikus Stam

University of Calgary



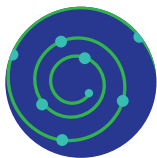
THE AMERICAN PSYCHOLOGICAL FOUNDATION awarded the 2015 Joseph B. Gittler Award to Henderikus Stam, professor of psychology at the University of Calgary. The annual prize honours a psychologist who has made outstanding scholarly contributions to the philosophical foundations of psychological knowledge.

Stam developed the history and theory specialty in the University of Calgary's department of psychology. His recent research has focused on contemporary theoretical problems in psychology and the historical foundations of 20th century psychology. He is founder and current editor of *Theory and Psychology*, a bi-monthly journal. Stam has published widely and has edited or co-edited more than half a dozen books. He has lectured extensively on theoretical and historical issues in psychology across North America, Europe, China and Australasia.

Stam holds a bachelor of arts, master's of arts and doctorate from Carleton University in Ottawa. A founding member and former president of the International Society for Theoretical Psychology,

he is also a former president of the Society for Theoretical and Philosophical Psychology of the American Psychological Association . He was also president of the International Society for Theoretical Psychology.

The annual Joseph Gittler Award from the American Psychological Foundation was established through a bequest from Joseph Gittler to recognize psychologists who are making and will continue to make scholarly contributions to the philosophical foundations of psychological knowledge.

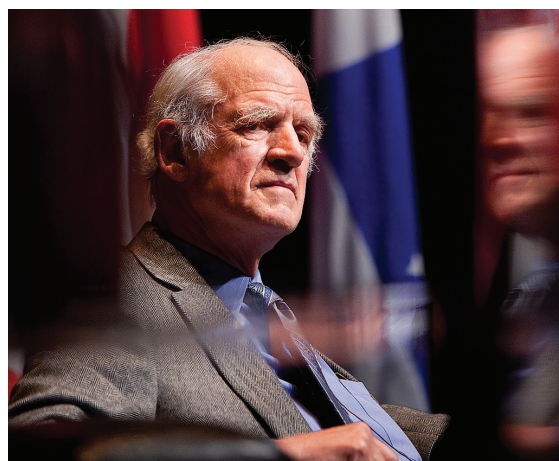


John W. Kluge Prize

Recipient

Charles M. Taylor

McGill University



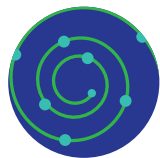
PROFESSOR EMERITUS AT MCGILL UNIVERSITY, Charles Taylor shares the prestigious \$1.5 million John W. Kluge Prize for Achievement in the Study of Humanity with German sociologist and philosopher Jürgen Habermas. Awarded by the U.S. Library of Congress, the prize recognizes lifetime contributions.

Dubbing him “a philosopher for the modern age,” the Librarian of Congress noted that “Taylor is a philosopher of extraordinary eminence. He writes with a lucidity that makes his work accessible to the non-specialist reader, ensuring that his contributions to our understanding of agency, freedom, spirituality and the relation between the natural sciences and the humanities will be of lasting import.”

Taylor was educated at McGill University and as a Rhodes Scholar at Oxford University. Although he has held affiliations at many major universities, his most enduring connection is with McGill. Taylor’s work also earned him the prestigious Kyoto Prize and the Templeton Prize. His writings have been translated into 20 languages. A public

intellectual, Taylor ran in three federal elections and led the Bouchard-Taylor commission with sociologist Gerald Bouchard that explored the impact of religious accommodation on Quebec’s identity and values.

Endowed by philanthropist John W. Kluge, the Kluge Prize recognizes achievement in the range of disciplines not covered by the Nobel prizes. Awarded by the Librarian of Congress with recommendations from scholars around the globe, it is administered by the John W. Kluge Center, the residential research centre within the Library. The prize celebrates the importance of the study of humanity and recognizes individuals whose outstanding scholarship in the humanities and social sciences has shaped both public affairs and civil society.



