



Canadian excellence, global recognition

**Canada's 2024 winners of major
international research awards**



**Universities
Canada.**



**Global
Excellence
Initiative**



Canada's leadership in research and discovery stems from the talent and dedication of our brightest minds.

The Global Excellence Initiative promotes the recognition of Canadian research talent on the international stage, and this booklet introduces nineteen of the 21 exceptional researchers whose groundbreaking work has earned them prestigious global awards in 2024.

These honorees are more than mere award recipients — they are pioneers whose discoveries push the boundaries of knowledge and redefine industries. Their work spans diverse fields, from research leading to breakthrough medications like Ozempic, to algorithms powering artificial intelligence and innovative explorations that connect textiles with computer coding. Their impact isn't confined to academia; it propels industries, sparks new businesses and improves lives. In just one year, Canada's universities generated nearly 300 patents and launched 875 startups — transforming ideas into tangible solutions.

Research fuels Canada's economy, generating C \$17 billion annually and accounting for 35% of the country's research and development (R&D). Its influence, however, extends far beyond numbers. Across the sciences, humanities and arts, research decodes history, preserves heritage and shapes our future through technological advancements while addressing complex ethical questions.

As we celebrate these exceptional individuals, we recognize their role in strengthening Canada's research ecosystem and global standing. Their achievements prove that Canadian expertise does not just compete on the world stage — it leads. This year's honorees exemplify what is possible when talent meets a strong research environment and an unwavering commitment to discovery. Looking ahead, their work reminds us that Canada's capacity for breakthrough ideas knows no bounds.

We remain committed to fostering environments where curiosity thrives and innovation flourishes.

Gabe Miller

President and CEO, Universities Canada

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BBVA FOUNDATION FRONTIERS
OF KNOWLEDGE AWARD

Dorthe Dahl-Jensen

University of Manitoba researcher discovers climate change warnings in polar ice

Dorthe Dahl-Jensen, a Canada Excellence Research Chair in Arctic Ice, Freshwater-Marine Coupling and Climate Change at the University of Manitoba, has won the prestigious **BBVA Foundation Frontiers of Knowledge Award in the climate change category.**

Dr. Dahl-Jensen is one of five winners of the 2024 award, recognized for their discovery of the link between greenhouse gases (GHG) and rising global temperatures through their analysis of ice cores in Greenland and Antarctica.

The scientists examined concentrations of carbon dioxide (CO₂) trapped within layers of polar ice over time.

Dr. Dahl-Jensen says the research is “fundamentally significant to the sustainability of our global climate.”

“I found that, even though we had warm periods over the last 800,000 years, CO₂ concentrations were never as high as they are today,” she says. “These findings signify the potential impacts of escalating temperatures and rising sea levels if measures are not taken to further reduce GHG emissions.”

The award committee says their work “required scientific, technical and logical breakthroughs in many areas to measure greenhouse gas concentrations,” and “has built upon sustained international collaborative efforts by generations of researchers.”



Bjorn Stevens, award committee chair, notes that the “main message from the ice sheets is that CO₂ and temperature are tightly coupled; that the amount of greenhouse gases in the atmosphere today is without precedent in the last 800,000 years. And this has profound implications for how our planet will evolve over the coming decades and centuries.”

BENJAMIN FRANKLIN MEDAL

Paul Hebert

Paul Hebert drives the effort to catalogue all life on Earth through DNA barcoding

Evolutionary biologist Paul Hebert and his team at the University of Guelph have a bold goal: to complete the inventory of life on our planet using an innovative approach — DNA barcoding.

“We use tiny slices of DNA — only about a millionth of the genome — to tell organisms apart,” he explains. It’s analogous to how retail barcodes discriminate products at a supermarket, making cataloguing life much more affordable and faster.

The pioneer of DNA barcoding and his team are working to register all species before mid-century and establish a global bio-monitoring system because life on our planet is imperiled. “Soon we’ll be tracking life in the oceans, in the rivers, and on land in near-real time”.

The work, for which Dr. Hebert won the 2024 **Benjamin Franklin Medal in Earth and Environmental Science**, holds tremendous potential for the future of biodiversity. “People don’t want to live on a lonely planet,” he says. “I think they want to do right by the other organisms on it, but if you don’t know them and you can’t track them, it’s impossible to manage them.”

Dr. Hebert has built upon the work of Nobel Prize winner Kary Mullis who invented PCR, a process for rapidly copying any segment of the genome. “What we brought new to the equation was standardization — that a tiny slice of DNA could discriminate all animal species on the planet,” Dr. Hebert explains. “And sequence analysis now costs less than a cent.”

Over the past 20 years, his research has attracted significant investment — including about \$100 million from Canada and \$60 million from other countries.



“We also established an organization called the International Barcode of Life which now leads the largest projects ever undertaken in biodiversity science. By 2030, we hope to convince the world to commit the billion-dollar funding needed to complete the inventory of life and activate a global bio-monitoring system.”

