Universities Canada. Universités Canada.

Global Excellence Initiative

2025 International research prize winners

Global Excellence Initiative

Initiative pour l'excellence mondiale

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Foreword

Canadian researchers are shaping global discovery and the world is taking notice. Across disciplines, from artificial intelligence and climate science to economics, engineering, health sciences and the arts, their work advances knowledge, strengthens communities and improves lives. In 2025 alone, Canadian scholars received 25 major international research awards. These awards are evidence of what sustained investment makes possible and a reminder of what is at stake if that investment falters.

The achievements highlighted in this booklet speak to the breadth and depth of Canada's research excellence. Peter Howitt's Nobel Prize in Economic Sciences is the result of decades of rigorous scholarship that has reshaped how governments understand growth, innovation and prosperity. The work of Yoshua Bengio and Nobel Laureate Geoffrey Hinton, honoured this year with the Queen Elizabeth Prize for Engineering, helped lay the intellectual foundation for modern artificial intelligence, technologies now transforming major industries and daily life around the world. Daniel Drucker's receipt of both the Breakthrough Prize and the BBVA Foundation Frontiers of Knowledge Award reflects research that has fundamentally altered how metabolic diseases are treated, directly improving outcomes for tens of millions of people. Canadian achievements extend to the arts as well, with scholars such as Angela Esterhammer and Nadia Shihab recognized by the Guggenheim Foundation for their exceptional creative and intellectual contributions that deepen our cultural understanding and enrich public life. Early career researchers are already shining on the international stage, including Maaike van Kooten's New Horizons in Physics Prize, signaling that the pipeline of Canadian talent is strong and growing. Our outstanding early career researchers provide us with the knowledge that Canada is in good hands for the future.

None of these breakthroughs emerged in isolation. Behind each one stands a university ecosystem that provides the infrastructure, the intellectual community and the long-term support that world-class research demands. Canadian universities are not simply places where discovery happens. They are active partners in it, connecting researchers across disciplines, training the next generation of scholars and translating knowledge into real-world impact.

This recognition sends a powerful message to scholars, innovators and entrepreneurs: curiosity matters, discovery unlocks opportunities and bold thinking allows us to solve problems, creating a stronger and safer world.

At a defining moment for Canada and for the world, research excellence is not abstract. It shapes health systems, economies, public policy and cultural understanding. The achievements profiled in these pages demonstrate what is possible when talent is matched with ambition and sustained commitment. They highlight a message echoed by many of the researchers featured here: discovery depends on stable funding and a strong research ecosystem. Continued investment in research will ensure that Canadian scholars remain at the forefront of the ideas, inventions and innovations shaping the future, enabling Canadians to both respond to the challenges ahead and define the solutions. Exceptional research takes place here in Canada.

Molly S. Shoichet, PhD, O.C., O. Ont., FRS

University Professor and Pamela & Paul Austin Chair in Precision & Regenerative Medicine, University of Toronto

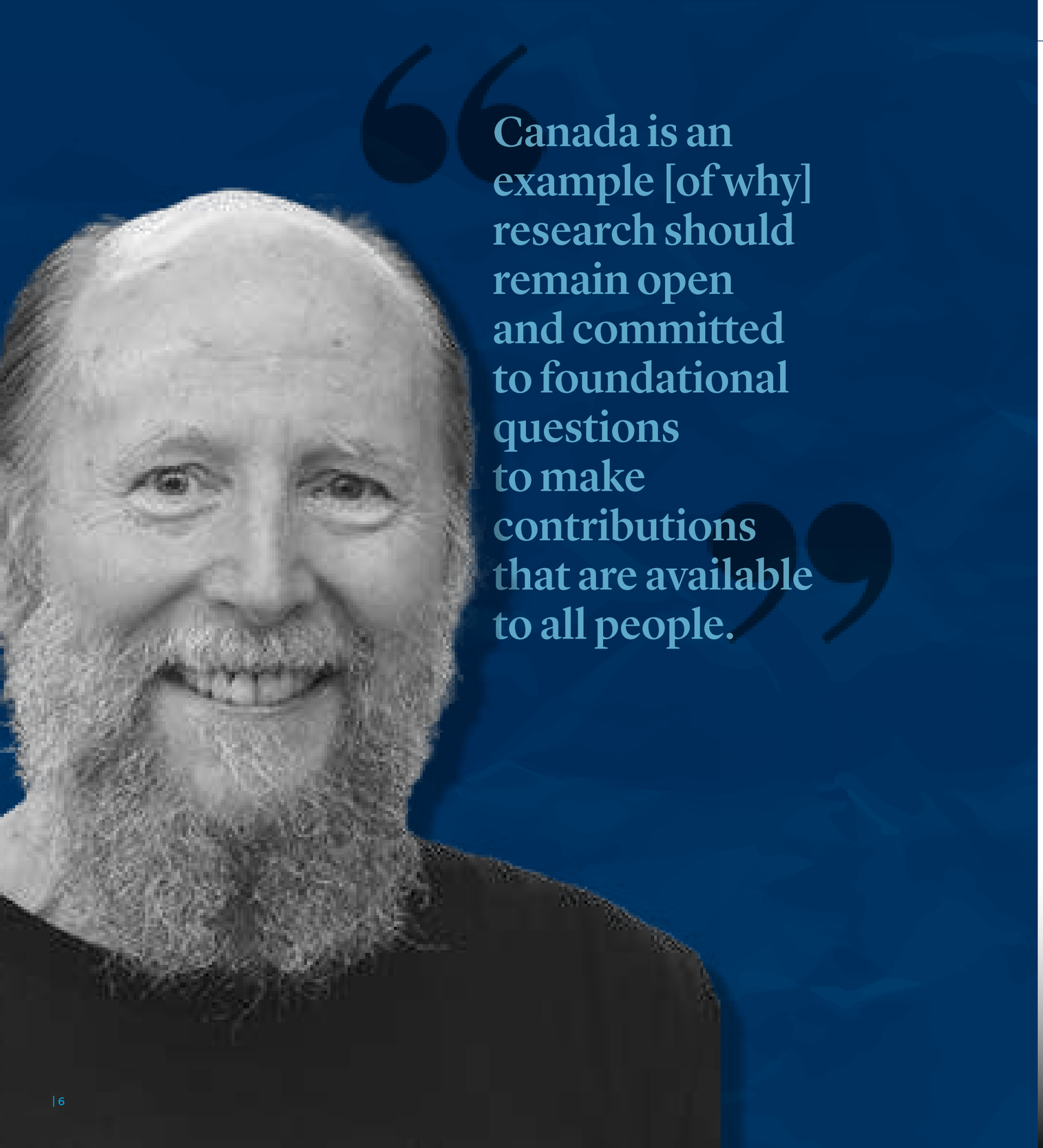
GEI Canvassing committee member

A.M. Turing Award

Often described as the “Nobel Prize in Computing,” the A.M. Turing Award is the Association for Computing Machinery’s highest technical honour. Named for Alan Mathison Turing, the British mathematician and computer scientist whose ideas laid the foundation of modern computing, the award recognizes contributions that have lasting impact on the field. Each year, the ACM typically selects a single recipient whose work has significantly advanced computing research and practice.