Templeton Prize

Recipient

Jean Vanier

L'Arche Canada



ACCLAIMED AS A CANADIAN who inspires the world and a nation builder, Jean Vanier is the founder of L'Arche, a revolutionary international network of communities where people with and without intellectual disabilities live and work together as peers. The Templeton Foundation awarded Vanier the prestigious Templeton Prize “for his innovative discovery of the central role of vulnerable people in the creation of a more just, inclusive and humane society.”

What began quietly in northern France in 1964, when Vanier invited two intellectually disabled men to come and live with him as friends, has now grown into 147 L'Arche residential communities operating in 35 countries. Jennifer Simpson, daughter of the Templeton Foundation's president, noted that “Vanier's powerful message and practice of love has the potential to change the world for the better, just as it has already changed the lives of countless individuals.”

Vanier also established Intercordia Canada in 2003, a non-profit organization that partners with Canadian universities to offer students

a unique, university-accredited experience. Intercordia aims to encourage moral responsiveness and develop respect for diversity and other cultures.

Humanist, philosopher, theologian and author, Vanier has written more than 30 books which have been translated into 29 languages, has given thousands of talks around the world, and has received many honours and awards, including the French Legion of Honour.

The Templeton Prize honours a living person who has made exceptional contributions to affirming life's spiritual dimension, whether through insight, discovery, or practical works. One of the most prestigious honours in the world, it is valued at nearly US\$1.7 million. Established in 1972 by the late Sir John Templeton, it recognizes outstanding individuals who have devoted their talents to expanding our vision of human purpose and ultimate reality.

Humanities



Award

Guggenheim
Fellowship
in Humanities

Recipient

Thomas Keymer

University of Toronto



A PROFESSOR AND CHANCELLOR Jackman Professor of English at the University of Toronto, Thomas Keymer was awarded a 2015 Guggenheim Fellowship in Humanities in recognition of his outstanding research and teaching career in English literature. The award will enable him to complete a book about the interplay between official press control and politically inflected literature between 1660 and 1820.

Titled *Poetics of the Pillory: Literature and Seditious Libel, 1660-1820*, the book will expand on a string of lectures he delivered at Oxford University in 2014.

Keymer's work in libel and censorship grew out of his interest in the literature of the 17th and 18th centuries as periods of political upheaval. "Authorities at the time went to great lengths to silence writers: repressive laws, the pillory, intimidation and proxy arrests among them," says Keymer. "Censorship energized these authors and made them more creative."

A graduate of Cambridge University, Keymer has taught at Royal Holloway, the University of London and at St Anne's College, Oxford. He directs the University of Toronto's collaborative program in book history and print culture, based at Massey College, where he is a senior fellow. He is also a fellow of the Royal Society of Canada, the Royal Historical Society and the English Association.

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Humanities



Award

Guggenheim
Fellowship
in Humanities

Recipient

Nikolai Kremmentsov

University of Toronto



A HISTORIAN OF RUSSIAN MEDICINE and life sciences, Nikolai Kremmentsov was awarded a Guggenheim Fellowship to carry out research on the interactions among science, medicine and literature in Bolshevik Russia (1917-1929). A professor at the Institute for the History and Philosophy of Science and Technology at the University of Toronto, he focuses on the history of international relations in science and medicine, especially during the interwar and Cold War periods.

Kremmentsov's project is titled "*I Want a Baby*": *The History of Bolshevik Eugenics*. In many countries, eugenics is often associated with genocidal race-purification programs. Not so during the Bolshevik Russia period, where it was based on a desire to improve the genetic fitness of the Russian people. But the movement failed to secure legislative support or spark an organized movement. After the 1917 Bolshevik revolution, however, it became an established scientific discipline, exerting influence on social policies. Eugenics was banned in the Soviet Union in 1930 under Joseph Stalin.

"My goal is to examine this history in detail in its national and international contexts. Public discourse and state policies towards science often change when a state's leadership changes, so drawing lessons from the Bolshevik Russia period may offer insights into the relationships between science and society that many nations grapple with today," says Kremmentsov.