Dr. Hebert’s 150-person team works in two purpose-built buildings funded by research grants. “We lead the biggest sequencing operation for DNA barcoding, maintain the largest archive of DNA extracts in the world, and will soon have the largest specimen collection in Canada. But most importantly, our informatics platforms protect and deliver all of this information to the world.”

“You can do a lot if you’re surrounded by a group of motivated people who know what they’re doing,” he says. “And have the funding to support them.”



BENJAMIN FRANKLIN MEDAL

Janet Werker

Developmental psychologist unlocks the secrets of language acquisition

Janet Werker is shining a light on what makes human communication so different from that in the animal kingdom. In exploring the roots of our language acquisition, the developmental psychologist is increasing our understanding of the complexity of human communication.

“There are communication systems across the animal kingdom, but they're not like ours,” says the University Killam Professor and Canada Research Chair at the University of British Columbia. “They don't have the complexity. They don't allow an infinite number of sentences to be made, new words to be created by a community or have the ability to talk about things that don't exist or existed in the past.

“We're learning there might be a few other species that actually give names to one another, but they still don't have the embedded clauses that we have, the real complexity of developing an argument, writing poetry, developing plays and writing history.”

Dr. Werker, whose groundbreaking work garnered her the 2024 **Benjamin Franklin Medal in Computer and Cognitive Science**, focuses on the perceptual foundations of communication that develop in very early infancy. “So how is it that little babies get started on this journey that rapidly takes them to becoming experts, first in understanding and processing and later in speaking their native language, or languages?

It's basic research that helps us understand who we are as a species. Dr. Werker looks at how different types of



experiences— such as exposure to illness or drugs, an optimal diet versus poor nutrition or growing up bilingual — impact language development.

She says it was both surprising and rewarding to receive the Benjamin Franklin Medal in computing and cognitive science. “It was definitely focused on the more STEM side of the work that I do,” she says of the award.

“I was pleased that language acquisition — a process of development that starts when we're most vulnerable and is ubiquitous but essential and still mysterious and magical — was being recognized in the computer and cognitive sciences.”



GUGGENHEIM FELLOWSHIP

Henri Darmon

Mathematician uses modern tools to explore ancient questions

In recognition of his work in number theory, McGill University mathematician Henri Darmon is among this year's winners of the **Guggenheim Fellowship**.

“Number theory is one of the oldest branches of mathematics, with roots going back to antiquity,” says Dr. Darmon. “It studies ostensibly elementary questions about whole numbers, such as Diophantine equations and the distribution of prime numbers. These fundamental questions have been part of human culture for millennia, but their exploration has led to the discovery of a rich array of tools and ideas that are now an essential part of modern mathematics.”

“Number theory combines a focus on venerable problems which would have made sense to the ancient Greeks or to medieval arabic scholars, with an ability to harness the full power of modern mathematical techniques.”

Although these are very old questions from thousands of years ago, it is only now that “we are starting to have the techniques and tools to address them,” he says. “While motivated by the purest of pursuits, these techniques have found substantial applications in such areas as signal processing, data compression and cryptography. The difficulty of factoring large numbers is at the heart of widely used public key crypto systems, which are indispensable for online transactions and secure communications. So, number theory plays a significant role in the infrastructure of modern economies.”



Dr. Darmon says he was “pleasantly surprised” to win the Guggenheim Fellowship and plans to donate the funds from his award to support the scientific activities of his research community.



GUGGENHEIM FELLOWSHIP

Antonietta Grassi

Antonietta Grassi's art celebrates women at the intersection of textiles and computer coding

Since she was three, Antonietta Grassi was “always drawing,” says the Montreal-based artist, whose work speaks to multiple histories, textiles and the pioneering role of women in technology.

The only Canadian among the 2024 recipients of the **Guggenheim Fellowship** in fine arts, Ms. Grassi grew up visiting the many fabric stores in Montreal and helping her Italian mother make clothes. Her passion for art and design led her to postsecondary studies in textiles and clothing design, not realizing that a career as a full-time artist was an option.

“I didn't really know you could be an artist,” she recalls. “The idea of going to art school wasn't even on my radar.” But while studying applied arts, she continued drawing and painting. When she started working in the textile industry in Montreal, she began taking painting and drawing classes at Concordia University at night.

“Essentially, I did my Bachelor of Fine Arts mostly part-time until the final year, when I sort of made the transition and said, ‘Okay, this is what I want to do.’”

That transition included a move into academia; she is currently a professor in visual arts at Dawson College, where her passion for textiles remains an important part of her work.

“I would go into these small towns in Northern Quebec and Ontario to see the production mills and all the looms,” she recalls of her early career in textiles. The loom came to influence her art.



“Looms were basically the inspiration for the first computers,” she says. “The loom was what inspired Charles Babbage, who worked on the Analytical Engine, which would be considered the first computer, in the 19th century — because the looms were programmed with punch cards.”