Recipient

- Richard Sutton



> Canada is an example [of why] research should remain open and committed to foundational questions to make contributions that are available to all people.

Richard Sutton

A.M. Turing Award

Humans and animals learn by doing, observing results, adjusting accordingly and trying again. Dr. Richard Sutton, a Professor in the Department of Computing Science at the University of Alberta, has spent his career translating that everyday process into a scientific framework that transformed artificial intelligence (AI).

His work explores reinforcement learning — a model of learning shaped by interaction, feedback and adaptation. Unlike supervised learning, where corrected answers are provided, reinforcement learning requires an agent to discover what works by trial-and-error. This result is a form of machine learning that more closely resembles how humans learn in real life.

Originally a theoretical framework, the influence of reinforcement learning is now widespread. It underpins landmark achievements, such as AlphaGo and guides automated decision-making digital platforms, from personalized recommendations to online advertising and content selection.

Dr. Sutton's interest in AI and learning began with a fascination about the nature of the mind. As a student, he was drawn to computers, often described as artificial brains, yet he quickly recognized a gap: computers followed instructions, but they did not learn like humans do. At the same time, the human brain could be understood as a machine. Reconciling that tension became the intellectual thread that guided his research.

Career

- Professor, University of Alberta

Education

- BA, Stanford University
- MA, University of Massachusetts
- PhD, University of Massachusetts

Sutton views artificial intelligence as an international endeavour, yet he is clear about Canada's role. "Canadian research has been very important in artificial intelligence," he notes. "We've been punching above our weight." Significant advances in deep learning emerged from Canada. The University of Alberta has become a global centre for academic reinforcement learning research. Strong AI research, he argues, should not be concentrated in only a few countries.

Even today, Dr. Sutton says the field is still evolving. As understanding deepens, he expects learning systems to transform how people work, think and spend their time — and to alter how humanity understands intelligence itself. Beyond building more capable machines, his work aims to illuminate learning as a fundamental process, offering insight not only into artificial systems, but into the human mind as well. His career illustrates how Canadian research has helped define the scientific foundations of modern AI.

Other honours & awards

- Royal Society of Canada ('16)

BBVA Foundation Frontiers of Knowledge Awards

The BBVA Foundation Frontiers of Knowledge Awards celebrate world-class research and artistic creation that have reshaped understanding across disciplines. Presented annually across eight categories — from the basic sciences and biomedicine to climate change, economics, the humanities and music and opera — the awards honour contributions noted by their originality, theoretical depth and lasting impact. Daniel Drucker was named a 2025 recipient in recognition of research that has reshaped biological and biomedical science and continues to influence human health worldwide.

Recipient

- Daniel Drucker

Breakthrough Prize in Life Sciences

Founded in 2013, the Breakthrough Prize in Life Sciences recognizes scientific discoveries that advance understanding of living systems and improve human health. Established by global technology and philanthropy leaders, the prize is awarded annually to researchers whose work has had a significant impact on biomedical science. In 2025, one of the recipients was Daniel Drucker, recognized for research that reshaped the understanding of metabolic disease and informed new approaches to treatment.

Recipient

- Daniel Drucker

> The Canadian government and public deserve to understand the benefits of supporting scientific research.

Daniel Drucker

Breakthrough Prize in Life Sciences
BBVA Foundation Frontiers of Knowledge Award

Few areas of biomedical research have had as immediate and far-reaching impact on global health as the work led by Dr. Daniel Drucker.

A University Professor at the University of Toronto's Department of Medicine, Drucker works at the intersection of basic biology and clinical impact, his research focusing on how the human body controls metabolism and body weight through hormonal and molecular signals, particularly the hormone glucagon-like peptide-1 (GLP-1). By uncovering how GLP-1 functions in the body, his research has helped lay the foundation for therapies that address obesity and type 2 diabetes — conditions that place a growing strain on health systems worldwide.

At its core, Drucker's research seeks to decode the body's internal communication systems. By clarifying how these signals function, his research has triggered a new generation of life-changing treatments that control blood sugars, manage body weight and improve overall metabolic health.

Drucker's work has been recognized by the international scientific community, reflecting the scale and durability of its impact. Over the years, he has received many of the world's most respected honours in biomedical research — acknowledgements that signal how deeply his discoveries have reshaped modern understanding of metabolic diseases.

Dr. Daniel Drucker has translated fundamental discoveries into tangible therapies that are improving lives worldwide. Canadian biomedical research is once again recognized globally thanks to Dr. Drucker's curiosity, expertise and a strong commitment to improving human health.

Career

- Professor, University of Toronto
- Senior Scientist, Lunenfeld-Tanenbaum Research Institute, Mount Sinai Hospital

Education

- BSc, University of Ottawa
- MD, University of Toronto

Other honours & awards

- Royal Society of Canada ('12)
- Wolf Prize in Medicine ('23)
- VinFuture Prize ('23)
- Princess of Asturias Award ('24)

CIFAR Azrieli Global Scholars Program

The CIFAR Global Scholars Program supports exceptional early-career researchers as they step into independence, providing the freedom and support to pursue high-risk, high-reward interdisciplinary research at a formative stage in their careers. Through close collaboration with leading researchers around the world, the program fosters bold ideas, builds global professional networks and offers focused leadership training aimed at advancing transformative knowledge and tackling some of the most pressing scientific and societal challenges. In 2025, scholars Artem Babaian, Peter Crockford and Oliver Warr were selected, reflecting the program's emphasis on originality, collaboration and long-term research impact.

Recipients

- Artem Babaian
- Peter Crockford
- Oliver Warr

> Investment into the Canadian research ecosystem today is building a technology-oriented economy for Canada.

Artem Babaian

CIFAR Azrieli Global Scholar

Dr. Artem Babaian is exploring life at its smallest — and most consequential — scale. By combining computational biology with the study of genes and viruses, his research analyses hundreds of millions of gigabytes of DNA and RNA sequence data to uncover biological signals that would be impossible to detect using traditional methods.

An Assistant Professor in the Department of Molecular Genetics at the University of Toronto, his interest traces back to childhood, he says. At age 11, after reading *The Hot Zone* by Richard Preston, Babaian became fascinated by microbes and how something so small could have such a large impact on something like human health. That early curiosity now drives a central question in his research: could previously unknown viruses play a role in diseases with unclear origins, like Alzheimer's disease? And if so, can these viruses be identified?

Babaian's work is expanding scientific understanding of viruses and their hidden biological connections to disease. What he discovers could change our understanding of human health and support earlier detection, improved diagnostics and open new paths for prevention and treatment options.

Still in the thick of its discovery period, Dr. Artem Babaian's research continues to push the limits of how data-driven science can deepen our understanding of human health.