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Mathematics



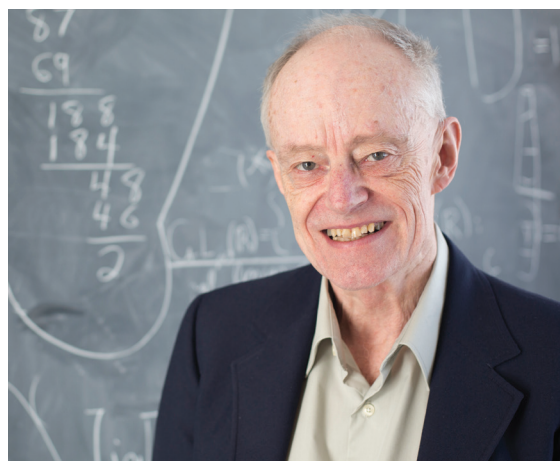
Award

Wolf Prize
in Mathematics

Recipient

James G. Arthur

University of Toronto



THE TED MOSSMAN CHAIR in Mathematics at the University of Toronto, James G. Arthur was awarded the prestigious 2015 Wolf Foundation Prize in Mathematics for “his monumental work on the trace formula and his fundamental contributions to the theory of automorphic representations of reductive groups.”

“Arthur’s work is a mathematical landmark that will inspire future generations of mathematicians,” the foundation says..

Arthur’s developments in automorphic forms and representation theory have opened new approaches to the challenges posed by a theoretical mathematical model developed some 30 years ago by Canadian mathematician Robert Langlands. The model, which seeks to link two branches of mathematics — analysis and algebra — has created a vision of a unified mathematical world in which independent mathematical disciplines will prove to be related. Arthur’s trace formula has become mathematicians’ most powerful tool in this quest, regarded by many as the most challenging frontier.

Arthur holds a bachelor of science and master’s of science from the University of Toronto and received his PhD from Yale University. He has been a professor at the University of Toronto since 1978. A fellow of the Royal Society, he was elected a foreign honorary member of the American Academy of Arts and Sciences in 2003. In 2012 he became a fellow of the American Mathematical Society.

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.

Mathematics



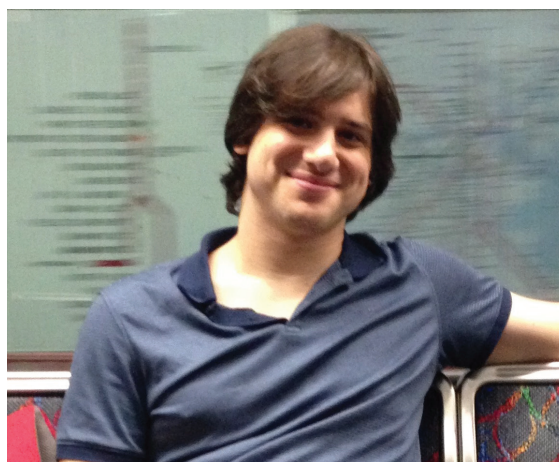
Award

Sloan Research
Fellowship
in Mathematics

Recipient

Jacob Tsimerman

University of Toronto



JACOB TSIMERMAN HAS BEEN AWARDED a Sloan Research Fellowship in Mathematics in recognition of his original contributions to number theory. An assistant professor in the University of Toronto's department of mathematics, he also won the 2015 SASTRA Ramanujan Prize for young mathematicians.

Tsimerman works at estimating how many solutions there are to a system of polynomial equations using integers — whole numbers that do not have a fractional or decimal component. His work is rooted in the fundamental concepts of number theory and algebraic geometry.

“He is one of the few mathematicians to have complete mastery over these two very different areas of mathematics,” notes the prize citation. “This has enabled him to achieve significant progress on a number of fundamental problems lying at the interface of the two subjects.”

