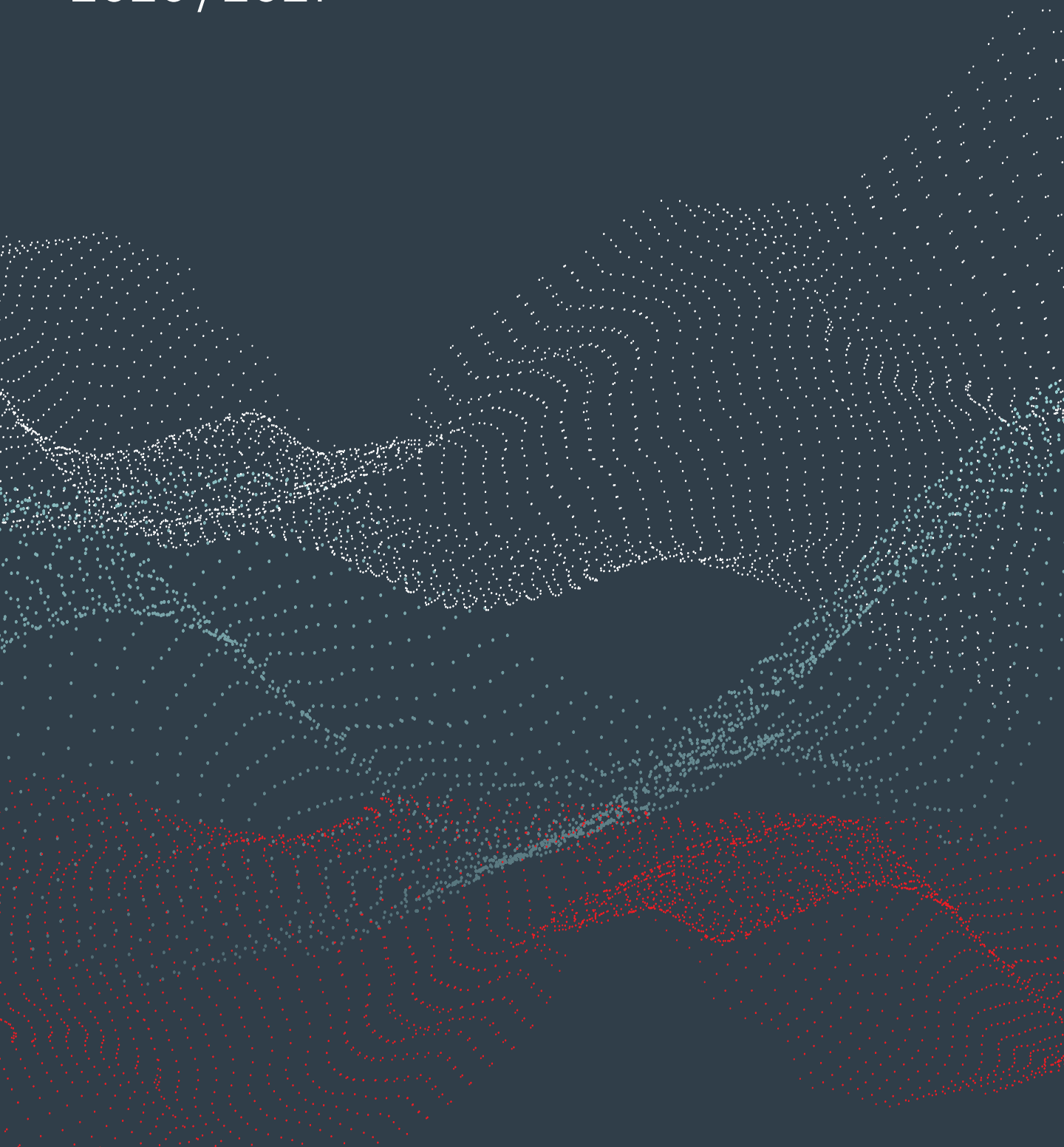


IMPACT REPORT

2020 / 2021



“CIFAR is a truly remarkable institutional invention. It has already done, and it also promises to do, untold good.”

GEORGE AKERLOF

*University Professor, Georgetown University
Nobel Laureate in Economics 2001*

CIFAR is located in the MaRS West Tower at 661 University Avenue in Toronto. For thousands of years, this area has been the traditional territory of many nations including the Huron-Wendat, the Seneca and, most recently, the Mississaugas of the Credit. Today, this meeting place is still home to many Indigenous people from across Turtle Island and we are grateful to have the opportunity to work, learn, and share on this land.

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A Global Research Organization

CIFAR is a global research organization that convenes extraordinary minds to address the most important questions facing science and humanity.

By building long-term, interdisciplinary, global communities of collaboration, we provide the world's top researchers with an unparalleled environment of trust, transparency and knowledge sharing. Our time-tested model inspires new directions of inquiry, creating a culture of risk-taking, accelerating discovery, and yielding breakthroughs across borders and academic disciplines. Through knowledge mobilization, we are catalysts for change in industry, government and society. In 2017, the Government of Canada appointed CIFAR to develop and lead the Pan-Canadian Artificial Intelligence (AI) Strategy, the world's first national AI strategy.

EQUITY, DIVERSITY & INCLUSION (EDI)

—
 In April 2020, CIFAR's Board of Directors approved the organization's first Action Plan on Equity, Diversity and Inclusion.



The plan outlines actions we need to address to ensure that we are living our values as an organization. These include:

- Fostering inclusive spaces — focusing on collaboration, respecting each other, and providing education on EDI principles;
- Providing equal opportunities for all and creating initiatives to increase the participation of underrepresented groups in CIFAR's community;
- Addressing unconscious bias from decision-making;
- Providing training and awareness, recognizing diversity as a strength, and addressing any systemic barriers to acceptance into CIFAR's community; and
- Committing to diversity — building on CIFAR's strengths with an intersectional approach to researcher selection, and having diverse leadership in research programs.

Each action is included in CIFAR's annual operating plan.

Our community includes more than 400 researchers from 161 institutions in 18 countries. They are among the most highly cited researchers in the world. Twenty Nobel Prizes have been awarded to CIFAR-affiliated researchers.

In 2020-2021 support for CIFAR came from the governments of Canada, Alberta and Quebec, as well as Canadian and international individuals, corporations, foundations and partner organizations.

The CIFAR Model





MESSAGE FROM OUR CHAIR

“I could not be more proud of the positive impact CIFAR has made during this critical time. The scientific curiosity that has always driven CIFAR’s community of researchers has proven to be vital in addressing the most important questions facing science and humanity in a post-pandemic world.”

COVID-19 has taught us all a profound lesson about how interconnected global society really is. Amidst tragedy and insurmountable challenges, we have also witnessed unprecedented transformations in the ways we work, interact and live. Our lives, our world, will never be the same. I believe the true test for our society will be in how we use these lessons to address future global challenges.

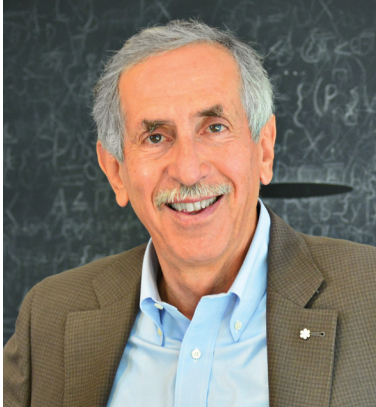
When the COVID-19 pandemic began, I witnessed the leadership of CIFAR’s community of researchers, staff and donors in addressing both the urgent and long-term challenges it presented. Our community of researchers mobilized quickly to address the immediate threat of the virus when it first emerged, for example pivoting their labs to conduct COVID-19 research. As the pandemic continued, they launched collaborations and projects to address questions around the impacts of the virus on our mental health and the effects of social isolation, among others. And, we had help from our longstanding partners, Manulife and the Max Bell Foundation, who helped with quick response grants for promising projects that fueled understanding. CIFAR President & CEO Dr. Alan Bernstein continues to be a trusted global leader in the COVID-19 pandemic, convening and connecting decision makers, guiding policy, and activating pivotal scientific discovery.