Career

- Assistant Professor, University of Toronto
- Principal Investigator, Donnelly Centre for Cellular and Biomolecular Research

Education

- BSc, McMaster University
- PhD, The University of British Columbia

Other honours & awards

- Gairdner Early Career Investigators ('23)

> Maintaining research excellence is an investment in a prosperous Canadian future.

Peter Crockford

CIFAR Azrieli Global Scholar
Sloan Research Fellowship

Long before modern technology could measure climate change, the Earth recorded its own history in stone — and Dr. Peter Crockford has built a career reading that record. An Associate Professor in the Department of Earth Sciences at Carleton University, Crockford works in Earth system science, leading a research group that reconstructs Earth's recent and ancient past by examining chemical traces in rocks and fossils. By reading these chemical records, his work seeks to unravel how life on Earth and its climate have co-evolved over billions of years.

A defining influence of Crockford's research path was his captivation with "Snowball Earth" glaciations, a time when the Earth was frozen from poles to equator. More than just an interesting time in Earth's history, these episodes present profound scientific challenges — which his research continues to analyze to better understand how Earth's systems respond to extreme change.

While his research is rooted in the past, Crockford's work can help answer today's most important questions about Earth — and beyond. By studying how Earth behaved under extreme conditions, his research helps scientists better understand how planets evolve and how environments change over time. "It is often noted that the past is the key to understanding the future," he says. "However, in the age of advanced telescopes, one could argue the deep past is the key to understanding the remote observations of distant exoplanets."

Career

- Associate Professor, Carleton University
- Guest Investigator, Woods Hole Oceanographic Institution (WHOI)

Education

- BSc, University of Victoria
- MSc, University of Victoria
- PhD, McGill University

Through his research, Dr. Peter Crockford plays a key role in connecting fundamental questions about Earth's ancient history to emerging frontiers in science, deepening our understanding of not only our planet, but worlds far beyond it.

> "Fundamental research is the foundation of modern society and societal advancement."

> Research and development are essential at all levels to ensure Canada and its diverse chorus of voices has the safe space it needs to speak up and strive for research excellence and advancement and provide leadership in making the world a better place.

Oliver Warr

CIFAR Azrieli Global Scholar

Although the Earth's surface feels solid and stable beneath our feet, deep underground lies a complex and dynamic network of fluids coursing through rock. From groundwater to oil to gas, Dr. Oliver Warr studies how these hidden systems behave — and what they mean for some of today's most urgent environmental challenges like climate change and sustainable resource management.

An Assistant Professor in the Department of Earth and Environmental Sciences at the University of Ottawa, Warr examines how underground fluids migrate, interact and evolve over time. Some processes unfold over months. Others stretch across millions or even billions of years. Understanding where these fluids originate, how quickly they move and how they change over time is essential for informed decision-making about resource development, carbon capture and long-term environmental protection.

Take groundwater, for example. "Around 40 percent of the water used for drinking and agriculture worldwide actually comes from underground reservoirs," he notes. Protecting these systems requires precise knowledge of how water travels through rock and how contaminants may spread. That insight supports more reliable access to a resource that communities depend on every day.

Education

- MGeol, University of Leicester
- PhD, University of Manchester

Warr's work also addresses the management of industrial by-products, including carbon dioxide. Geological formations are being considered as long-term storage sites to reduce greenhouse gas emissions. Warr's research helps determine whether these sites can safely contain carbon dioxide and other harmful by-products of society, such as nuclear waste, helping hazardous materials remain, in his words, "under geologic lock and key."

By revealing how fluids move and evolve beneath the Earth's surface, Dr. Oliver Warr's research is advancing climate change solutions and supporting safer, more effective approaches to resource use and environmental protection.

Global Young Academy

The Global Young Academy brings together early-career researchers from six continents to support interdisciplinary and intergenerational dialogue on major societal challenges. Members are selected for their scientific excellence and their commitment to engaging beyond academia, helping bridge research and public impact. Among those recognized through its membership in 2025 are Élise Devoie, Małgorzata Anna Gazda and Elena Kuzmin, whose work reflects the Academy's emphasis on leadership, collaboration and societal engagement.

Recipients

- Élise Devoie
- Małgorzata Anna Gazda
- Elena Kuzmin

> It is a critical moment for Canada to step up and take centre stage in terms of cold regions research.

Élise Devoie

Global Young Academy

Climate change is transforming northern landscapes in visible and invisible ways. Dr. Élise Devoie works alongside northern communities to understand how these changes are reshaping water systems people and ecosystems depend on every day.

As an Assistant Professor in Civil Engineering at Queen's University, her research focuses on hydrology and hydrogeology of cold regions — the study of how water moves through thawed and frozen ground, lakes, rivers and wetlands in sub-Arctic environments. She works in partnership with remote First Nations communities in the Northwest Territories to understand how climate change is affecting drinking water, fish habitat and local waterways and how these systems are adapting.

Devoie's research journey was irrevocably shaped by her first field trip North. Time spent on the awe-inspiring land with community members deepened her sense of responsibility and belonging. "I knew that it was my calling to do everything I could to understand, steward, protect and honour this territory," she says. "Working together with community partners has been the best way I've found to embark on this mission."

At the heart of her work is the belief that the Earth provides everything we need — and caring for it is a shared responsibility.

Career

- Assistant Professor, Queen's University

Education

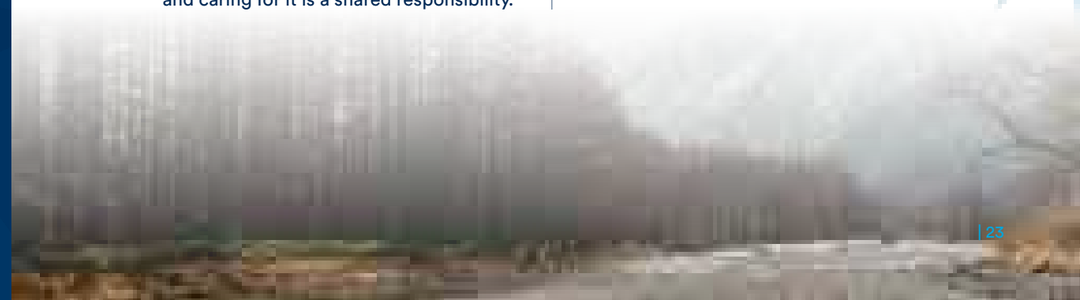
- BMath, University of Waterloo
- PhD, University of Waterloo

Bringing together scientific tools and Traditional Knowledge, her research helps communities and decision-makers better understand how northern water systems are changing and how to respond in ways that support both environmental health and community well-being.

Dr. Élise Devoie's research addresses a broader challenge facing societies worldwide: managing water responsibly in a changing climate. Rooted in northern landscapes, her work reflects a core strength of Canadian research — partnership-driven science guided by respect and focused on practical solutions.