Tsimerman holds a bachelor of arts from the University of Toronto and completed his PhD at Princeton University. Following a post-doctoral

position at Harvard University, he joined the University of Toronto faculty in 2014.

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The 2015 SASTRA Ramanujan Prize was established in 2005 to recognize outstanding work by young mathematicians in fields related to the work of the late Srinivasa Ramanujan.

Mathematics



Award

Sloan Research
Fellowship
in Mathematics

Recipient

Hau-tieng Wu

University of Toronto

HAU-TIENG WU, ASSISTANT PROFESSOR in the department of mathematics at the University of Toronto, was awarded a 2015 Sloan Research Fellowship to further his mathematical work and statistical big data analysis, as well as his research into their medical applications. Among his interests is determining how different breathing patterns affect blood pressure, heart rate and other physiological signals. He also works to assess sleep stages using modern tools such as electrocardiograms.

He focuses on analyzing massive datasets by applying proper mathematical tools and theorems.

Wu earned his medical degree at Taiwan's National Yang-Ming University and completed his residency at the Taipei Veterans General Hospital in Taiwan. He obtained his PhD in mathematics from Princeton University where he completed postdoctoral research. He also carried out postdoctoral work in the statistics department at the University of California, Berkeley and in the mathematics department

$$\int_{S^{d-1}} \int_0^{\epsilon^\gamma} \epsilon^{-d/2} K' \left(\frac{t}{\sqrt{\epsilon}} \right) \frac{\|\Pi(\theta, \theta)\|}{24\sqrt{\epsilon}} f(x) t^d$$

$$\epsilon \int_{S^{d-1}} \int_0^\infty K'(s) \frac{\|\Pi(\theta, \theta)\|}{24} f(x) s^{d+2} ds d\theta$$

$$\epsilon \frac{f(x)}{24} \int_{S^{d-1}} \|\Pi(\theta, \theta)\| d\theta \int_0^\infty K'(s) s^{d+2} ds$$

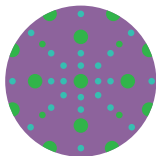
$$\epsilon \frac{f(x)}{24 |S^{d-1}|} \mu_{1,3}^{(1)} \int_{S^{d-1}} \|\Pi(\theta, \theta)\| d\theta$$

becomes $\epsilon \frac{\mu_{1,2}^{(0)}}{2d} (\Delta f(x) + 2w(x)f(x)) + O(\epsilon^2)$.
ing all the above terms together.

at Stanford University. He joined the University of Toronto in 2014.

The \$50,000 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.

Medicine &
Neurosciences



Award

L'Oréal-UNESCO
Women in
Science Rising
Talent Grant

Recipient

Vanessa D'Costa

University of Toronto and Hospital for Sick Children



A POSTDOCTORAL FELLOW in cell biology at The Hospital for Sick Children Research Institute, Vanessa D'Costa was awarded a L'Oréal-UNESCO Women in Science Rising Talent grant for her research into mechanisms that allow salmonella bacteria to escape the immune system.

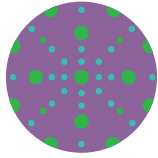
Salmonella is one of the leading causes of food-borne gastroenteritis worldwide. Severe cases of salmonellosis can cause death and contribute to the development of reactive arthritis, an autoimmune disorder. Recent years have seen an increase in infections by drug-resistant salmonella.

Salmonella bacteria cause infection by evading the immune system with the help of toxin-like proteins called effectors, whose function is not fully understood by scientists. D'Costa's research aims to determine how these effectors manipulate host cells and enable the pathogen to bypass the body's disease-fighting systems. Her findings will provide insight into the functioning of other drug-resistant bacteria and, more generally, our understanding of the immune system.

D'Costa was earlier awarded a Frederick Banting and Charles Best Canada Graduate Scholarship from the Canadian Institutes of Health Research while completing her PhD at McMaster University and a Banting Postdoctoral Research Fellowship at the University of Toronto.