CIFAR has made a positive impact during this critical time. The scientific curiosity that has always driven CIFAR’s community of researchers has proven to be vital in addressing the most important questions facing science and humanity in a post-pandemic world. By inspiring new directions of inquiry and creating a culture of risk-taking, CIFAR supports the world’s most extraordinary minds in advancing knowledge for a better world.

I am proud to lead this organization, as both a donor and as the Board Chair alongside our exceptional Board of Directors. Now, more than ever, I am exhilarated by the organization’s accomplishments and what’s next for CIFAR.

A handwritten signature in black ink, appearing to read 'W. Young', with a stylized flourish at the end.

William L. Young
Chair, CIFAR Board of Directors



MESSAGE FROM OUR PRESIDENT & CEO

While this past year has brought many challenges, it has also been an opportunity for the CIFAR community to demonstrate our resilience and ingenuity, as well as the critical importance of science for all our wellbeing.

The pandemic has galvanized staff, Fellows, CIFAR Azrieli Global Scholars and Canada CIFAR AI Chairs, as well as donors and Board members, who remain steadfast in the knowledge that science will lead to a better world. Indeed, CIFAR's global community of researchers is inspiring new directions of inquiry that will drive profound change.

Over the past year, we convened interdisciplinary groups of researchers around topics such as the ethics of AI research and how economies can be more inclusive following COVID-19. Janet Werker (Advisor, Brian, Mind & Consciousness) and Alona Fyshe (Canada CIFAR AI Chair and Fellow, Learning in Machines & Brains) are investigating the evolution of digital literacy in a multicultural world, an important project as the world increasingly learns and works online. Supported by a Catalyst Fund grant, CIFAR Azrieli Global Scholar Jean-Philippe Julien, partnered with Cyclica to identify existing antiviral drugs that might be repurposed to treat patients with COVID-19.

Beyond COVID-19, our community of researchers have continued to pursue ambitious questions that are core to CIFAR's mission. We fund high-risk, high-reward ideas through our Catalyst Funds, and support the next generation of talent through the CIFAR Azrieli Global Scholars Program and our summer and winter schools, such as the CIFAR Deep Learning + Reinforcement Learning Summer School. In April 2020, we launched our series of CIFAR Virtual Talks to share the latest research insights with public audiences around the globe.

Importantly, we began laying the foundation for our upcoming Global Call for Ideas by bringing together global leaders and thinkers from across disciplines in a series of virtual meetings. Our goal was simple: identify where research can play a critical role in advancing knowledge toward a more resilient future. I was energized by the discussions and ideas that came out of these meetings, and look forward to embarking on this unique process in the coming year.

I am also so impressed by the ingenuity of our staff who rallied together in spite of the daily challenges posed by a dangerous virus, social isolation, the demands of pandemic parenting and confined living arrangements, as we continue to work from home.

All of this is a testament to the strength, commitment, and resilience of our staff and our global community of researchers. Through all this, CIFAR has emerged as one of the world's most important and unique research assets. That journey is the culmination of our nearly 40 year history of funding high-risk, high-pay off research, and of creating global communities of some of the world's top researchers. With this unique vision, it is a safe bet that the next 40 years hold even more promise.

I am excited and optimistic about the future that lies ahead, as I am sure you will be after reading this report. Thank you for your steadfast support.

Dr. Alan Bernstein
OC, OOnt, PhD, FRSC/MSRC
President & CEO

A Year of Impact

Addressing the COVID-19 pandemic has required a global, concerted, and multilateral effort, with science at its core. Never have the interdisciplinary science and global collaboration that are central to CIFAR's mission and vision been more important.



The Manulife CIFAR Population Health & Well-being Grant Program, established in 2020, examines topics such as what COVID-19 does to the brain, how COVID-19 affects the microbiomes of infants, and the role of robots in serving our most vulnerable communities.

This report highlights key collaborations and milestones over a nine month fiscal period from July 1, 2020 to March 31, 2021. In September 2019, CIFAR's Board of Directors approved a change in fiscal year-end from June 30 to March 31 to align with many funders and partners.

ADVANCING KNOWLEDGE

CIFAR addresses the most important questions facing science and humanity. Its community of researchers work together on long-term, international, interdisciplinary collaborations.

SHAPING THE FUTURE OF RESEARCH

CIFAR brought together global leaders from academia, government, business, and the arts through the CIFAR Futures Council, a series of international strategic foresight meetings. The goal was to identify where research can play a critical role in advancing knowledge for a more resilient future. The discussions helped to establish priority research areas for CIFAR's third Global Call for Ideas, launching in 2021.

STRENGTHENING CANADA'S AI RESEARCH LEADERSHIP

AI talent attraction and retention has been central to the CIFAR Pan-Canadian AI Strategy since its launch. Canada reached a significant milestone in 2021 with the announcement of 29 new Canada CIFAR AI Chairs, which brought the total to more than 100.

UNDERSTANDING AI AND POPULATION HEALTH IN COVID-19 AND BEYOND

CIFAR supported high risk, high reward, interdisciplinary, research projects that produced rapid results, and enhanced our understanding of, and response to, COVID-19 and more.

CIFAR Azrieli Global Scholar Jean-Philippe Julien (The Hospital for Sick Children and University of Toronto), Costin Antonescu (Ryerson University) and Bo Wang (Canada CIFAR AI Chair, Vector Institute, University of Toronto) and Canadian startup Cyclica used computer modelling to identify a pre-existing lung cancer drug as a potential treatment for COVID-19.

CIFAR Fellow in the Learning in Machines & Brains program, Kyunghyun Cho (New York University) and Jimmy Lin (University of Waterloo) developed Covidex, an open-source platform that applies state-of-the-art

neural network models and AI to curate a knowledge database of scientific articles about COVID-19 and related research.

Six projects, supported by the Manulife CIFAR Population Health & Well-Being Grant Program pushed traditional research boundaries and offered new insights into the pandemic. From the long-term effects of the pandemic on brain and physical health, to the impact on our social networks, the research projects are critical to our understanding.

In partnership with the RBC Foundation, nine new CIFAR AI Catalyst Funds were awarded to support machine learning research in privacy, bias in machine learning, the study of natural language, the prediction and control of the future state of AI systems, and others. The funds provide research teams with up to \$100,000 over two years.

FOSTERING COLLABORATION ACROSS RESEARCH PROGRAMS

CIFAR brought together disciplines that would not typically collaborate, such as astrophysicists, neuroscientists, and philosophers. These discussions explored the connections between ideas and disciplines, laying a foundation for potential future collaborations, projects and breakthroughs.

The Brain, Mind & Consciousness and Learning in Machines & Brains programs explored "Artificial Consciousness" and the connections between AI, neuroscience, and philosophy. In February, two CIFAR Azrieli Global Scholars, Joshua Shepherd (Carleton University) and Raffaella Margutti (Northwestern University), brought together the Brain, Mind & Consciousness and Gravity & the Extreme Universe programs to discuss "Discovery, Re-Discovered", exploring issues surrounding the nature of discovery and achievement in science.

DEVELOPING RESEARCH LEADERS



The CIFAR Azrieli Global Scholars program is one of the most prestigious early-career research opportunities in the world.

CIFAR is committed to creating a research environment that is diverse, equitable, and inclusive. We support high-potential early-career researchers from across the globe through mentorship, networking, and skills training. We accelerate discovery by including future research leaders in our global, interdisciplinary research network.

THE RESEARCH LEADERS OF TOMORROW: 2020-22 CIFAR AZRIELI GLOBAL SCHOLARS

The scholars come from six countries and hold appointments at institutions in Canada, France, Germany, Ireland, the United Kingdom, and the United States. CIFAR Azrieli Global Scholars receive \$100,000 in unrestricted research support, and have the unique opportunity to work shoulder-to-shoulder with the world's leading researchers at a critical point in their careers. CIFAR provided interactive virtual opportunities for scholars to advance their leadership strengths as a community of peers through expert-led training workshops on mentoring, managing a research team, network-building, and other topics relevant to their careers.