Ms. Grassi's current work explores those connections between textiles and computer coding. “And in that story, there's also the forgotten story of women's involvement. The first coders were women, because of the link to textiles. Ada Lovelace was one of the first coders. So, there are forgotten stories about women and their important role in the history, both of textiles and computer coding, and also in art history.”

The artist says winning the Guggenheim Fellowship is a “huge validation” of her work.

“The visual artists who have gotten it, I have enormous respect for them,” she says. “It's great to be part of that group.”



GUGGENHEIM FELLOWSHIP

Carl Knappett

Archaeologist Carl Knappett shines a light on the overlooked deep histories of containment

Ancient societies leave us many clues as to their nature in the traces of their material culture. It is these objects left behind — and particularly those that were used as containers — that is the research focus of University of Toronto art historian and archaeologist Carl Knappett, a 2024 winner of the **Guggenheim Fellowship**.

We may think of most of these traces through the typologies we construct to give order to the past; but the fact is that much of the pottery we study, particularly from later prehistory (e.g., the Bronze Age), served important containing functions for communities. Pottery was used to store and transport liquids such as oil and wine, to process foodstuffs through cooking, to drink in ceremonial feasts and to bury the dead. Such a wide range of purposes, but we have rarely thought through what it meant to contain. With such objects the aims may seem purely physical; what Dr. Knappett wants to do is think through some of the accompanying metaphysical aspects. Containment — and its corollary, release — were surely powerful metaphors for many aspects of social life.

Part of how Dr. Knappett seeks to branch out is to think about some of the similarities between past and present in how containers shape society. Containers are evidently critical to many aspects of contemporary life, from the ways we contain resources such as water, to the management of waste or the containment of forest fires. And yet, the infrastructures we employ, from the scale of the disposable coffee cup to the river dam, are frequently overlooked. Our proclivity for thinking in terms of closed categories — consider terms like ‘siloining’ or ‘thinking outside the box’ — does not help us recognize the deeply embedded ways



in which containers infiltrate our lives. Dr. Knappett feels that taking a ‘deep history’ approach to these questions could be one effective means of shining a light on these intractable problems.

He says he is honoured and thrilled to receive this award, which will allow him to spend the coming year researching and writing a wide-ranging book on containers and containment as physical, cognitive and political phenomena.



GUGGENHEIM FELLOWSHIP

Laura Marks

New media researcher works to reduce carbon footprint of streaming media

Laura Marks is on a mission to reduce the carbon footprint of Internet infrastructure with a simple message: “Let’s use small files.”

The Grant Strate Professor in the School for the Contemporary Arts at Simon Fraser University is a winner of the 2024 **Guggenheim Fellowship**. The award will support her work on a new book, *Small Files for a Small World*, on the carbon footprint of the Internet including her sponsorship of international small-file workshops in 12 cities including Dhaka, Bangladesh; Cairo, Egypt; Kigali, Rwanda; Tehran, Iran; Guwahati, India and Mexico City, Mexico.

“It’s the idea that Internet infrastructure uses too much electricity, too many resources, and that’s not sustainable with our planet’s limited resources,” Dr. Marks explains. “The approach I’m bringing to try to fix it is that we should produce and consume fewer huge files, to put less pressure on servers and networks. The goal is to slow the expansion of Internet infrastructure. We also need to be aware that artificial intelligence uses an amount of electricity that’s untenable if we have any hope to stop catastrophic global warming.”

A major challenge in this mission is the lack of awareness of how big the problem is. “It’s about the carbon footprint of information and communications technology, so that’s basically data centres, networks and the Internet plus devices,” she says, noting the carbon footprint is double that of the aviation industry, which garners much more attention for its emissions.

Dr. Marks is a leading contributor to and champion of the small file movement. Among other contributions, she started the Small File Media Festival (smallfile.ca), now in its fifth



year. People from all over the world submit very tiny films to the festival. “They have about three per cent of the bitrate of standard video,” she says, “and they’re gorgeous.”

As a film and media theorist, Dr. Marks’ work covers a broad area of study, stretching from media ecology and experimental cinema to Islamic philosophy and Arab cinema.



GUGGENHEIM FELLOWSHIP

Victor Quijada

Quebec choreographer shares his RUBBERBAND Method with the world

Victor Quijada's career as a choreographer is a story of constant evolution and innovation. Most notably, he created a new technique for dancers — the RUBBERBAND Method — that breaks down barriers and brings different dance forms together into a new language of dance.

Mr. Quijada's contributions to choreography were recognized with a 2024 **Guggenheim Fellowship**.

The RUBBERBAND Method combines the energy of hip-hop with the refinement of classical ballet and the angular characteristics of contemporary dance.