The L'Oréal Foundation-UNESCO Women in Science International Rising Talents awards were launched in 2015 to advance the careers of outstanding young women in science and offer them international visibility. The Rising Talents are chosen from among doctoral and post-doctoral researchers who have received fellowships from L'Oréal-UNESCO Women in Science's national and regional programs. D'Costa received an Excellence in Research Fellowship from the L'Oréal Canada Women in Science program in 2014.

Medicine &
Neurosciences



Award

Sloan Research Fellowship in Neuroscience

Recipient

Julie Lefebvre

University of Toronto and Hospital for Sick Children



JULIE LEFEBVRE, SCIENTIST in the Neurosciences and Mental Health Program at The Hospital for Sick Children, was awarded a 2015 Sloan Research Fellowship in Neuroscience for her work to understand the fundamental mechanisms of how the brain is wired.

Lefebvre's research involves studying the roles of genes in the complex formation of neural circuits. "I hope to bridge my work to advance our understanding of how genetic alterations affect brain development and other brain disorders," says Lefebvre.

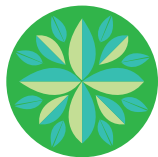
She aims to identify how nerve cells form specific patterns of neural connections that are essential for proper development and functioning of the nervous system. Her research will provide insights into how neural circuits assemble in a healthy brain, and how defects in these developmental pathways contribute to abnormal brain function and neurodevelopmental disorders.

Lefebvre received her bachelor of science from McGill University and earned her PhD at the

University of Pennsylvania for research on neuromuscular development. She completed postdoctoral work at Harvard University, investigating molecular mechanisms of neuronal morphogenesis and circuit formation in the retina. She joined The Hospital for Sick Children in December 2013.

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Natural Sciences



Award

Guggenheim
Fellowship in
Natural Sciences

Recipient

Michael Doebeli

University of British Columbia



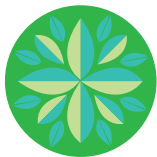
PROFESSOR IN THE DEPARTMENTS of zoology and mathematics at the University of British Columbia, Michael Doebeli is “one of the foremost mathematical evolutionary biologists in the world and the main authority for theory on the evolution of organismal diversity,” says a statement issued by the John Simon Guggenheim Memorial Foundation. The foundation awarded Doebeli a fellowship in natural sciences in recognition of his research, which has led to a major change in how scientists understand the origin of new species.

The mathematical model Doebeli developed seeks to unravel a key evolutionary riddle: what factors underlie the generation of biological diversity both within and between species. His work has shown that new species can form in the absence of geographic separation, something once viewed as theoretically impossible. Doebeli has also provided new perspectives that have led to a unified understanding of the evolution of cooperation in nature.

Doebeli completed a PhD in pure mathematics from the University of Basel, Switzerland. Among other prestigious awards, he received the 2014 Research Award of the Canadian Applied and Industrial Mathematics Society, and is a fellow of the Royal Society of Canada.

U.S. Senator Simon Guggenheim and his wife established the John Simon Guggenheim Memorial Foundation in 1925. The foundation offers fellowships to further the development of scholars and artists by assisting them to engage in research in any field of knowledge and creation in any of the arts, under the freest possible conditions. The fellowships are intended for men and women who have already demonstrated exceptional capacity for productive scholarship or creative ability in the arts.

Natural Sciences



Award

Sloan Research
Fellowship in
Ocean Sciences

Recipient

Stephanie Waterman

University of British Columbia



AN ASSISTANT PROFESSOR in physical oceanography, Stephanie Waterman has been awarded a Sloan Research Fellowship to pursue her research in physical oceanography.

In the department of earth, ocean and atmospheric sciences at the University of British Columbia, Waterman combines observational and theoretical oceanography to better understand how different components of ocean circulation, operating at different time and length scales, interact. She has been involved in a number of international observational campaigns in the North Atlantic, North Pacific and Southern Oceans.