TRAINING THE NEXT GENERATION OF AI TALENT

The annual CIFAR Deep Learning + Reinforcement Learning (DLRL) Summer School has a reputation for fostering the next generation of AI talent, with many former students now working in top tech firms and prestigious research institutions. Held in partnership with Mila, the highly competitive program drew more than 1,200 applicants, with only 300 of the brightest minds from across 45 countries selected to participate. The DLRL Summer School is an initiative of the CIFAR Learning in Machines & Brains Program and the CIFAR Pan-Canadian AI Strategy.

MOBILIZING KNOWLEDGE

CIFAR engages experts in industry, civil society, healthcare, and government in cross-sectoral conversations with global research leaders. The goal is to drive innovation that has a positive impact on society. Our public engagement programming stimulates scientific curiosity and shares the organization's research advances and programmatic activity with its stakeholders.



Members of CIFAR's Brain, Mind & Consciousness program, discuss the optimal conditions for our brains at a Virtual Talk. Pictured (L-R): Mark Daley (Vice-President, Research, CIFAR), Megan Peters (CIFAR Azrieli Global Scholar, University of California, Irvine) and Adrian Owen (CIFAR Co-Director and Koerner Fellow, Western University).

CREATING SOCIETAL IMPACT IN HEALTH, POLICY AND TECHNOLOGY

Together with international experts, CIFAR's community of researchers moved forward on a number of societal impact plans related to their programs. These included applying algorithms in astronomy to health research, building a culture of ethical AI in research labs, developing a national strategy for rebuilding Canada's research capacity with neutron beams, and optimizing the devices used to convert CO₂ to clean fuels, among others. Stay tuned: CIFAR fellows are creating a microbiome-focused curriculum for post-secondary public health programs.

STIMULATING SCIENTIFIC CURIOSITY THROUGH CIFAR'S VIRTUAL TALKS

CIFAR's signature series of free 30-minute virtual public events engaged more than 2,000 stakeholders around the world by introducing CIFAR's community of researchers and sharing outcomes of their work. The series generated new subscribers and social media engagement across Twitter, Facebook and YouTube.

CIFAR PRESIDENT & CEO: A TRUSTED VOICE DURING THE PANDEMIC

A recognized leader in health research and a celebrated scientist, Dr. Alan Bernstein provided an important voice on COVID-19 related topics including manufacturing vaccines in Canada, making vaccines accessible to all Canadians, and advocating for international collaboration for vaccines in low- and middle-income countries. He appeared in nearly 1,000 media stories internationally, conducted 119 media interviews, placed eight op-eds (including *National Post*, *The Hill Times*, *The Atlantic*, *La Presse* and *The Globe and Mail*) and he testified before the House of Commons Standing Committee on Health.

RESEARCH COMMUNITY

CIFAR's community of researchers is characterized by its research excellence, openness to disruptive thinking, interest in collaboration across disciplines and borders, and commitment to impact.

A GLOBAL COMMUNITY

381
researchers*

61
Advisors

202
Fellows

142
institutions

18
countries

28
CIFAR Azrieli
Global Scholars

105
Canada CIFAR
AI Chairs

EXTRAORDINARY MINDS



91 major awards and honours bestowed upon members of CIFAR's research community

Including the 2020 Willet G. Miller and Flavelle Medals of the Royal Society of Canada, one Canada Excellence Research Chair, and two Sloan Fellowships

COLLABORATING AND CONNECTING



63 virtual program meetings and cross-programmatic events

2,000+ attendees across 10 CIFAR Virtual Talks

*Includes active researchers in all CIFAR programs as of March 31, 2021. Note that the breakdown on the right totals 396 because 15 researchers hold dual appointments as a Canada CIFAR AI Chair, and as a CIFAR Fellow, or an Advisor, or a CIFAR Azrieli Global Scholar.

**Self-reported number of peer-reviewed journal articles and conference papers, books and book chapters, and publicly released working papers, white papers or policy reports influenced by participation in CIFAR programs. (Source: Program Member Annual Reports, 2021, n=181 researchers)

ADDRESSING THE MOST IMPORTANT QUESTIONS FACING SCIENCE AND HUMANITY



1,440

publications influenced
by CIFAR activities**

396

publications co-authored by two
or more CIFAR researchers***

93.4%

of researchers report that
participation in CIFAR activities has
positively informed or impacted their
research (e.g., inspiring new ideas,
influencing research directions, etc.)

HIGH-IMPACT SCHOLARSHIP



179

fellows, advisors and CIFAR
Azrieli Global Scholars (62%)
contributed to the **top 1%** of
most-cited papers worldwide
from 2014-2018.****

A HUB FOR COLLABORATION



46

formal partnerships with
governments, research
organizations, industry
and foundationsSIX CIFAR KNOWLEDGE
MOBILIZATION EVENTS
ENGAGED 139 PEOPLE
FROM SEVEN COUNTRIES

97%

of knowledge users
reported the events
were good/excellent

94%

reported improved
understanding
of topic

81%

got new ideas
that will benefit
their work

78%

plan to integrate
new ideas into
their work

100%

plan to share their
new learnings with
their network

69%

made new
connections

By building long-term, interdisciplinary, global communities of collaboration, CIFAR provides the world's top researchers with an unparalleled environment of trust, transparency and knowledge sharing. In addition, we enable high-risk, high-reward ideas and projects to accelerate discovery through:

31

Catalyst Grants:
\$1,073,156 (total value)

6

Manulife CIFAR Population
Health & Well-Being Grants:
\$286,053 (total)

We launched the first ever Societal Impact
Fund Grant: **\$10,000**

***Self-reported number of publications co-authored with other CIFAR researchers. (Source: Program Member Annual Reports, 2021, n=181 researchers)

****Percentage of CIFAR researchers contributing to the top 1% of most-cited papers at the world level from 2014-2018. Statistics produced by Science-Metrix using data from Scopus (Elsevier). Analysis excludes Canada CIFAR AI Chairs as research in AI is frequently published in conference papers rather than journals, and is thus not captured in the Scopus data.

CIFAR PAN-CANADIAN ARTIFICIAL INTELLIGENCE STRATEGY

The world's first national AI strategy is advancing Canada's leadership in AI through research, training, and innovation.



BOOSTING CANADA'S ECONOMY THROUGH AI

Since its launch in 2017, the Pan-Canadian AI Strategy generated [significant growth in Canadian AI ecosystem](#):

- 1,200+ graduate and postdoctoral fellows have been trained across the three partner AI institutes (Amii, Mila, and the Vector Institute)
- Canada placed fourth in the world in AI skills migration
- 45+ new AI R&D labs were established in Canada by major multinational firms
- Canada saw an increase of 3.6% in tech employment, an area that grew twice as fast as other occupations.

LAUNCHING GLOBAL CALL FOR PROPOSALS FOR RESPONSIBLE AI GOVERNANCE SOLUTIONS

In September 2020, CIFAR launched a call for a Solution Network, (The successful Network will comprise a global team of cross-sectoral, interdisciplinary experts) who will receive flexible funding of up to \$800,000 over three years. An initiative of CIFAR's AI & Society Program, the Network will design, develop and implement responsible AI governance solutions to mitigate inequality in low-middle income countries.



Nidhi Hegde (University of Alberta, Amii) and Rahul Krishnan (University of Toronto, Vector Institute), appointed as Canada CIFAR AI Chairs in 2021, are conducting AI research in areas that are important to Canadians – including privacy and health.



"One of the major reasons I decided to move to Canada and join the University of Toronto and the Vector Institute was the pan-Canadian effort led by CIFAR. The Canada CIFAR AI Chairs Program held its promise; it strengthens my academic freedom to pursue ambitious research ideas which I think have a lot of potential but need several years of innovation before they are sufficiently mature. Being part of this network of excellence is not only an honor, but also a true competitive advantage in my group's every day research work."