Other honours & awards

- CIFAR Azrieli Global Scholar ('23)



> Investing in research is an investment in the country's future. It strengthens communities, drives innovation and ensures that Canada remains a place where ideas can grow into meaningful contributions for society.

Małgorzata Anna Gazda

Global Young Academy

Why do animals look the way they do? How can small changes in DNA generate the remarkable diversity of life on Earth? These questions guide the research of Dr. Małgorzata Anna Gazda, an evolutionary biologist studying how genes shape visible traits — like the colours of feathers, scales or skin — and how those traits change as species adapt over time.

Gazda is an Assistant Professor in the Université de Montréal's Department of Biological Sciences, where she leads a research program in animal genomics and evolutionary biology. Her work brings together population genetics, whole-genome analysis and molecular biology to better understand how genetic variation translates into physical differences. "What fascinates me is how evolution repeatedly finds different solutions to similar biological challenges," she says.

By studying DNA from natural populations, Gazda investigates how traits such as colour, pattern and sex-based differences emerge and evolve across species. Her research traces the pathways between genes and appearance, revealing how subtle molecular shifts can produce meaningful changes in form and function. The implications extend beyond basic discovery. Understanding how organisms adapt at the genetic level can inform conservation efforts and improve predictions about biological responses to environmental changes. "Studying evolution gives us tools to think forward, not just backward," she explains.

Career

- Assistant Professor, Université de Montréal

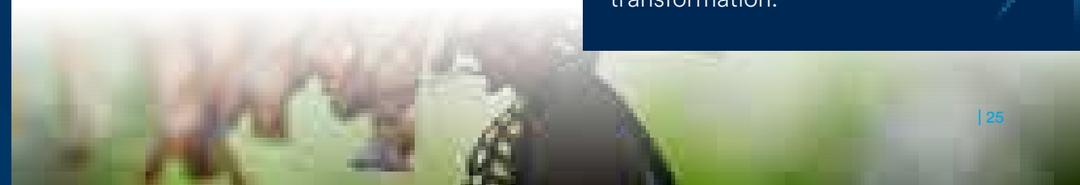
Education

- BSc, Jagiellonian University
- MSc, Jagiellonian University
- PhD, Universidade de Porto

Beyond her work in evolutionary biology, Gazda studies how the science itself is conducted and communicated. Her efforts to improve transparency and data quality help strengthen confidence in scientific results and support a more open and inclusive research culture, where knowledge can be shared and reused effectively.

Together, the streams of Dr. Małgorzata Anna Gazda's work demonstrate how exploring life at its most fundamental level can help build a more thoughtful, informed and resilient future. By examining how life adapts at the genetic level, her research helps to predict biodiversity loss, environmental disruption and how species evolve. Dr. Gazda's work reflects the rigour and global impact of Canada's research in evolutionary science.

> "By supporting curiosity-driven and applied research, Canada builds the human capital needed to address emerging challenges — from environmental change to public health to technological transformation."



> Canada provides opportunities for the next generation of researchers to develop expertise and train in cutting-edge techniques that are in high demand.

Elena Kuzmin

Global Young Academy

Some of the most important drivers of disease are not individual genes, but the interactions between them. Dr. Elena Kuzmin's work uncovers these hidden interactions, showing how networks of genes shape health, disease and biological resilience.

An Assistant Professor at Concordia University, with an affiliated appointment at McGill University, Kuzmin works in systems biology, a field that examines how genes function collectively rather than in isolation. She investigates complex genetic interactions where combined effects cannot be predicted by studying each gene alone.

Her interest in this field began in graduate school, as genome sequencing revealed just how much genetic variation exists within populations. Scientists could catalogue countless genetic changes, yet a deeper question remained. "Knowledge about how such variants interact to generate phenotypic outcomes was lacking," she explains. Understanding those interactions became the driving force behind her research.

Kuzmin conducted the first systematic study of three-gene interactions in yeast, which showed how genetic networks can buffer change — or amplify it. This insight helps explain why complex diseases are so difficult to predict and treat. Building on this work, she turned to cancer research, showing how major chromosomal losses can shift triple-negative breast cancer into more aggressive states and expose hidden genetic weaknesses.

Career

- Assistant Professor, Concordia University
- Adjunct Professor, McGill University
- Canada Research Chair in Synthetic and Functional Genomics

Education

- BSc, University of Toronto
- MSc, University of Toronto
- PhD, University of Toronto

From evolutionary processes to human disease, Dr. Elena Kuzmin's work shows how genetic interactions shape biology at every level. By revealing how genes work together, her research has led to more predictive approaches to understanding disease and improving human health. In doing so, she contributes to a growing strength in Canadian research: rigorous, systems-level science that advances both fundamental knowledge and practical insight.

> "Canadian research excellence is important because it is a major step toward improving health care in Canada and positions the country as a global leader in precision medicine"

Guggenheim Fellowship

The Guggenheim Fellowship supports mid-career scholars and artists who have demonstrated exceptional achievement and a strong capacity for continued work. Awarded annually through a competitive selection process open to citizens and permanent residents of the United States and Canada, it recognizes both sustained excellence and future promise. Administered by the John Simon Guggenheim Memorial Foundation, the fellowship provides recipients with financial support and the flexibility to pursue independent research or creative projects across a wide range of disciplines. In 2025, Canadian recipients included Angela Esterhammer, Sheila Heti, Sasha Ivanochko and Nadia Shihab, reflecting the fellowship's long-standing commitment to advancing scholarship and creative practice.

Recipients

- Angela Esterhammer
- Sheila Heti (not profiled)
- Sasha Ivanochko
- Nadia Shihab

> Research in literature and humanities enriches our understanding of how Canadian society took shape in the nineteenth century.

Angela Esterhammer

Guggenheim Fellowship

At moments of upheaval, societies look for ways to understand themselves. Dr. Angela Esterhammer turns to nineteenth-century literature to show how people have long grappled with rapid economic, political and cultural change.

A Professor in the Department of English at the University of Toronto, Esterhammer studies the work of John Galt, a Scottish-born writer whose novels, journalism and public life capture a world in flux in the 1800s.

She examines how Galt pushed the boundaries of genre and voice, blending fact and fiction to respond to emerging media, expanding markets and increasing global mobility.

“I’m seeking to open up new perspectives on literature and society of the early-to-mid-nineteenth century,” she explains. By tracing how writers navigate economic uncertainty, political debate and cultural transformation, her research shows that literature is not only reflective, but participatory. Galt’s own life also underscores that connection. Deeply tied to Canada, he played a key role in early settlement and founded the Ontario towns of Guelph and Goderich.

What first drew Esterhammer to Galt was the breadth of his remarkable imagination and the scope of his social vision. “Yet his writing has been largely lost from view since the nineteenth century — and it’s worth bringing back into circulation!” she says. Through multiple narratives and social perspectives, Galt explored questions that remain urgent today: power, injustice and moral responsibility.