Her Arctic research is organized in conjunction with the Canadian Arctic GEOTRACES program, an initiative to better understand biogeochemical processes in the ocean and improve projections of the ocean's response to global change.

A graduate of Queen's University, Waterman completed a PhD in physical oceanography at the Massachusetts Institute of Technology and Woods Hole Oceanographic Institution. She

was a research fellow at the United Kingdom's National Oceanography Centre, the Grantham Institute for Climate Change at Imperial College, London and the Climate Change Research Centre and Australian Research Council Centre of Excellence for Climate System Science before joining the University of British Columbia in 2014.

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Physics



Award

Sloan Research
Fellowship in
Physics



Recipient

Pascal Audet

University of Ottawa

UNIVERSITY OF OTTAWA PROFESSOR and geophysicist Pascal Audet was selected as a Sloan Research Fellow for pioneering a technique to measure how human activity affects the Earth's crust.

An expert in earthquake seismology, Audet uses GPS data coupled with gravity variations obtained from the Gravity Recovery and Climate Experiment satellite to determine the extent to which large-scale human activity affects the deformation of the Earth's crust and to evaluate its impact on natural hazards.

Recently, his technique played an important role in an international study published in the journal *Nature* that showed the direct link between human-induced groundwater depletion and the uplift of California's Sierra Nevada and Coast Ranges. This may increase the number of small earthquakes in the adjacent San Andreas Fault.

The fellowship will allow Audet to study the impacts of the oilsands in Western Canada.

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Physics



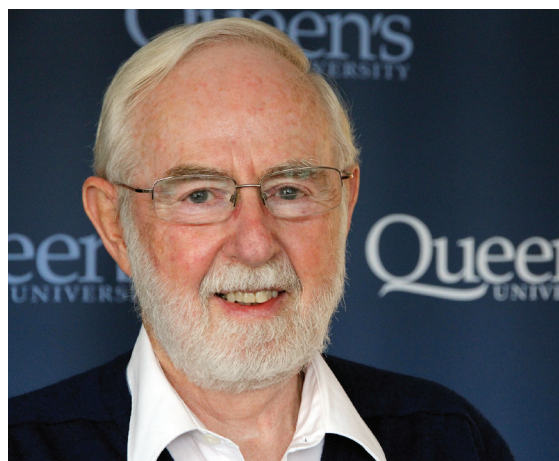
Award

Nobel Prize
in Physics

Recipient

Arthur B. McDonald

Queen's University



A PROFESSOR EMERITUS at Queen's University in Kingston, Arthur B. McDonald is the co-winner of the 2015 Nobel Prize in Physics. He shares the prize with Takaaki Kajita of the University of Tokyo.

The two men won the prize for their contributions to experiments demonstrating that particles called neutrinos can change identities or “oscillate” as they travel from the sun. The neutrinos — sub-atomic particles that whizz through the universe at nearly the speed of light — transform themselves between three types: electron, muon and tau.

The transformation requires that neutrinos have mass, dispelling the long-held notion that they were massless. The Royal Swedish Academy of Sciences said the discovery “has changed our understanding of the innermost workings of matter and can prove crucial to our view of the universe.”

McDonald's work, carried out by a team of scientists from Canada, the United States, Britain and Portugal, took place at the Sudbury Neutrino

Observatory (SNO). A collaborative effort by six Canadian universities (Carleton University, Laurentian University, Queen's University, the University of British Columbia and the University of Guelph), SNO is situated two kilometres underground at a working nickel mine. Now called SNOLAB, it is Canada's leading edge astroparticle physics research facility. According to McDonald, the work could only have been performed in Canada.

A Companion of the Order of Canada, McDonald is director of the Sudbury Neutrino Observatory Institute and holds the Gordon and Patricia Gray Chair in Particle Astrophysics at Queen's University in Kingston. Among other distinctions, he received the 2015 Fundamental Physics Prize.

The Nobel Prize in Physics is an annual award given by the Royal Swedish Academy of Sciences to those who have made the most outstanding contributions for mankind in the field of physics.