NICOLAS PAPERNOT

Canada CIFAR AI Chair, Vector Institute, University of Toronto

ADVANCING RESEARCH IN FUNDAMENTAL AI, HEALTH AND COVID-19

- Accessing the world's largest open source medical database, Canada CIFAR AI Chair Danilo Bzdok (Mila, McGill University) used machine learning models to identify that some brains have a "neural signature" that affects how we respond to feelings of social interaction or isolation.
- Canada CIFAR AI Chair Golnoosh Farnadi (Mila, HEC Montréal) is developing deep learning algorithms that optimize fairness in decision-making algorithms. She was recognized with the Google AI 2021 Research Scholar Award for her work.
- A Fellow in CIFAR's Child & Brain Development Program, Anna Goldenberg and CIFAR Azrieli Global Scholar Marzyeh Ghassemi (both are Canada CIFAR AI Chairs, Vector Institute, University of Toronto) are working with collaborators using machine learning to predict which children and their families are most at risk when it comes to COVID-19.
- Canada CIFAR AI Chair Russ Greiner (Amii, University of Alberta) and a team of researchers have developed a machine learning algorithm that predicts the early symptoms of schizophrenia, as well as identifies the severity of the disease in patients.



Danilo Bzdok's research on the effect of perceived social isolation on the human brain was ranked fifth in *Nature Communication's* most downloaded articles.



*"CIFAR puts the top minds
in the same room to talk about
subjects of interest to all of
them, but from different angles."*

CLAIRE TROTTIER

WHY I GIVE

Claire Trottier is a microbiologist and immunologist. The Trottier Family Foundation, based in Montreal, was established to create meaningful impact that improves the lives of Canadians. She spoke with Leslie McCarley, CIFAR's Vice-President, Advancement about why she supports CIFAR.

Leslie: CIFAR has a unique approach that convenes extraordinary minds to address important questions. What is it about this model that appeals to you?

Claire: It's an incredible model because the big problems facing science and humanity will require people from varied backgrounds to address the different facets of the same problem. And, it's rare that people from such disparate spheres come together to tackle an issue.

It's great to have an organization that encourages cross- and inter-disciplinary conversations and collaboration. CIFAR puts the top minds in the same room to talk about subjects of interest to all of them, but from different angles. There is a lot of value in that.

Leslie: Is there anything particularly unique about the times we live in, and the impact of science, during a global pandemic?

Claire: Many CIFAR researchers pivoted to address this immediate threat. That kind of responsiveness is unique. And, because they've been working with colleagues outside their respective fields, CIFAR researchers hit the ground running.

The broader research community didn't have that same experience to draw on. At first, you'll recall that there was great debate about whether the virus was spread via aerosol or droplets and a lot of it boiled down to how clinicians defined terms versus how aerosol engineers defined terms. When you bring these experts together, it sinks in – they each have their own definitions and types of evidence they consider relevant.

At the Trottier Family Foundation, we're convinced collaboration will help us solve problems faster and more efficiently. That's what appeals to us about CIFAR.

Leslie: CIFAR asks questions with implications for the future. It has urgency, with a long view. As a scientist, can you share your perspective on why that might be important today?

Claire: The long view is absolutely essential. I got my vaccine two weeks ago. The basic science and discovery

science that went into our ability to make that vaccine rapidly is incredible. Over decades, we made investments in basic science, and it paid off, big time. We would all still be waiting for a vaccine without it. Can you imagine?

I'm a scientist by training, and I believe in applied research. You need basic research, fundamental research, and collaborative research. Otherwise, we're in big trouble.

Leslie: It could be argued that knowledge on a shelf isn't knowledge at all. How do you think research breakthroughs should be mobilized and translated into practice in industry and public policy?

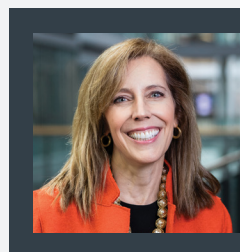
Claire: I'd love to see governments look at how they fund research and how they can encourage and support collaboration and risk-taking. We would get a lot further if there was more of that type of support.

It's a great honour for scientists to be selected as CIFAR researchers. In an ideal world, you wouldn't need this type of recognition to be valued in universities and academia. Doing collaborative work, like what's being done at CIFAR, should be the norm.

Leslie: CIFAR is an international organization based proudly in Canada. Do you think our home base matters?

Claire: CIFAR is a Canadian-based organization with Canadian and international researchers. It supports collaborative research and leadership, and it also brings the best Canadian researchers together with the best from around the world.

I think it's a cool thing to be proud of as a Canadian.



Leslie McCarley,
CIFAR's Vice-President,
Advancement, leads CIFAR's
efforts to advance private
revenue support.

leslie.mccarley@cifar.ca

WHY I GIVE



**YMMMA
VILLACASTIN**
WHY I GIVE

Ymma Villacastin first learned of CIFAR when applying for CIFAR's AI4Good, a summer program that brings together young trainees from across Canada who identify as women in STEM.

"I believe that an interconnected network of people will bring a brighter tomorrow for our descendants," says Ymma. "That's why I'm supporting CIFAR through my monthly giving."

In September, Ymma will begin her undergraduate degree in mathematics and computer science at the University of Calgary, with the hope of becoming a researcher herself.

"Until then, I look forward to celebrating CIFAR's big wins, knowing that I'm part of them through my philanthropy."



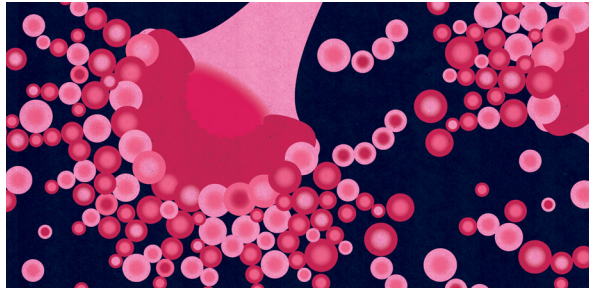
**GEORGE
FIERHELLER**
**LEAVING
A LEGACY**

George Fierheller's passion for exploring the unknown led him to CIFAR, where he became an active Board member, trusted advisor and a loyal donor throughout his life. George gave generously, and he continued this tradition by choosing to remember CIFAR in his will.

"Dad was fascinated by the future and what great minds could accomplish when they worked together," says his daughter, Lori Wittemeier. "He always said, if you believe in an initiative, you should be willing to give your time and whatever funds you can. That's why he was such a strong supporter of CIFAR."

Research Programs

CIFAR's research programs address the most important questions facing science and humanity. They bring together international, interdisciplinary researchers who work together for five-year terms. Programs are led by a director or two co-directors. They engage 20-25 fellows and advisors from around the world, and include two or three CIFAR Azrieli Global Scholars for two-year terms.



LIFE & HEALTH

FUNGAL KINGDOM: THREATS & OPPORTUNITIES

FOUNDED

2019

PROGRAM DIRECTORS

Leah Cowen
University of Toronto

Joseph Heitman
Duke University

FELLOWS

12

ADVISORS

5

Catalyst Fund enables unique interdisciplinary collaboration

An unlikely collaboration between two CIFAR Fellows — medical doctor Bruce Klein (University of Wisconsin, Madison) and wildlife biologist Fellow David Blehert (U.S. Geological Survey) has made phenomenal advances in understanding a fungus that caused an epidemic of death among bats in North America. Each bringing their unique expertise, the two researchers developed a vaccine for bats against White Nose Syndrome that is being deployed in wild populations at risk.

As both antibiotic producers and deadly pathogens, necessary members of ecosystems and are invasive species, fungi are complicated. Understanding the complexity of the fungal kingdom demands a multidisciplinary approach. This CIFAR team includes diverse experts who interrogate the unique facets of fungal biology in order to mitigate the threats posed by fungi and harness their extraordinary potential.

RESEARCH AND SOCIETAL IMPACT HIGHLIGHTS

Addressing life-threatening fungal infections

The team is developing innovative strategies using novel antifungals to treat life-threatening fungal infections. Working collaboratively, the team has screened powerful and diverse chemical libraries, including natural products and derivatives, to identify molecules that kill fungal pathogens.

Meeting the challenge of fungicide resistance

Fellows Eva Stukenbrock (Max Planck Institute of Evolutionary Biology), Sarah Gurr (University of Exeter), Matthew Fisher (Imperial College London), James Kronstad (University of British Columbia) and Christina Cuomo (Broad Institute) are assessing the diversity of endophytic fungi associated with leaves and roots of wheat grown in fungicide-treated and untreated fields. Future experiments will aim to understand the genetic diversity and evolution of drug resistance within fungicide-resistant strains.