In bringing John Galt’s world back into focus, Dr. Angela Esterhammer reminds us how humanities research sharpens our understanding of the present. Her work reflects the strength of Canadian literary scholarship and how the study of literature remains central to how societies interpret disruption and possibility today.

Career

- Research Professor, University of Toronto

Education

- BA, University of Toronto
- PhD, Princeton University

Other honours & awards

- Royal Society of Canada (‘15)
- John Scott Medal (‘23)

> Canadian research excellence lies in its capacity to hold complexity while developing technologies, processes and ideas that meaningfully improve the lives of its citizens.

Sasha Ivanochko

Guggenheim Fellowship

For Sasha Ivanochko, choreography is a way of thinking through the body, a rigorous research practice that uses movement to investigate enduring questions about identity and perception. While her projects draw from a range of influences, they are united by a commitment to understanding how the body can function as a site of research.

Working independently as a choreographer and researcher, Ivanochko develops her practice through studio-based experimentation and archival inquiry. Her Guggenheim-supported research engages with the rituals of her Ukrainian-Canadian heritage, treating the body as a living archive. “My dance work is both a wrestling with and a loving embrace of culture in the body,” Ivanochko explains. Movement becomes a form of inquiry — one that preserves memory while inviting it to evolve.

Ivanochko’s work has been shaped by deeply personal and global forces, including the loss of her parents and the ongoing war in Ukraine. These experiences inform her investigation into how histories, power and belonging are carried and transmitted through embodied practice. “Dance has always been my primary method of inquiry,” she notes.

By bringing this work to the stage, Ivanochko demonstrates that research excellence extends beyond traditional academic settings. Her work highlights choreography as a form of knowledge production — one that engages memory, perception and lived experience — and affirms the vital role of creative inquiry in advancing understanding within and beyond Canadian contexts.

Career

- Founder, Ivanochko in company

Education

- MFA, Simon Fraser University

> Canadian research excellence sustains a protected space for critical, artistic and political inquiry.

Nadia Shihab

Guggenheim Fellowship

Nadia Shihab's research in film and moving image explores subjectivity, feeling and form through relational and intergenerational processes. Working across documentary, experimental and hybrid approaches, she creates short and feature-length films shown at festivals, galleries, museums and on public television — bringing complex narratives into public view.

Shihab is an Assistant Professor in the School of Contemporary Arts at Simon Fraser University, where she approaches filmmaking as a form of research-creation — a practice where artistic production generates new knowledge. She began making films, she explains, out of "a sense of urgency and necessity." As a university student during the events of September 11 and the beginning of the War on Terror, she saw negative portrayals of Arab and Muslim communities saturate mainstream media. "If negative images of us were used to dehumanize our communities, create fear and build support for a never-ending war, then it seemed our own survival and self-determination depended on making images of our own," she recalls.

While that commitment continues to shape her work, it exists alongside an artistic practice of experimentation with both process and cinematic form. Through diverse practices that include co-creation with women in her family and engaging with archives, Shihab hopes her films "open up new and more humane ways of seeing ourselves and one another" while also advancing new forms in contemporary art and documentary cinema.

By approaching filmmaking as rigorous research, Nadia Shihab shows how artistic practice can generate knowledge alongside traditional academia. Her work reflects the strength of Canadian research in the arts — research that challenges narratives, expands representation, explores more ethical methodologies and advances new aesthetic forms.

Career

- Assistant Professor, Simon Fraser University

Education

- BA, University of Texas at Austin
- MCP, University of California, Berkeley
- MFA, University of California, Berkeley

Nobel Prize in Economic Sciences

Established in 1968 by Sveriges Riksbank, the Nobel Prize in Economic Sciences extends the Nobel tradition to the field of economics. Awarded annually by the Royal Swedish Academy of Sciences in Stockholm, the prize recognizes contributions that have profoundly advanced the economic sciences. In 2025, Peter Howitt was among the recipients, recognized for research that has shaped modern understanding of economic growth and innovation.

Recipient

- Peter Howitt

> For an advantaged country like Canada to continue to prosper, we need to have research at all levels, including fundamental and applied research.

Peter Howitt

Nobel Prize in Economic Sciences

Economic growth does not happen by accident. According to Dr. Peter Howitt, it unfolds in waves, driven by new technologies that transform how we live and work. He spent his career studying those forces — and the tensions they create.

His research focuses on "creative destruction," the idea that long-term growth emerges through waves of innovation that bring "new products, new ideas" while rendering older technologies obsolete. These shifts raise living standards, but they also create disruptions for people and industries tied to the past. By developing a formal economic model of this process with longtime collaborator Philippe Aghion, Howitt helped move a powerful but abstract idea into the core of modern economic theory.

Now a Professor Emeritus in the Department of Economics at Brown University, Howitt's academic roots are distinctly Canadian. A graduate of McGill University and Western University, he later taught at Western for two decades. He credits these experiences with providing "the best environment you can imagine" to grow as a researcher. The work he began in Canada laid the foundation for his lasting contributions to economic growth theory.

Howitt's theory extends well beyond academic debate and national borders. Economies must continuously generate new ideas to keep improving living standards, yet that process is never frictionless. In a world shaped by climate change, artificial intelligence and rapid technological disruption, understanding how innovation spreads — and how societies manage its costs — is critical.

Dr. Peter Howitt's career demonstrates how ideas stand the test of time. His work continues to shape how societies understand their own progress and the responsibilities that come with it.

Recognized with the Nobel Prize in Economic Sciences, the highest honour in his field, Dr. Howitt is redefining how the world thinks about growth, productivity and prosperity.

Career

- Professor Emeritus, Brown University

Education

- BA, McGill University
- MA, Western University
- PhD, Northwestern University

Other honours & awards

- Royal Society of Canada ('92)
- BBVA Foundation Frontiers of Knowledge Award ('19)

New Horizons in Physics Prize

The New Horizons in Physics Prize recognizes early-career researchers who have already made significant contributions to the field. Awarded annually by Breakthrough Initiatives, the prize honours recipients whose work signals exceptional promise for future impact. Among those recognized in 2025 was Maaike van Kooten, whose research exemplifies the prize's focus on originality and early achievement.

Recipient

- Maaike van Kooten

> Canadian research excellence leads to solving new problems and making new discoveries, improving the lives of Canadians and deepening our understanding of the world around us.

Maaike van Kooten

New Horizons in Physics Prize

Dr. Maaike van Kooten is pushing the limits of how clearly humanity can see the universe. Working in astronomy instrumentation, she specializes in adaptive optics, technology that corrects the blur caused by Earth's atmosphere in ground-based telescopes. "We measure what the atmosphere is doing and move a small mirror into curved shapes to de-blur and provide crisp images for astronomers," she explains. Though this was an effective method, the direct imaging of exoplanets was still limited by a very short but impactful delay (~2milli-seconds). Using predictive mathematical models to anticipate atmospheric shifts milliseconds ahead of time, she and her colleagues were able to account for this delay, resulting in image performance doubling — or even tripling — on some of the world's largest telescopes.