"It's a movement approach, a way to think about the body and the environment, and how the body affects the environment," he explains. "It involves weight-sharing — taking somebody else's weight and giving my weight to somebody else in a very fast way. It also involves transitioning from standing to the floor, to upside down, to on my head or elbow, and back to my feet. And the RUBBERBAND Method gives the dancer the tools to do those things safely."

Mr. Quijada's dance company in Montreal not only trains members in the RUBBERBAND Method but also prepares them as teachers to facilitate and share the method in various countries.

"In the two-week winter intensive program, we currently have four studios with about 10 dancers in each from all over the world," he says. "I have two of my company members in each studio guiding these dancers in this method." About 60 dancers take part in his three-week summer intensive program.



The biggest part of the company's activities, however, is touring and performing his dance productions — including upcoming dates in the United States, Canada, Mexico and Germany.

Mr. Quijada says that company members performing his work on stage, and "having the chance to observe audiences react and interact with the propositions I am offering," shapes the ongoing evolution of his work.

Born and raised in Los Angeles, Mr. Quijada first danced in the city's b-boying circles and hip-hop clubs. He later moved to New York City to join the dance company THARP!. In 2000 he moved to Montreal to join Les Grands Ballets Canadiens, before founding his RUBBERBAND company in the city in 2002.



GUGGENHEIM FELLOWSHIP

Jonathan Sterne

Guggenheim winner explores links between sound and artificial intelligence

McGill Professor of Culture and Technology Jonathan Sterne was at first surprised and then “thrilled” to be awarded a 2024 **Guggenheim Fellowship** for his work on the cultural dimensions of communication technologies.

“It is such an honour to be in great company,” he said of joining the impressive list of Guggenheim Fellowship laureates.

A historian and philosopher of media technology, Professor Sterne’s research focuses on sound, culture and disability. He explores the cultural dimensions of communication technologies, especially their form and role in large-scale societies.

One of his major ongoing projects looks at the history and theory of sound in the modern West. He has published dozens of articles and book chapters on a wide range of topics in media theory and historiography, disability studies, science and technology studies, new media and cultural studies. He has also written on the politics of academic labour.

As a researcher, he employs historiographic, philosophical and interpretive methods; long-form interviews and ethnographic participant observation. In addition to his books and articles, Sterne has published online since 1994, experimenting with multimodal and open access approaches, which are now gathered under the digital humanities umbrella.

Professor Sterne says the Guggenheim award will provide him with extra time and resources for his work on a new book about sound and artificial intelligence.





KYOTO PRIZE

Paul Hoffman

Geologist proved Snowball Earth theory

Paul Hoffman had to rise above backlash in exploring a hypothesis that other scientists had ignored. As a result of his perseverance, the adjunct professor in the University of Victoria's School of Earth and Ocean Sciences has made groundbreaking discoveries about global freezing and plate tectonics in Earth's early history.

Dr. Hoffman's impactful research garnered him the 2024 **Kyoto Prize in Basic Sciences**. The geologist says he is "thrilled" to win the prestigious award "because this is the first time a geologist has been awarded a Kyoto Prize ... So, it's great for geology to be recognized as a basic science."

As outlined in the Kyoto Prize citation, by the late 1980s evidence emerged that glaciers existed around the equator about 700 million years ago. A potential explanation, the Snowball Earth hypothesis, proposed that the Earth's surface had been fully covered with ice. That idea was dismissed by many researchers as unrealistic. It was largely thought that a fully frozen state would have led to total life extinction.

But the Snowball Earth theory held that "the long freeze should be followed by a torrid aftermath, the hottest climate the Earth had ever experienced," explains Dr. Hoffman. "So, I was drawn to it because there was a theory, and the theory made predictions, which could be tested. And now, lo and behold, all of those predictions, as it turned out, were true."

Geological surveys Dr. Hoffman conducted in Namibia, Africa, were crucial to his ability to test and prove the theory by studying similar glacial deposits of the same age.

Over time, many naysayers came to support his findings. "Much to the credit of the geological community, they have pretty much come around to it, and I think it's broadly accepted now," Dr. Hoffman says. "Now, the question that is



unresolved, of course, is how exactly the biosphere survived and what parts of the biosphere survived. Because all living things descended from the survivors of Snowball Earth."

Over the past few years, his work has primarily focused on polar-alpine microbial ecology, "to see whether there's enough diversity there" to account for all the radiations that followed the snowball. "This ancestry that I'm proposing should be visible in the genomes of living organisms as well," he explains.



L'ORÉAL-UNESCO FOR WOMEN
IN SCIENCE, NORTH AMERICA

Nada Jabado

Pioneer in pediatric brain tumours wins L'Oréal-UNESCO award

Nada Jabado, a leading expert in pediatric neuro-oncology, has been named the 2024 **L'Oréal-UNESCO For Women in Science Laureate for North America**.

A Canada Research Chair in Pediatric Oncology at McGill University, Dr. Jabado is committed to increasing our understanding of childhood brain tumors.