Connecting with clinical experts to explore the future of fungal diagnosis

Program Fellows and Advisors established a societal impact plan that will bring together members of the program and North America’s top-tier clinical diagnostics labs to explore where cross-sector collaboration can accelerate progress in fungal diagnostics.

“This is the most exciting grouping of like-minded academics I have ever been privileged to be part of. Our forays through the fungal kingdom have led us to forge new and exciting projects. No topic is barred and no comment dismissed — what an incredible adventure!”

SARAH GURR

CIFAR Fellow, University of Exeter



LIFE & HEALTH

HUMANS & THE MICROBIOME

Microorganisms cover our skin and fill our guts. These bacteria, viruses and fungi – collectively called the human microbiome – have a tremendous impact on human health. This program brings anthropologists, biologists, and other scholars together to ask new questions about the microbiome’s impact on human health and development, and how it is affected by individual and societal behaviour.

RESEARCH AND SOCIETAL IMPACT HIGHLIGHTS

Exploring how COVID-19 will affect health and well-being through the microbiome

Stemming from discussions at the program’s first virtual meeting in March 2020, the group collectively wrote an interdisciplinary perspective piece on the “hygiene hypothesis” and COVID-19, published in the [Proceedings of the National Academy of Sciences](#). The research was profiled broadly in national and international media, including the *New York Times Magazine*, *The Globe and Mail* and *The Guardian*.

Examining the impact of global antibiotic overuse

Program members Martin Blaser (Rutgers University), Melissa Melby (University of Delaware), Margaret Lock (McGill University) and Mark Nichter (University of Arizona) published a collaborative paper in [BioEssays](#) that examined cultural factors in the variation and overuse of antibiotics in humans. The paper proposed solutions to improve antibiotic stewardship and address the growing problem of antimicrobial resistance and chronic diseases associated with excessive antibiotic use.

Training the next generation of public health experts

Building on the program’s engagements with the public health sector, program members developed microbiome-focused curriculum materials for use in post-secondary public health programs, drawing on perspectives from public health faculty and instructional design principles. The curriculum will be piloted in fall 2021.

“The key importance of being a CIFAR fellow is the ability to meet and discuss across disciplines. The CIFAR meetings are always inspirational, and provide unique opportunities to think outside the box. CIFAR’s organization and objectives stand out from the crowd by supporting critical thinking and creativity among scientists that in my mind always will prevail.”

SVEN PETTERSSON

CIFAR Fellow, Nanyang Technological University of Singapore

FOUNDED

2014

PROGRAM DIRECTORS

Brett Finlay
University of
British Columbia

Melissa Melby
University of
Delaware

FELLOWS

13

**CIFAR AZRIELI
GLOBAL
SCHOLARS**

ADVISORS

7

6

PARTNERS

Brain Canada Foundation through
the Canada Brain Research Fund

SUPPORTERS

Canada Life

CIFAR and Brain Canada support groundbreaking research to understand the brain.

CIFAR has proudly partnered with Brain Canada through the Canada Brain Research Fund from 2015 to 2021 on three of our ground-breaking programs: Brain, Mind & Consciousness, Humans & the Microbiome, and Learning in Machines & Brains. The partnership has enabled CIFAR researchers to work together to address complex questions, and pioneer new approaches to understanding the brain.



INDIVIDUALS & SOCIETY

BRAIN, MIND & CONSCIOUSNESS

FOUNDED

2014

PROGRAM DIRECTORS

Adrian Owen
Western University

Anil Seth
University of Sussex

CIFAR AZRIELI GLOBAL SCHOLARS

FELLOWS

17

3

ADVISORS

6

ASSOCIATE FELLOWS

2

PARTNERS

Anonymous partner, Brain Canada Foundation through the Canada Brain Research Fund

SUPPORTERS

Canada Life, Michael and Sonja Koerner, The Lawrence and Judith Tanenbaum Family Foundation, Templeton World Charity Foundation, Inc.

The quality of our consciousness is what sets us apart from other species, and seems to be one of the defining traits of being human. Yet the nature of consciousness remains a mystery. The Brain, Mind & Consciousness program brings together neuroscientists, philosophers, and psychologists to grapple with the fundamental underpinnings of consciousness, relating the findings to biology on the one hand and to philosophical questions on the other.

RESEARCH AND SOCIETAL IMPACT HIGHLIGHTS

Exploring the development of cognition and consciousness in infants

Understanding cognition and consciousness in infants, relies on combining brain imaging with cognitive tasks. This is easier to do with adults, but challenging to do with infants. Fellow Nicholas Turk-Browne (Yale University) identified [methods](#) for awake infant fMRI, published in *Nature Communications*, that can reveal the inner workings of the developing, preverbal mind.

Shedding light on a largely impenetrable mental construct

Co-Director and Koerner Fellow Adrian Owen (Western University) and Fellows Robert Zatorre (McGill University), Aniruddh Patel (Tufts University), and Mor Regev (McGill University) published work in *Cerebral Cortex* that compares the unique temporal neural response profile of imagined and heard musical pieces, revealing the existence of common neural activation when bridging perceived and recalled experiences.

Linking research with clinical neurology and extended reality (XR) technologies and experiences

Fellow Laurel Trainor (McMaster University) launched CIFAR’s first Societal Impact Project which pioneers research at the intersection of XR, machine learning, and the cognitive neuroscience of social interaction. Trainor is collaborating with a creativity-focused AI company, and will use AI avatars to interact with research subjects to assess the cognitive processes that control humans’ social interactions.

Creating a shared resource with Catalyst Funds

Led by program Co-Director and Koerner Fellow Adrian Owen (Western University) and Co-Director Anil Seth (University of Sussex), the team is creating a repository of centralized data collected by Fellows. The aim is to spark and sustain program wide collaboration by collating shareable tools and resources (e.g., stimulus sets, validated questionnaires, experiment code).

“CIFAR meetings continue to be the place where I get the most inspiration for new ideas and approaches that go beyond what’s popular in my field today. When I’m at CIFAR meetings I get a perspective that is wider and more generative than at any other meetings I attend. Thanks to being part of the Brain, Mind & Consciousness “family,” ideas I get at the meetings can be developed through sustained conversations and interactions with some of the best scientists in the field, leading to novel projects and research directions.”

ANIRUDDH PATEL

CIFAR Fellow, Tufts University



INDIVIDUALS & SOCIETY

BOUNDARIES, MEMBERSHIP & BELONGING

All societies distinguish members from non-members. The Boundaries, Membership & Belonging program explores ways to create and empower groups without reinforcing ideas that produce pernicious divisions and hierarchies. The program brings together leading social scientists and political and legal theorists who collaborate to make sense of membership politics.

RESEARCH AND SOCIETAL IMPACT HIGHLIGHTS

Exploring a core question stemming from the pandemic

Fellow Stephen Reicher (University of St. Andrews) co-authored a book, [Together Apart: The Psychology of COVID-19](#), on how to support public adherence with public health guidelines. Contrary to the dominant expectation that the public would be unable to cope with restrictions, the evidence from many countries indicated that although people were suffering, they showed (and continue to show) remarkably high levels of adherence. The authors argue that understanding how to nurture a sense of shared identity is critical to this process.

Outlining how human society could be organized in 300 years

Building on a program meeting discussion about the implications of a world without nation-states, Fellow Andreas Wimmer (Columbia University) produced an [article](#) in *Nations and Nationalism* that outlined five scenarios of how human society could be politically organized in 300 years, after nation-states have dissolved and nationalism as their foundational ideology has dissipated.

Connecting with senior policymakers to share insights on the implications of group boundaries and identities

Co-Directors Irene Bloemraad (University of California, Berkeley) and Will Kymlicka (Queen's University) engaged senior officers from multiple Canadian federal ministries in a discovery meeting to identify avenues for future interaction to bridge research and policy.