A Research Officer at the National Research Council's Herzberg Astronomy and Astrophysics Research Centre, van Kooten works at the intersection of astronomy, physics and engineering. Drawn to the field's multidisciplinary nature, she designs and tests advanced optical systems that dramatically sharpen telescope images, particularly of planets orbiting distant stars with far greater clarity.

The impact is scientific and foundational. By improving image quality close to bright stars, adaptive optics allows astronomers to study smaller exoplanets and planetary systems at earlier stages of formation. These discoveries deepen our knowledge of the universe and our place within it.

For Dr. Maaike van Kooten, research is both knowledge and opportunity. "Canada is contributing on a global scale in astronomy through not only key R&D but also designing and building state-of-the-art systems." Every advance in telescope technology opens new windows into the universe and expands the range of questions scientists worldwide can ask and answer about it.

In sharpening our view of distant worlds, Canadian research continues to expand humanity's horizons, one millisecond at a time.

Career & Education

- Research Officer, NRC Herzberg Astronomy and Astrophysics Research Centre

Education

- BSc, University of Victoria
- MSc, University of Victoria
- PhD, Leiden University

Queen Elizabeth Prize for Engineering

The Queen Elizabeth Prize for Engineering honours bold, transformative innovations that deliver clear global benefits to humanity. Widely regarded as the world's leading award for engineers and engineering, the prize celebrates visionaries whose work has pushed the boundaries of what engineering can achieve, while also inspiring future generations to pursue the field. In 2025, the prize recognized seven engineers for foundational contributions to modern machine learning, a key driver of advances in artificial intelligence (AI). Among those recognized were Yoshua Bengio and Geoffrey Hinton, whose contributions have reshaped modern engineering and its impact on society worldwide.

Recipients

- Yoshua Bengio
- Geoffrey Hinton

> Canada has the potential to contribute at the highest level. We have a pool of experts, the energy and many assets for this challenge.

Yoshua Bengio

Queen Elizabeth Prize for Engineering

Few researchers have shaped a field — and its future direction — as decisively as Dr. Yoshua Bengio.

A Professor in the Department of Computer Science and Operations Research at the Université de Montréal, Bengio's work has had a major impact in helping bring machine learning out of the realm of theory and into real-world applications. His early contributions to deep learning laid the groundwork for how computers learn from data, driving advances such as speech recognition, image analysis, language translation and pattern detection. What began in university labs now underpins tools being used in hospitals, labs, public service and businesses worldwide, accelerating research and lifting productivity across sectors.

That first wave of impact helped define modern artificial intelligence (AI). The second is centered around safety. As leading AI companies aim to make systems always more capable and autonomous, Bengio has turned his focus to a central question facing researchers and policymakers alike: how do we ensure these systems remain safe, trustworthy and aligned with human goals? He argues that society needs stronger technical and institutional guardrails to make systems more transparent, reliable, harder to misuse and easier to control.

This work is now being advanced through LawZero, a nonprofit startup Bengio launched in June 2025, focusing on developing "Scientist AI" — systems designed to prioritize truth, causal understanding and scientific reasoning over agentic capabilities. This approach aims to preserve AI's capacity to accelerate discovery without introducing new risks.

Bengio's career reflects the full spectrum of research excellence: discovery, application and stewardship. It also underscores a broader truth about Canadian research. When sustained investment meets academic freedom and global collaboration, Canadian scholars do more than contribute to international conversations, they help set the agenda.

Through both his groundbreaking research and now his leadership in rethinking AI safety, Dr. Yoshua Bengio's work continues to shape how AI is developed and governed — ensuring that its benefits are shared broadly and safely, at home and around the world.

Career

- Professor, Université de Montréal
- Scientific Director, Mila – Quebec Artificial Intelligence Institute
- Scientific Director, IVADO
- Chair, Canada CIFAR AI

Education

- BSc, McGill University
- MSc, McGill University
- PhD, McGill University

Other honours & awards

- Royal Society of Canada ('17)
- A.M. Turing Award ('18)
- Princess of Asturias Award ('22)
- VinFuture Prize ('24)

Geoffrey Hinton

Queen Elizabeth Prize for Engineering

Long before artificial intelligence (AI) became part of everyday life, Dr. Geoffrey Hinton was developing the ideas that made today's systems possible. His research on neural networks and backpropagation — a method that allows networks to adjust themselves by learning from errors — laid the groundwork for modern machine learning.

A Professor Emeritus at the University of Toronto's Department of Computer Science, Hinton was driven by a fundamental question: how does the human brain learn? That curiosity led him to explore how models of artificial neural networks could mimic aspects of human cognition. At a time when these networks were often dismissed, his persistence helped bring them to the centre of AI research and eventually into global innovation.

What began as foundational research now powers technologies used by billions of people every day. Hinton's work helped shape modern AI, influencing systems that learn from data and improve their performance over time, such as speech recognition, translation and medical imaging. These advances continue to support research, communication and technological progress around the world.

At the same time, Hinton has been clear about the responsibilities that come with such rapid progress. As with many new technologies, AI systems carry risks. In recent years, he has spoken publicly about the need for stronger guardrails, calling for international cooperation, clear guidelines and rigorous safety standards to ensure AI development remains aligned with human well-being.

Hinton's career demonstrates how investment in fundamental science can redefine entire disciplines — recognition underscored by the Queen Elizabeth Prize for Engineering and the 2024 Nobel Prize in Physics. His achievements have strengthened Canada's position at the forefront of artificial intelligence and affirmed its leadership in advanced research. Today, his advocacy for stronger AI governance and safety frameworks challenges the scientific community, industry and policymakers to work together to ensure these technologies serve the public interest.

Career

- Professor Emeritus, University of Toronto

Education

- BA, University of Cambridge
- PhD, University of Edinburgh

Other honours & awards

- Royal Society of Canada ('98)
- BBVA Foundation Frontiers Award ('16)
- A.M. Turing Award ('18)
- Princess of Asturias Award ('22)
- Nobel Prize in Physics ('24)
- VinFuture Prize ('24)

Shaw Prize in Astronomy

Established in 2022, the Shaw Prize in Astronomy recognizes individuals who have achieved distinguished and significant advances in the field. Presented annually by the Shaw Prize Foundation — alongside awards in Life Science and Medicine, Computer Science and Mathematical Sciences — it honours research that has expanded humanity's understanding of the universe and the fundamental processes that shape it. John Richard Bond was a co-recipient of the 2025 award for his pioneering research in cosmology.

Recipient

- John Richard Bond

> Canada supports this kind of research because of its collaborative spirit and its commitment to training a generation of great thinkers who will become the innovators of the future.

John Richard Bond

Shaw Prize in Astronomy

Understanding our place in the universe has always captured human imagination. For Dr. John Richard Bond, that curiosity became a lifelong pursuit. His work explores the story of the universe from its earliest moments to the structures we observe today. “It takes the universe from the very beginning to the very end and everything in it,” he explains.