“For some tumors, we have treatments, for others, we don't because we don't understand very much what's happening there. I need to understand if I want to treat them correctly. And this is what I strove to do in my research.”

Her achievements include a major discovery related to glioblastoma — a type of cancer that starts as a growth of cells in the brain or spinal cord. “I tried to understand what was driving it. And we hit the jackpot, if I can use the term, when we found the first-ever discovered histone mutation in human disease. And from there, we try to understand what those mutations are.”

That discovery has driven the development of new treatments that have improved the lives of many children with cancer.

Advances in childhood oncology give Dr. Jabado great optimism for the future. She cites the example of treating brain tumors in areas that are very hard to access: “We do a lumbar puncture, which is nothing compared to a neurosurgery.” She notes that in some other cases, once the target tumour is found, treatment is delivered via an oral pill.



“This is happening, and it is what we see happening more and more.”

The L'Oréal-UNESCO award committee noted Dr. Jabado's work in “revolutionizing our comprehension of the genetic defects responsible for aggressive pediatric brain tumours.”

“Through her innovative research and effective leadership in establishing a global collaborative network, she has reshaped the medical approach to pediatric cancer, advancing both diagnostic capabilities and clinical treatments for young patients,” the committee said.



NOBEL PRIZE AND VINFUTURE PRIZE

Geoffrey Hinton

Geoffrey Hinton wins Nobel Prize in Physics

Computer scientist Geoffrey Hinton, widely known as the ‘Godfather of AI,’ has won the 2024 **Nobel Prize in Physics**. The University of Toronto’s Professor Emeritus shares the honour with Princeton University’s John J. Hopfield for discoveries and inventions that enable machine learning with artificial neural networks.

Dr. Hinton describes winning the Nobel Prize as a “total surprise.”

“I thought it must be a prank to begin with,” he says, adding that he didn’t know he had been nominated. “So, it took a while to sink in that this was real.”

Dr. Hinton has welcomed the platform afforded to him by the Nobel win to warn about the risks associated with artificial intelligence (AI) and the need for increased focus on safety. He left his job at Google in 2023 to focus on raising awareness among researchers, institutions, governments and the public about the risks of unfettered AI development.

“There is some evidence of the message getting through,” he says, but stresses that more action is needed.

“I’m pleased that it’s had an effect,” he says of his warnings. “Governments aren’t yet willing to do what needs to be done, but at least people are beginning to be aware of the problem — particularly the issue of whether these things are going to get smarter than us, and what might happen as a result.

“A few years ago, most people thought it was just science fiction, and now they understand that it’s a real problem that’s coming.”



Dr. Hinton says the research funding environment in Canada — particularly support for basic, curiosity-driven research — played an important role in his achievements in AI.

“That’s a big advantage Canada has in AI,” he says. “We now have these big institutes like the MILA (the Montreal Institute for Learning Algorithms) and the Vector Institute, which help a lot with funding AI.”

In 2024 Dr. Hinton also won the prestigious **VinFuture Grand Prize** for his leadership and foundational work in neural network architectures. He shared the prize with four other scientists, including Yoshua Bengio of the Université de Montréal, each receiving \$3 million US for their transformational contributions to the advancement of deep learning.

Dr. Hinton won the Turing Award, often referred to as the ‘Nobel prize of computing,’ in 2018.

In addition to his efforts to sound the alarm over AI safety needs, Dr. Hinton’s current interests include demonstrating that today’s chat bots have subjective experience.

PRINCESS OF ASTURIAS AWARD

Daniel Drucker

After success of diabetes and obesity treatments, Daniel Drucker looks to potential of GLP-1 drugs for other illnesses

Daniel Drucker has added to his impressive collection of major international research prizes with this year's **Princess of Asturias Award for Technical and Scientific Research**.

The senior scientist at the Lunenfeld-Tanenbaum Research Institute at Mount Sinai Hospital and professor at the University of Toronto's Temerty Faculty of Medicine is once again being recognized for his research on the physiology and therapeutic potential of glucagon-like peptides (GLP) — hormones produced in the gut that form the basis for several highly effective drugs to treat type 2 diabetes, obesity and intestinal disorders.

These include a class of type 2 diabetes drugs called GLP-1 agonists, which improve blood sugar control and have been shown to benefit weight loss. Dr. Drucker's work has received significant public attention in recent years due to the success of GLP-1 drugs such as Ozempic for diabetes and Wegovy for weight loss.

He shares the 2024 Princess of Asturias Award for Technical and Scientific Research with Jeffrey M. Friedman, molecular biologist (U.S.); Joel F. Habener, endocrinologist (U.S.); Jens Juul Holst, chemist (Denmark) and Svetlana Mojsov, chemist (North Macedonia and U.S.). The five scientists have been developing this research since the 1970s.

As impressive as the success of GLP-1 drugs has been so far, they hold tremendous potential for even greater impact on human health in the years ahead.