“CIFAR is an academic’s dream: The opportunity to participate in conversations that take one in new directions, to learn from colleagues who offer different and exciting perspectives and methods, and the sheer pleasure of embarking on an intellectual journey with no pre-ordained destination.”

AUDREY MACKLIN

CIFAR Fellow, University of Toronto

FOUNDED

2019

PROGRAM DIRECTORS

Irene Bloemraad

University of California, Berkeley

Will Kymlicka

Queen's University

FELLOWS

10

ADVISORS

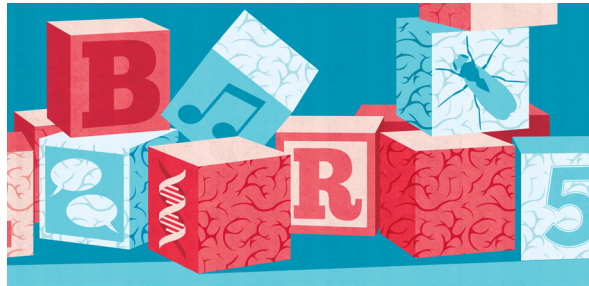
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SUPPORTERS

BMO Financial Group, Koerner Foundation

Catalyst Fund project aims to pull together diverse and incomplete datasets

The question of whether nationhood can be inclusive is a central question for CIFAR’s Boundaries, Membership & Belonging program. The ability to answer that question is limited by inconsistent terminology and use of case sets by researchers. A project involving many of the program’s members aims to develop a comprehensive, searchable database that will allow researchers to develop more accurate accounts of inclusive nationalism, and its preconditions.



INDIVIDUALS & SOCIETY

CHILD & BRAIN DEVELOPMENT

FOUNDED

2003 (formerly Experience-Based Brain and Development until 2013)

PROGRAM DIRECTORS

Takao Hensch
Harvard University and University of Tokyo

Candice Odgers
University of California, Irvine

FELLOWS

14

CIFAR AZRIELI GLOBAL SCHOLARS

4

ADVISORS

5

ASSOCIATE FELLOWS

4

PARTNERS

Genome British Columbia

SUPPORTERS

Canada Life, The Joan and Clifford Hatch Foundation

The Child & Brain Development program examines the effect of the early environment on children, and how adversity can have lifelong effects on health and development. Over the past decade, program members including biologists, psychologists, and medical doctors have transformed our understanding of the interplay between nature and nurture, and generated important findings related to the biological underpinning of our early experiences as children.

RESEARCH AND SOCIETAL IMPACT HIGHLIGHTS

Understanding impacts of the social environment on morbidity and mortality

Fellows Daniel Belsky (Columbia University) and Jenny Tung (Duke University), and their colleagues, found that the social environment, both in early life and adulthood, is one of the strongest predictors of morbidity and mortality risk not only in humans, but also in animals. These findings highlight the importance of the social environment to health and mortality, as well as Darwinian fitness – outcomes of interest to social scientists and biologists alike.

Developing community-based approaches to COVID-19 screening

The early work of Fellow Thom McDade (Northwestern University), supported by CIFAR, investigated the factors that contributed to viral transmission of COVID-19 in the community, as well as the level of immunity following exposure in the general population. His work has already been disseminated widely across scientific and broader audiences and has attracted additional funding.

Exploring the role of brain ‘noise’ in optimizing cognitive function

Fellow Paul Frankland (The Hospital for Sick Children) and collaborators from two other CIFAR programs, enabled by CIFAR Catalyst Fund grants, used computer modelling to explore the contribution of one source of noise in the adult brain – continuous integration of newly generated neurons into established hippocampal circuits – to the process of generalization. The ability to generalize from one specific instance to other, similar instances, is a crucial component of our intelligence.

Transforming children’s health

Program members are developing new ways to collect health and development data to transform how we understand, measure, and support child health. Working with Canadian policymakers across health, education, ethics and other areas, the team is building the information infrastructure that is required in order to target interventions where and when they are needed most – focusing first on child well-being gaps widened by the pandemic, and then broadening scope.

CIFAR and Genome BC partnership advances understanding of brain development

CIFAR is proud of its longstanding partnership with Genome British Columbia (Genome BC), whose commitment to advancing the clinical implementation of precision health in British Columbia aligns with the Child & Brain Development program’s work in understanding the “personalized” development trajectories of children, and integrating machine learning/AI into this line of research.

“Being part of CIFAR is by far the best experience in my almost 40-year academic career. CIFAR’s convening and supporting the top international interdisciplinary scientists to work together on a difficult problem is unsurpassed.”

MARLA SOKOLOWSKI

CIFAR Fellow, University of Toronto



INDIVIDUALS & SOCIETY

INNOVATION, EQUITY & THE FUTURE OF PROSPERITY

The benefits of innovation tend to be concentrated in a limited number of industries, regions and hands. Innovation that exacerbates inequality can undermine public support for science and innovation and can contribute to broader political alienation. The Innovation, Equity & the Future of Prosperity program brings together economists, political scientists, engineers, and historians to examine how the policies used to generate and diffuse innovation affect the distribution of opportunities and outcomes in society.

RESEARCH AND SOCIETAL IMPACT HIGHLIGHTS

Does a “one size fits all” approach to innovation policy make sense?

In [Innovation in Real Places](#), Co-Director Dan Breznitz (University of Toronto) shows that cities and regions have wasted trillions of dollars aspiring to be the next Silicon Valley, and questioned whether other models (that don't rely on a flourishing high-tech industry) might be more viable. Breznitz argues that success lies in understanding the changed structure of global production systems and then using those insights to enable communities to recognize their own advantages, focusing on specialized innovation.

Innovation in technology-enabled care work

The COVID-19 pandemic highlighted not only a shortage of care staff for older populations, but also an overworked and overstressed workforce. Fellow Goldie Nejat (University of Toronto) aims to innovate technology-enabled care work using robots to assist with activities of daily living. In collaboration with Associate Director Amos Zehavi (Tel Aviv University), Nejat is working to promote public policies that support the inclusion of such technologies to help both older adults and caregivers.

Advancing inclusive innovation policy

In a virtual [briefing](#), program Co-Directors Dan Breznitz (University of Toronto) and Susan Helper (Case Western Reserve University) and Canadian federal government officials explored opportunities for inclusive innovation in the post-COVID era, and new initiatives for measuring and tracking progress.

“What's nice about CIFAR is that it not only brings together a brilliant mix of scholars who are addressing common problems from different standpoints, but that it does so on an ongoing basis. Too often these things are designed as one-off events, where there's just not enough time to get to know each other, to come to understand each other's idioms, methods, assumptions, and language – let alone to really transcend disciplinary boundaries. Often I find myself more confused than intrigued, let alone excited, by interdisciplinary endeavours. But CIFAR builds communities that are meant to last. What starts out as a brief chat can evolve into a real collaboration, given enough time, and CIFAR gives it enough time.”

ANDREW SCHRANK,
CIFAR Fellow, Brown University

FOUNDED

2019

PROGRAM DIRECTORS

Dan Breznitz
University of
Toronto

Amos Zehavi
Tel Aviv University

Susan Helper
Case Western
Reserve University

FELLOWS

9

ADVISORS

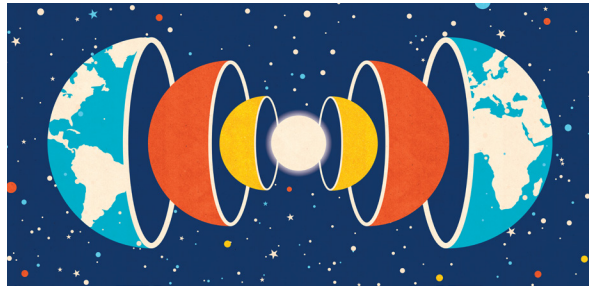
4

SUPPORTERS

Max Bell Foundation

Examining innovation policies and COVID-19

Program Fellow Andrew Schrank (Brown University) and Co-Director Susan Helper (Case Western Reserve University) collaborated on a project that addresses the central question of the program: how to ensure that distribution sensitive innovation programs receive broad policy support to ensure long term sustainability. As a next step, Schrank published a [paper](#) defending a “broadly targeted” approach to innovation policymaking.