Bond is a University Professor in the Canadian Institute for Theoretical Astrophysics hosted by the University of Toronto. His research centres on the cosmic microwave background, the faint radiation left over from the Big Bang. Often described as the universe’s earliest light, this radiation carries information from a time when the universe was only a few hundred thousand years old.

Through theoretical models developed with collaborators around the world, Dr. Bond and team predicted patterns that should appear in this ancient light. When satellites and ground-based experiments later observed these patterns, they confirmed many of those predictions. These results allowed scientists to decode detailed information about the universe’s composition, age and structure.

These discoveries transformed cosmology. They revealed that the atoms that make up stars, planets and people account for only about five percent of the universe. Most of the cosmos consists of dark matter and dark energy, invisible components that influence how galaxies form and the universe expands. Bond also played an important role in bringing theorists and experimentalists together at a pivotal moment in the field’s development. By linking theory with major international experiments and satellites, researchers were able to test ideas about the universe with unprecedented precision.

The result was what many now call cosmology’s “Golden Age,” transforming the field from a largely speculative discipline into one grounded in detailed observation. For Bond, understanding the universe is about more than scientific discovery. Studying the universe inspires curiosity and encourages people to ask fundamental questions about the world around them. It also trains the next generation of scientists to think logically and tackle complex problems.

Bond believes Canada has played an important role in advancing this research through its collaborative approach to science. “Canada supports this kind of research because of its collaborative spirit and its commitment to training a generation of great thinkers who will become the innovators of the future,” he says.

By helping reveal the universe’s first light and all that grew from it, Dr. Bond has contributed to a deeper understanding of the cosmos and how humanity fits within it.

Career

- Professor, University of Toronto

Education

- BSc, University of Toronto
- MSc, California Institute of Technology
- PhD, California Institute of Technology

Other honours & awards

- Royal Society of Canada (‘01)

Sloan Research Fellowship

The Sloan Research Fellowships support exceptional early-career scientists and scholars whose work signals strong potential to shape the future of their fields. Awarded annually to 126 researchers, these two-year fellowships recognize distinguished performance and originality among those hold a PhD or equivalent in disciplines spanning the natural sciences, engineering, economics and related fields. The 2025 fellowship recipients included Fabio Boschini, Peter Crockford, Michelle Delcourt, Paul Masset, Sean Michaletz, David Rolnick and Bhavin Shastri, whose research reflects the program's emphasis on foundational inquiry and long-term scholarly impact.

Recipients

- Fabio Boschini
- Crockford, Peter (page 17)
- Michelle Delcourt
- Paul Masset
- Sean Michaletz
- David Rolnick
- Bhavin Shastri

> Without fundamental, curiosity-driven research, there is no hope for innovation and real breakthroughs.

Fabio Boschini

Sloan Research Fellowship

Understanding the materials that shape our world begins by understanding how their smallest components behave. Dr. Fabio Boschini studies strongly correlated electron systems — often called quantum materials — where interactions between electrons give rise to complex and unexpected properties.

He compares the challenge to "deciphering an ancient lost language." Scientists may recognize the individual "letters," but without the underlying grammar, the system cannot be fully understood. Boschini's research seeks to establish those initial grammar rules — the principles that explain how quantum materials' emergent properties arise.

Boschini is a Professor at the Institut national de la recherche scientifique (INRS)'s Énergie Matériaux Télécommunications Research Centre, where he heads the time- and angle-resolved photoemission endstation at the Advanced Laser Light Source (ALLS) national facility. By advancing fundamental knowledge of quantum matter, his work strengthens the scientific foundation that future technologies will rely on. He is also training highly qualified personnel in advanced experimental techniques, helping prepare the next generation of researchers while contributing to Canada's research capacity.

Career

- Professor, Institut national de la recherche scientifique
- Canada Research Chair in Quantum Materials' Dynamics

Education

- BSc, Politecnico di Milano
- MSc, Politecnico di Milano
- PhD, Politecnico di Milano

Curiosity has guided his path from the start. "I am naturally drawn to anything I don't understand," he says. Rather than choosing easy problems, he focuses on questions that take years of sustained effort. What motivates him is the moment when the pieces finally connect and a new discovery emerges — one that matters to the wider scientific community.

Through fundamental, curiosity-driven research, Dr. Fabio Boschini is building the foundational knowledge that will enable the next generation of quantum materials and technologies.

"Canada should invest in its exceptional local researchers and allocate more resources to support fundamental science."

Dr. Michelle Delcourt is refining the mathematical frameworks that quietly support the coordination of modern life.

Michelle Delcourt

Sloan Research Fellowship

Some mathematical problems shape an entire field for generations. Hadwiger's conjecture — a deceptively simple question about graph colouring — is one of them, challenging leading mathematicians for decades. Dr. Michelle Delcourt has just pushed the needle that much closer to an answer.

Delcourt is an Associate Professor in the Department of Mathematics at Toronto Metropolitan University. She first encountered Hadwiger's conjecture in high school, sparking her interest in the deeper mysteries of mathematical graph theory. Now, her own work is cited in the very textbook in which she first learned about the mathematical conundrum — a full-circle moment in a career shaped by mathematical curiosity.

Alongside collaborator Dr. Luke Postle of the University of Waterloo, Delcourt developed an original proof that significantly advances understanding of Hadwiger's conjecture. Published in the *Journal of the American Mathematical Society*, their work has influenced the direction of current research in graph theory. While the problem is abstract, its applications are concrete. Graph colouring underpins practical systems such as conflict-free exam scheduling and assigning radio frequencies to prevent interference.

Career

- Associate Professor, Toronto Metropolitan University

Education

- BSc, Georgia Institute of Technology
- MSc, University of Illinois at Urbana-Champaign
- PhD, University of Illinois at Urbana-Champaign

By strengthening the theoretical foundations of graph theory, Dr. Michelle Delcourt is refining the mathematical frameworks that quietly support the coordination of modern life. Her work reflects the enduring importance of fundamental mathematics in Canadian research — advancing knowledge that shapes systems far beyond the classroom.

> "Hadwiger's is the problem in graph colouring, it is the one everyone wants to solve and the one that all the best minds in graph theory have made partial progress towards over the years. It is one that I never thought I would make substantial progress on, so I am very proud of that."

> Scientific research is the backbone of future economic growth and improvement in health care and quality of life.

Paul Masset

Sloan Research Fellowship

Before a decision is made or a movement begins, the brain performs intricate processes across vast networks of neurons. Dr. Paul Masset is revealing how those networks are organized and how they give rise to thought itself.

Masset is an Assistant Professor in the Department of Psychology at McGill University and an Associate Academic Member at Mila – Quebec AI Institute. His lab studies how different types of neurons work together to shape behaviour, learning and decision-making. "My research integrates ideas and methods from neuroscience, AI and psychology," he explains. Drawing on this multidisciplinary approach, his team develops innovative tools to measure and analyze brain activity and builds models that mirror how brain networks learn and adapt. A central focus of the lab is understanding how dopamine helps the brain adjust through experience — insight that could reshape how we think about learning and mental health.