"The GLP-1 field is interesting because it seems to be expanding," says Dr. Drucker. "We started with type 2



diabetes 20 years ago, and then 10 years ago we had the weight loss/obesity chapter. But you know, we're getting exciting results in the field and in the clinic with heart disease, heart failure, kidney disease and metabolic liver disease. There are trials on all kinds of psychiatric disorders and ongoing trials with Parkinson's and Alzheimer's.

It seems to be just expanding tremendously into many different domains, which is fascinating. We'll just have to see where this goes."

Dr. Drucker says the success and potential of GLP-1 drugs point to the importance of investing in basic research. "If you invest in strong basic science, you just don't know what you're going to get, whether it's artificial intelligence, or the Internet, or vaccines, or our story of glucagon-like peptides... There are so many success stories that justify fundamental, basic science funding."

His numerous global recognitions include the Warren Alpert Foundation Prize, the Gairdner International Award, the VinFuture Prize for Innovators with Outstanding Achievements in Emerging Fields and the Wolf Prize in Medicine. Together with Drs. Habener, Mojsov and Holst, Dr. Drucker is included in TIME magazine's list of the most influential people in health in 2024.



PRINCESS OF ASTURIAS AWARD

Michael Ignatieff

Michael Ignatieff honoured for defense of fundamental human rights and values

Canadian author, academic and former politician Michael Ignatieff has won Spain's **Princess of Asturias Award for Social Sciences** in recognition of his broad-ranging research and writing in defence of fundamental human rights. The award jury highlighted Ignatieff's multifaceted career, encompassing the study of history and philosophy as well as the practice of journalism and politics — all with a focus on freedom, tolerance and the safeguarding of institutions.

Dr. Ignatieff says he is “surprised and delighted” to be a 2024 winner of the Princess of Asturias Award, noting that previous winners in the social sciences include many of his “intellectual heroes.”

He has held senior academic posts at various universities, including serving as a president of Central European University (CEU) during a tumultuous period from 2016 to 2021 — when the Hungarian government challenged the university's legal right to operate in the country. That recent experience, he says, deepened his commitment to the defence of democracy and academic freedom.

“What was shocking is that this was happening in an EU member state, a member of NATO, a member of the democratic family of nations,” he says. “So, it was a very important moment of awakening for me to realize how vulnerable democracy could be and how vulnerable academic freedom could be, and it's made me since then a very much more adamant defender of academic freedom than I was before.”

Today, as CEU rector emeritus and history professor, Dr. Ignatieff continues to teach the history and law of international human rights. His current research and writing interests include the political experience of his generation.



“I was born in 1947, and we had a very particular trajectory,” he explains. “We had this incredible wave of economic prosperity right through to 1973 and that kind of defined our expectations, our hopefulness. And then we saw the end of communism, which we never expected. We saw the explosive experience of globalization in the ‘90s, and as many of us came to full maturity and assumed positions of responsibility — from 9/11 followed by the financial crisis of 2008 followed by Covid — we've had one hammer blow after another. So, I'm interested in the shape of this experience.”

Dr. Ignatieff's published work includes *The Needs of Strangers* (1984), *The Russian Album* (1987), *The Warrior's Honor* (1998), *Isaiah Berlin: A Life* (1998), *Virtual War* (2000), *Human Rights as Politics and Idolatry* (2001), *The Lesser Evil* (2004), *The Ordinary Virtues* (2017) and *On Consolation* (2021).



SLOAN RESEARCH FELLOWSHIP

Maya Fishbach

Astrophysicist is helping to advance new field in gravitational wave astronomy

Maya Fishbach, a leader in the emerging field of multi-messenger astronomy, is helping to bridge the fields of gravitational- and astrophysics. An assistant professor with the Canadian Institute for Theoretical Astrophysics (CITA) at the University of Toronto, Dr. Fishbach is advancing a new area of research that draws on observations of both gravitational waves and electromagnetic radiation.

“The specific field of gravitational wave astronomy that I work on is still in its infancy, so we don't even really know what it's going to teach us about the universe,” she explains. “People often compare this moment that we're in now in gravitational wave astronomy with when Galileo first turned a telescope to the sky, and we didn't really know what was out there beyond our planet, beyond our solar system, beyond our galaxy.”

Dr. Fishbach says her research, which involves listening to gravitational waves to better understand the black holes they come from, reflects “a very human curiosity that people have about what is out there,” beyond what is immediately in front of us. It's about learning as much as we can about the universe.

The astrophysicist's work has been recognized with a 2024 **Sloan Research Fellowship**.

Dr. Fishbach came to focus on this particular field during the first year of her PhD in astrophysics, when gravitational waves were detected for the first time. “That really revolutionized the whole field of physics and astronomy, and also obviously my career, because I decided to go into this exciting new field.”



She says winning the Sloan Fellowship is a “huge honour” — both as a recognition of the work that she has done and the potential that the review committee sees in her research.