EARTH & SPACE

EARTH 4D: SUBSURFACE SCIENCE & EXPLORATION

FOUNDED

2019

PROGRAM DIRECTORS

John Mustard
Brown University

Barbara Sherwood Lollar
University of Toronto

FELLOWS

8

ADVISORS

4

Searching for the true limits of life on Earth

Enabled by a Catalyst Fund grant, the Null Life Detection study led by Fellows Heather Graham (NASA), Bénédicte Ménez (Institut de Physique du Globe de Paris), and Magdalena Osburn (Northwestern University) is being used to inform changes in the Life Detection Knowledge Base tool in development with the Center for Life Detection Science at NASA’s Ames Research Center. The team aims to create a new definition of ‘habitability’ by looking at the places on Earth where life is not found, a fairly rare approach, and one that aims to transform the field.

Beneath our feet is a vast, unexplored world consisting of up to tens of kilometres of thick crust containing water, gases, nutrients, resources, and various forms of life. The Earth 4D program’s multidisciplinary team draws on geology, chemistry, planetary science, and engineering to investigate the interactions between the subsurface and the surface of Earth. They seek to inform and expand our understanding of planetary evolution and the possibility of finding life elsewhere.

RESEARCH AND SOCIETAL IMPACT HIGHLIGHTS

Identifying the potential of Earth-like environments in the subsurface of Mars

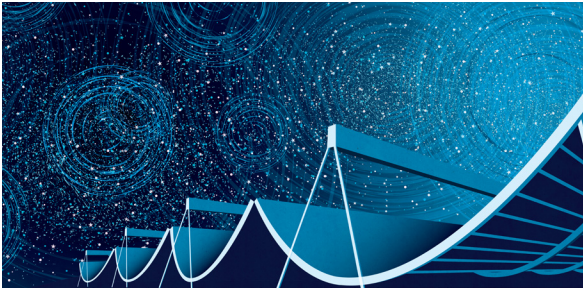
By studying water in the deep subsurface of the Earth, Co-Directors John Mustard (Brown University) and Barbara Sherwood Lollar (University of Toronto), Fellow Vlada Stamenković (Blue Origin) and co-authors [determined](#) in *Astrobiology* that pathways exist for biology to gain energy from oxidation and reduction reactions deep below the Earth’s surface, where conditions are comparable to extra-terrestrial conditions. This knowledge laid the foundation to extend this work to Mars, and to provide testable hypotheses that the rover Perseverance, which landed on Mars in February 2021, could explore.

Approaching the last unexplored region for life in the solar system beyond Earth

Fellows identified regions in the subsurface of Mars that would be suitable for microbes to live today, and determined the technologies and missions to explore those regions in this decade. They demonstrated why life could still exist in those regions, how to get there affordably, and how to determine whether liquid groundwater and life could be there.

“What I love about CIFAR and what makes it unique is the mixture of curiosity, diversity, global awareness and determination to advance society while still feeling like being part of a small and caring family.”

VLADA STAMENKOVIĆ
CIFAR Fellow, Blue Origin



EARTH & SPACE

GRAVITY & THE EXTREME UNIVERSE

For most of human history our only information about the Universe came from visible light. Later we learned to detect other forms of electromagnetic radiation like infrared and radio waves. Now we can finally detect gravitational waves, and that opens the door to fundamentally new ways of observing and understanding the Universe. Astronomers, cosmologists, physicists, and computer scientists in the Gravity & the Extreme Universe program ask questions about the nature of extreme gravity, the origin and evolution of the Universe, and the structure of compact objects such as black holes and neutron stars, as well as profound questions about fundamental physics and astrophysics.

RESEARCH AND SOCIETAL IMPACT HIGHLIGHTS

CHIME continues providing unique astrophysical insights

Using the Canadian Hydrogen Intensity Mapping Experiment (CHIME) telescope, Fellows localized the mysterious fast radio burst phenomenon with the highest precision, to understand any possible physical associations, e.g., black holes, supernovae. In particular, the team showed that magnetars – highly magnetized young neutron stars – are capable of producing events that are very similar to fast radio bursts. This suggests that at least some fast radio burst sources are magnetars.

Narrowing the gap between neutron stars and black holes

Fellow Vassiliki Kalogera (Northwestern University) and collaborators working at the LIGO and Virgo detectors observed an atypical gravitational-wave signal originating from the merger of highly asymmetrical masses – a 23 solar-mass black hole and a 2.6 solar-mass compact object. With CIFAR support, Kalogera and her team examined the formation and evolution of such binary systems. This work suggests that if this gravity wave is the result of massive-star binary evolution, the mass gap between neutron stars and black holes may be narrower than previously thought or even nonexistent.

Transferring astrophysics technology to other fields

A virtual [roundtable](#) of program members, Canada CIFAR AI Chairs and other experts from academia, clinical practice, and industry explored how advances in the algorithms used in astronomy can be adapted to address similarly complex data in biomedicine and medical imaging. The group discussed shared challenges and identified opportunities for future collaboration.

“The CIFAR roundtable for Algorithms in Astronomy and Biomedicine was really instructive. This event was a good opportunity to identify the challenges that both fields are sharing. Applying AI/ML to huge [volumes] of data is bringing new challenges and everyone would benefit from interdisciplinary collaboration to tackle these.”

TIMOTHÉE BERNARD

Lead engineer at Imagia

FOUNDED

1986 (formerly Cosmology & Gravity until 2017)

PROGRAM DIRECTOR

Victoria Kaspi
McGill University

FELLOWS

17

ADVISORS

6

SUPPORTERS

R. Howard Webster Foundation

CIFAR AZRIELI GLOBAL SCHOLARS

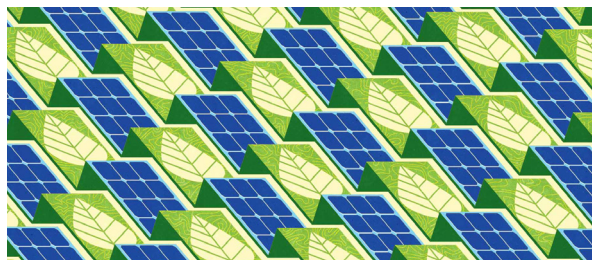
3

ASSOCIATE FELLOWS

12

The Canadian Hydrogen Observatory and Radio-transient Detector (CHORD) builds on CHIME's success

Led by Fellow Matt Dobbs (McGill University), and enabled by a Catalyst Fund grant, this world-leading facility, located in British Columbia, will allow Canadian astronomers to address the most exciting areas in physics today.



INFORMATION & MATTER

BIO-INSPIRED SOLAR ENERGY

FOUNDED

2014

PROGRAM DIRECTORS

Curtis Berlinguette
University of British Columbia

Greg Scholes
Princeton University

Gabriela Schlau-Cohen
Massachusetts Institute of Technology

FELLOWS

7

CIFAR AZRIELI GLOBAL SCHOLARS

2

ADVISORS

5

SUPPORTERS

Arthur J.E. Child Foundation, Chisholm Thomson Family Foundation, The George Cedric Metcalf Charitable Foundation, Gerald Heffernan, McLean Group, Trotter Family Foundation

A Catalyst Fund project examines renewable energy options

Christopher Chang (University of California, Berkeley) and Curtis Berlinguette (University of British Columbia) are developing a hybrid system that uses an artificial leaf and principles of biology for sustainable energy conversion.

The process of photosynthesis, which plants use to turn the Sun’s energy into fuel, has been optimized over billions of years of evolution. The Bio-Inspired Solar Energy program examines the biological, physical, and chemical lessons of photosynthetic organisms to create better ways of harvesting, transporting and storing light energy.

RESEARCH AND SOCIETAL IMPACT HIGHLIGHTS

Joint publication on bio-inspired solar energy conversion

The team [outlined](#) in *Nature Reviews Materials* that key advances and future challenges in the field are setting the stage for the program’s second term at CIFAR and the broader field of energy science.