The long-term implications of Masset's work are significant. By clarifying how the brain constructs perception, movement and thought and how these processes are disrupted in psychiatric and neurodegenerative diseases, his research may help link treatments to their effects on cognition and design new brain-inspired algorithms.

By advancing fundamental knowledge of how the brain works, Dr. Paul Masset is building the scientific foundation that will drive future medical and technological breakthroughs.

Career

- Assistant Professor, McGill University

Education

- BA, University of Cambridge
- MEng, University of Cambridge
- MSSc, École des hautes études en sciences sociales
- PhD, Cold Spring Harbor Laboratory

> "Canada is [in] a unique position to attract some of the best talent in the world."

> “Canadian science contributes insights that the world cannot obtain anywhere else.”

Sean Michaletz

Sloan Research Fellowship

As climate change accelerates, forests are approaching critical thresholds — and Dr. Sean Michaletz is working to understand where those limits lie. His research explores how plants respond to heat, drought and other environmental stressors and what those responses mean for ecosystems and the global climate. By studying the physical and biological processes that control how plants absorb carbon, use water and survive extreme conditions, he connects the inner workings of a single leaf to the future of entire forests.

An Associate Professor at the University of British Columbia’s Department of Botany and Biodiversity Research Centre, Michaletz combines principles from physics, chemistry and biology with measurements gathered in forests around the world. His lab translates those measurements into predictive models. “We build models that explain how processes inside a leaf or a stem determine the growth and survival of whole plants,” he explains, “and how those individual responses scale up to influence forests and the global carbon cycle.”

In Canada — home to much of the boreal forest — this work carries national consequence. Northern forests and cold-region ecosystems store vast amounts of carbon and are warming faster than many other regions. Shifts in these systems affect carbon storage and emissions, biodiversity and the well-being of forest-dependent communities. By improving our understanding of how Canadian forests will respond to rising temperatures and intensifying climate extremes, Michaletz’s research provides evidence to inform climate policy, resource management and long-term planning.

Forests are central to climate stability and community well-being. By sharpening predictions of how they will respond to hotter, drier conditions, Dr. Sean Michaletz’s work equips policymakers and resource managers with the tools to build resilience across Canada and beyond.

Career

- Associate Professor, The University of British Columbia

Education

- BA, Hamline University
- MSc, University of Calgary
- PhD, University of Calgary

> “Canada can continue to be a place where rigorous basic science thrives alongside work that directly informs policy and practice.”

> [Canada is] a leader in global research in both sustainability and AI.

David Rolnick

Sloan Research Fellowship

Career

- Assistant Professor, McGill University

Education

- BSc, Massachusetts Institute of Technology
- PhD, Massachusetts Institute of Technology

Artificial intelligence (AI) is most often associated with chatbots and routine task automation. But Dr. David Rolnick is applying it to a different challenge: climate change.

An Assistant Professor at McGill University's School of Computer Science, Rolnick works at the intersection of AI and climate solutions. His research develops algorithms that monitor biodiversity at scale, map agricultural activity using satellites and support the discovery of materials for low-carbon energy systems. "Our goal is to aid the people who are working on these problems, not replace them," he explains. Each project is built in partnership with experts in ecology, electricity systems and meteorology to ensure the tools address real-world needs.

The results are already in use. His agricultural monitoring algorithms have been adopted by NASA Harvest and the European Space Agency's World Cereal program, contributing to food security and land-use planning around the world. Software developed in his lab has processed millions of insect images from camera trap networks, strengthening biodiversity research. Tools developed for mapping trees contributed to a winning solution in the XPRIZE Rainforest Challenge. Most broadly, his work has helped shape how AI is positioned within climate action strategies and funding initiatives internationally.

Dr. David Rolnick's work shows how AI can be a powerful tool for climate action. By aligning advanced computing with environmental needs, his research positions Canada at the forefront of technology-driven climate solutions.

> "Canadian research has fueled advancements across society — both in Canada and the rest of the world."

> The future of Canadian research is bold, interdisciplinary and globally impactful — driven by curiosity, inclusive excellence and flexible investment.

Bhavin J. Shastri

Sloan Research Fellowship

From discovering new medicines to identifying planets beyond our solar system, some of today's grand scientific challenges remain out of reach — even for the world's fastest supercomputers. For certain problems, traditional machines would take longer than the age of the universe to produce an answer. Dr. Bhavin Shastri is working to change that.

Shastri is an Associate Professor in the Department of Physics at Queen's University. His research explores the physics of computation. More specifically, photonic computers: systems that use light instead of electricity to process information. By harnessing light, these systems can operate at dramatically higher speeds and with far greater energy efficiency than conventional electronic machines, opening new possibilities for solving complex problems.

The potential impact of this work reaches far beyond faster hardware. By rethinking the physical foundations of computation, Shastri aims to enable calculations that are currently impractical or impossible. More powerful and efficient systems could accelerate discoveries in fields where today's computers fall short.

For Shastri, research is not only about technical advancement but about public purpose. "Canadian research excellence is vital because it combines world-class scientific rigour with a strong public-good mandate," he says. Canada's values of openness, interdisciplinary and international collaboration, he believes, position researchers to tackle major challenges while training diverse talent and translating discovery into social and economic impact.

By pushing the limits of what computers can achieve, Dr. Bhavin Shastri is helping make breakthroughs — from medicine to astronomy — possible sooner and with far less energy.

Career

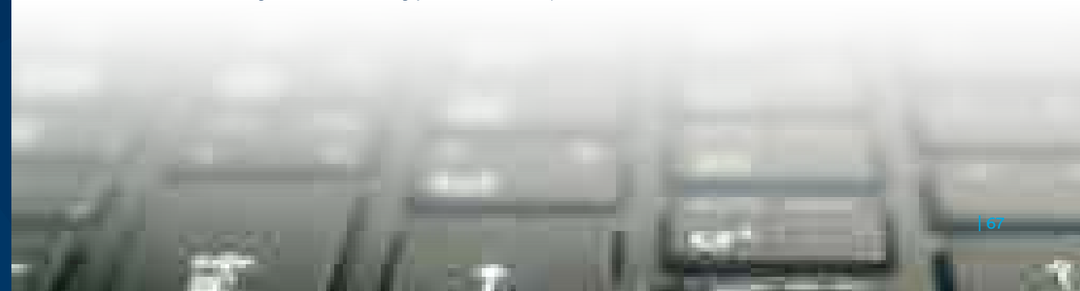
- Associate Professor, Queen's University
- Canada Research Chair in Neuromorphic Photonic Computing

Education

- BEng, McGill University
- MEng, McGill University
- PhD, McGill University

Other honours & awards

- Royal Society of Canada ('24)

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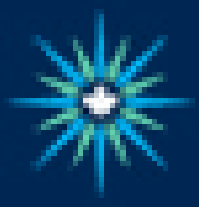


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