“It's amazing to be among this cohort of people who have won it in the past,” she says, including many researchers she admires and respects.

“It feels really nice to be among them and to be part of this community.”



SLOAN RESEARCH FELLOWSHIP

Kaitlyn Gaynor

Ecologist studies animals' response to human impacts on their environments

Large mammals are always making decisions, such as where to go, what to eat, how to stay safe. Increasingly, those decisions relate to human impacts on their environment. The behavioral response of animals to our presence is the focus of Ecologist Kaitlyn Gaynor's research — the work that garnered the University of British Columbia Assistant Professor a 2024 **Sloan Research Fellowship**.

"I study large, terrestrial mammals, like bears and elephants and lions, and the work we do in our lab involves applying fundamental concepts from behavioral ecology and community ecology to help us understand how they respond to novel changes in their environment caused by human activity," she explains. "Animals are constantly making decisions about what to do at a given time and place, and we humans are changing the opportunities available to them, the perceived risks that they're experiencing. Therefore, we're changing the decisions that they're making — and sometimes those decisions have negative consequences for the animals. They can keep them away from good habitat. They might get them killed."

"But sometimes these changes allow animals flexibility in their behaviour, allow them to make a living in a world that looks really different from the world in which they originally evolved, and perhaps to coexist better with people."

Ultimately, the motivation of Dr. Gaynor's research is to better inform the management and conservation of large mammals that need a lot of space — space that humans are increasingly taking away from them.

Her lab is currently exploring what happens when humans take predators out of environments and then put them back in. What does that mean for the behaviour of the other



species interacting with those predators? It's part of her continuing work in Gorongosa National Park in Mozambique.

Dr. Gaynor calls the Sloan Fellowship a "tremendous honour," noting that, in her case, it reflects "a broader recognition of the importance of doing work that straddles fundamental science and applied science." She says she is grateful to the "incredible colleagues and peers and mentors" who have supported her work and the "graduate students, undergraduates and postdocs in my lab who are now really leading a lot of the work."



SLOAN RESEARCH FELLOWSHIP

Daniel Litt

Leading researcher in algebraic geometry and number theory wins Sloan Fellowship

Daniel Litt, Assistant Professor in mathematics at the University of Toronto, is an emerging leader in using modern algebraic geometry to answer classical questions in geometry, topology, number theory and dynamics.

“I work primarily, in algebraic geometry and number theory” he explains. “So, a lot of what I do is think about the interactions between those two areas. For example, how is the geometry of a shape influenced by the algebra of the equations that define it?”

Number theory has recently found many uses in cryptography and other areas, but Dr. Litt emphasizes that his work isn't directly aimed at any kind of application. “It's more fundamental research,” he says, noting that he works on questions that may have been explored by someone in the 17th or 18th centuries.

His pursuit of answers to longstanding mathematical questions garnered Dr. Litt the 2024 **Sloan Research Fellowship**, which he sees as a “little vote of confidence that you should keep doing what you're doing.”

“It's an honour to be recognized that way,” he says.

Dr. Litt's research interests also include questions about positivity and vanishing theorems, dynamics of algebraic varieties and Hodge theory.





SLOAN RESEARCH FELLOWSHIP

Courtney Paquette

Mathematician followed unusual path to machine learning research

Courtney Paquette, Assistant Professor of Mathematics at McGill University, didn't foresee a career in machine learning when she was doing her undergraduate degree in finance. At the time, she was studying supply chain management and learning how to use mathematics for efficiencies in ordering supplies, which introduced her to the field of optimization probability.

"I really liked it," she recalls, which led her to taking additional courses in this area. "While I was in a numerical analysis course, the professor basically said, 'What are you doing? You're really good at math. Do you want to do a PhD in math?'"

That's when she pivoted in her studies to optimization probability — and found she had some catching up to do. "It was hard because I didn't actually have the background [for a PhD]," she says.

A year spent working at what is now known as Google DeepMind led Dr. Paquette to focus on machine learning "because that's where optimization was going at the time."

"At Google, I got to interact a lot with computer scientists (I'm more on the theory side). They introduced me to some cool problems that they were asking about theoretically, which had very applied applications, and that's how I ended up working on the practical implications of machine learning."

Among other things, Dr. Paquette — a Canada CIFAR AI Chair — is working to make machine learning algorithms more efficient in terms of compute (time and cost) budgets.

"The problem with running these really big models, like large language models [such as those used by Chat GPT], is that



they're so big and we can't run them for very long; we're limited by compute. So we need to be able to sort of predict the behavior of an algorithm so that it will run in the most compute-efficient way."

Dr. Paquette has been named a 2024 **Sloan Research Fellow**. She welcomes the award as recognition of the value of her research.

"I've been really trying to change the way we do optimization, so it feels nice to be recognized for trying to do something a little bit different from what is normally done."