Physics

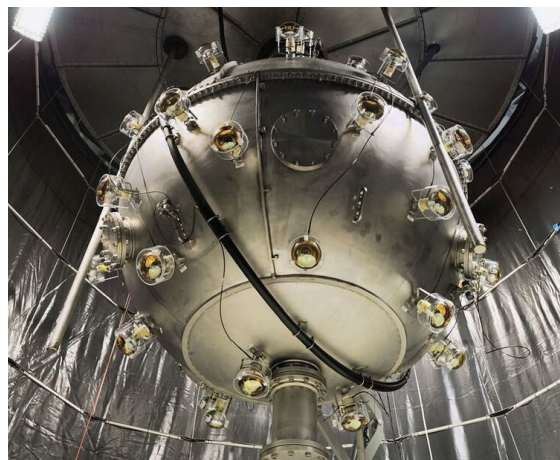


Award

Breakthrough
Prize in
Fundamental
Physics

Recipient

Sudbury Neutrino Observatory



THE SUDBURY NEUTRINO OBSERVATORY (SNO) WAS one of five winners of the Breakthrough Prize in Fundamental Physics. The five experiments, carried out in Canada, China and Japan will share the \$3 million prize equally. The observatory is a collaborative effort by six Canadian universities: Carleton University, Laurentian University, Queen's University, the University of British Columbia and the University of Guelph.

According to the Fundamental Physics Prize Foundation, the award is presented to the five teams and their combined 1,377 leaders and members for the fundamental discovery and exploration of neutrino oscillations, “revealing a new frontier beyond, and possibly far beyond, the standard model of particle physics.”

Queen's University's Arthur B. McDonald, co-winner of the 2015 Nobel Prize in Physics, accepted the prize on behalf of SNO. McDonald and his team built the SNO experiment, which is housed more than two kilometres underground in a working nickel mine, to pick up neutrinos streaming from the sun's core. Using the data

collected by SNO in the late 1990s and early 2000s, they showed that solar neutrinos, which are all created as one type, arrive on Earth as a mixture of types.

The cavern that housed SNO has since expanded and morphed into a multipurpose underground physics facility called SNOLAB.

Founded in 2012 by Russian entrepreneur, venture capitalist and physicist Yuri Milner, the Breakthrough Prize in Fundamental Physics recognizes individuals who have made profound contributions to human knowledge. It is open to all physicists — theoretical, mathematical and experimental — working on the deepest mysteries of the universe. It is one of three awarded by the Breakthrough Foundation for outstanding contributions in life sciences, fundamental physics and mathematics.”

Physics



Award

Sloan Research Fellowship in Physics

Recipient

Pedro Vieira

Perimeter Institute for Theoretical Physics,
University of Waterloo



PERIMETER INSTITUTE FACULTY MEMBER and adjunct professor at the University of Waterloo, theoretical physicist Pedro Vieira has earned a 2015 Sloan Research Fellowship for his explorations into the foundations of quantum field theory. He also won the prestigious Gribov Medal given by the European Physical Society to a young researcher in the theoretical physics fields of particles or quantum field theory.

At Perimeter, Vieira tackles the toughest and most long-standing problems of quantum field theory. He uses a mathematical technique called holography to translate questions about four-dimensional field theories into questions about two-dimensional string theories. That makes it possible for him to look at the questions through the use of integrability, a powerful mathematical technique for exactly solving two-dimensional theories. Holography then relates the solution in two dimensions back to a solution in four dimensions.

A graduate of the Universidade de Porto, Portugal, Vieira earned his master's and PhD at

the École Normale Supérieure in Paris, France. He joined the Perimeter Institute in 2009.

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Awarded by the European Physical Society, the Gribov Medal is given once every two years for outstanding work in theoretical particle physics and/or field theory by a physicist under the age of 35.

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For more information:

communications@univcan.ca

613 563-1236

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