VINFUTURE PRIZE

Yoshua Bengio

Yoshua Bengio recognized for contributions to deep learning systems

Yoshua Bengio, a global leader in artificial intelligence, is a winner of the 2024 **VinFuture Grand Prize**. The Université de Montréal professor shares the award with four other scientists, including University of Toronto Professor Emeritus Geoffrey Hinton, for his work in pioneering neural networks and deep learning algorithms.

Deep learning uses artificial neural networks for tasks like voice recognition, computer vision and language processing. It draws inspiration from the human brain, using algorithms to convert the biological process of learning into mathematical sequences. The goal is for machines to improve their performance over time by learning from data, sometimes with supervision and increasingly through self-learning techniques.

“Professor Bengio’s contributions have become integral to modern deep learning systems, particularly in NLP (natural language processing),” says the VinFuture citation. “His advancements have enabled tools used by millions worldwide, including virtual assistants and machine translation services. His work continues to shape deep learning fields, from robotics to personalized medicine.”

Professor Bengio is a Full Professor at Université de Montréal, the Founder and Scientific Director of MILA, a community of more than 1,200 researchers specializing in machine learning and the world’s largest academic research centre for deep learning. He co-directs the Canadian Institute for Advanced Research (CIFAR) Learning in Machines & Brains program and acts as Scientific Director of the Institute for Data Valorization (IVADO).



His groundbreaking work in deep learning also earned Professor Bengio the 2018 Turing Award, regarded as ‘the Nobel Prize of Computing,’ along with Dr. Hinton and Yann LeCun.

He was named one of TIME’s magazine 100 Most Influential People of 2024.

Awards descriptions

BBVA Foundation Frontiers of Knowledge Awards

The BBVA Foundation Frontiers of Knowledge Awards seek to recognize and encourage world-class research and artistic creation, prizing contributions of lasting impact for their originality and theoretical significance. These international awards honour fundamental disciplinary or interdisciplinary advances across eight categories: Basic Sciences (Physics, Chemistry, Mathematics); Biology and Biomedicine; Information and Communication Technologies; Ecology and Conservation Biology; Climate Change; Economics, Finance and Management; Humanities and Social Sciences; and Music and Opera.

Benjamin Franklin Medal

Since 1824, The Franklin Institute of Philadelphia has honored the legacy of Benjamin Franklin by presenting awards for outstanding achievements in science, engineering and industry. As the oldest comprehensive science and technology awards program in the United States, The Franklin Institute Awards Program has recognized more than 2,000 of the most pioneering scientists, engineers, inventors and innovators from across the globe.

Sloan Research Fellowships

The Sloan Research Fellowships seek to stimulate fundamental research by early-career scientists and scholars of outstanding promise who hold a PhD or equivalent in chemistry, computer science, economics, mathematics, molecular biology, neuroscience, ocean sciences, physics or a related field. These two-year fellowships are awarded yearly to 126 researchers in recognition of distinguished performance and a unique potential to make substantial contributions to their field.

Guggenheim Fellowships

Guggenheim Fellowships are intended for mid-career individuals who have demonstrated exceptional capacity for productive scholarship or exceptional creative ability in the arts and exhibit great promise for their future endeavors. Fellowships are awarded through an annual competition open to citizens and permanent residents of the United States and Canada.

Kyoto Prize

The Kyoto Prize is an international award of Japanese origin, presented to individuals who have made significant contributions in the fields of science and technology, as well as the arts and philosophy. This internationally renowned award was born out of the sincere wish of Kazuo Inamori to “contribute to the progress of the future of humanity while maintaining a balance between the development of science and civilization and the enrichment of the human spirit.”

L'Oréal-UNESCO For Women in Science

The L'Oréal-UNESCO For Women in Science International Awards are presented every year to five outstanding women scientists — one per each of the following regions: Africa and the Arab States, Asia and the Pacific, Europe, Latin America and the Caribbean, North America — in recognition of their scientific accomplishments. These exceptional researchers are rewarded for their important contributions to the progress of science, either in life sciences or in the fields of physical sciences, mathematics and computer science.

Nobel Prizes

The Nobel Prize is an international award administered by the Nobel Foundation in Stockholm, Sweden, and based on the fortune of Alfred Nobel, Swedish inventor and entrepreneur. The award seeks to reward outstanding efforts in the fields that Nobel was most involved in during his lifetime: physics, chemistry, physiology or medicine, literature and peace.

Princess of Asturias Awards

The Princess of Asturias Foundation convenes the Princess of Asturias Awards which aims at rewarding the scientific, technical, cultural, social and humanitarian work carried out at an international level by individuals, institutions or groups. These awards are granted in eight categories: the Arts, Communication and Humanities, Concord, International Cooperation, Literature, Social Sciences, Sports, and Technical and Scientific Research.

VinFuture Prize

The VinFuture Prize honours breakthrough scientific research and technological innovations that create meaningful change in the everyday lives of millions of people. The Prize aims to recognize exceptional inventors and researchers from global academic universities, research labs and industry.

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