Understanding how nature sequesters and transforms carbon

Fellow Catherine Drennan (Massachusetts Institute of Technology) and her team succeeded in solving a series of crystal structures of carbon monoxide dehydrogenase (CODH) from *Desulfovibrio vulgaris* that have provided insight into the oxygen-sensitivity of the enzymes. These findings represent a major breakthrough in terms of designing CODHs that are more amenable to practical applications such as CO₂ fixation on an industrial scale.

Examining the role of solar energy-driven reaction in industrial-scale production

Advocating for expanding the scope and use of photo-chemistry in industrial scale reactions, a [paper](#) published in *Energy & Environmental Science* by Heffernan Fellow and Associate Director Gabriela Schlau-Cohen (Massachusetts Institute of Technology) and Co-Director Greg Scholes (Princeton University) makes the case for how solar-driven reactions can transform chemical manufacturing.

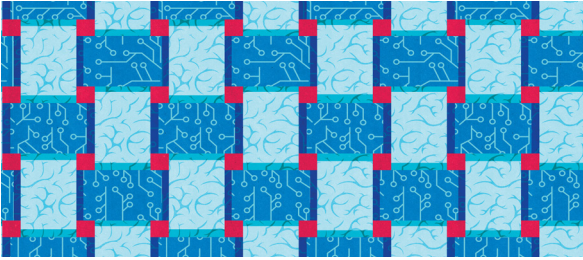
Transforming CO₂ into high-value chemicals and fuels

Based on conversations and collaborations that began in a 2019 roundtable, a group of academic and industry experts, including program Co-Director Curtis Berlinguette (University of British Columbia), published a [review article](#) in *Nature Energy* that describes recent advances and remaining challenges in the design of anion exchange membranes (AEM), a critical component of CO₂ conversion devices.

“CIFAR meetings are a chance to step outside the day-to-day routine to interact with new people with the space to think in a big picture way about what is possible.”

GABRIELA SCHLAU-COHEN

Heffernan Fellow and Associate Program Director, Massachusetts Institute of Technology



INFORMATION & MATTER

LEARNING IN MACHINES & BRAINS

Current AI systems are limited in their ability to understand the world. This program draws on neuro- and computer science to investigate how brains and artificial systems become intelligent through learning. The program's fundamental approach – going back to basic questions rather than focusing on short-term technological advances – has the dual benefit of improving the engineering of intelligent machines and explaining intelligence.

RESEARCH AND SOCIETAL IMPACT HIGHLIGHTS

Predicting COVID-19 mortality in real time

Using the health records of 100,000 patients across 70 hospitals, Fellow Bernhard Schölkopf and CIFAR Azrieli Global Scholar Stefan Bauer (both of the Max Planck Institute for Intelligent Systems), trained a real-time mortality prediction model to make early identification of patients with the highest mortality risk. This advancement is critical to enabling effective intervention and prioritization of care.

Co-founding Neuromatch Academy, an online summer school in computational neuroscience

Originating as a CIFAR Catalyst Fund supporting in-person summer schools, the initiative expanded to pool resources with other organizers around the world to create a large-scale virtual school, as a unified effort during the COVID-19 pandemic. Led by Fellow Konrad Kording (University of Pennsylvania) and CIFAR Azrieli Global Scholar Megan Peters (University of California, Irvine), Neuromatch Academy engaged about 1,700 interactive students worldwide, 190 teaching assistants, and over 5,000 “observer” students who signed up to work through the material on their own.

Advancing a global conversation on ethical AI

Program fellows and advisors hosted a virtual [roundtable](#) with other academic and industry AI research leaders, Canada CIFAR AI Chairs, and experts in technology ethics and governance and in organizational culture, on how to create and sustain a culture of ethics in AI research and training environments.

“CIFAR is a global thought leader in AI, and given the importance of ethics in the current state of affairs, the topic should be front and center in our discussions and our actions.”

SASHA LUCCIONI

Université de Montréal, Mila

FOUNDED

2004 (formerly Neural Computation and Adaptive Perception until 2016)

PROGRAM DIRECTORS

Yoshua Bengio
Université de
Montréal

Yann LeCun
Facebook AI
Research and
New York
University

FELLOWS

14

**CIFAR AZRIELI
GLOBAL
SCHOLARS**

3

ADVISORS

7

**ASSOCIATE
FELLOWS**

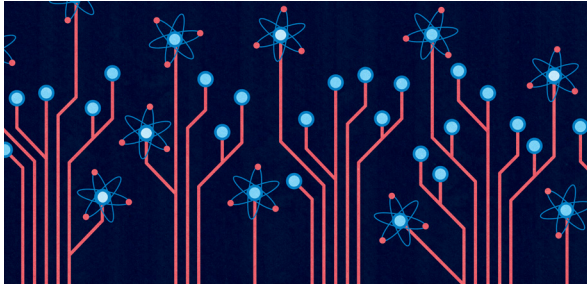
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Brain Canada Foundation through
the Canada Brain Research Fund

SUPPORTERS

Alfred P. Sloan Foundation, Facebook



INFORMATION & MATTER

QUANTUM INFORMATION SCIENCE

FOUNDED

2002 (formerly Quantum Information Processing until 2014)

PROGRAM DIRECTOR

Aephraim Steinberg
University of Toronto

FELLOWS

11

ADVISORS

5

CIFAR AZRIELI GLOBAL SCHOLARS

3

ASSOCIATE FELLOWS

5

The Quantum Information Science program focuses on the fundamental science behind quantum information in order to discover how best to harness it, solve important computational problems, and develop new insights into physics and information. The program takes a broad interdisciplinary approach, bringing together physicists, computer scientists, and others working in connected disciplines to address the field’s most fundamental challenges.

RESEARCH AND SOCIETAL IMPACT HIGHLIGHTS

Measuring the duration of quantum tunnelling

Physicists have been trying to crack the mystery of quantum tunnelling for 90 years, arguing about how exactly this tunnelling happens, what the atoms do as they tunnel, and how long they take to make the journey. Program Director Aephraim Steinberg (University of Toronto) and his team, seeking to provide clarity on how long particles spend tunnelling, timed how long ultracold rubidium atoms took to tunnel through a micron-thick laser beam that should have reflected them. This breakthrough, built on decades of work in Steinberg’s lab, is the world’s first such measurement and uncovers deep truths about the physical laws that govern quantum interactions.

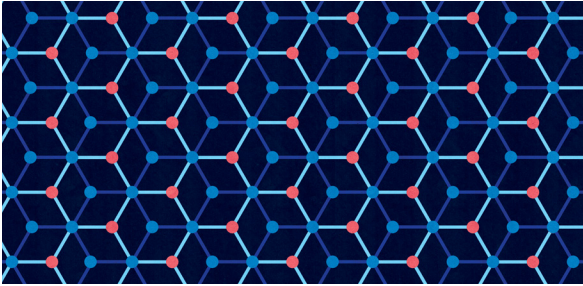
Developing ‘noise protected’ qubit architectures

Fellows Irfan Siddiqi (University of California, Berkeley) and Alexandre Blais (Université de Sherbrooke) are trying to use the internal structure of a quantum circuit to create a new class of quantum bits where the zero and one states live in unconnected spaces. This recipe provides one with protection against energy relaxation and thus the possibility of long-lived quantum coherence – and more stable quantum computation.

“Participating in the program gave me the impression of moving to a different country. Learning a new language, discussing with people I wouldn’t spontaneously talk to, and questioning things I took for granted is challenging but incredibly exciting.”

ALEXEI OURJOUNTSEV

CIFAR Azrieli Global Scholar, Collège de France



INFORMATION & MATTER

QUANTUM MATERIALS

The Quantum Materials program is working towards bringing on the Quantum Age by integrating theory, materials synthesis, and experiment to explore and advance the frontiers of quantum physics. The program is structured around four main thrusts: quantum spin liquids; topological materials; the pseudogap phase of cuprate superconductors; and strange metals. To understand the working principles of such quantum matter, this team is developing new tools, new models, and new materials.

RESEARCH AND SOCIETAL IMPACT HIGHLIGHTS

Shedding light on the previously unsolved mystery of condensed matter

Building on years of work by the program, Co-Director Louis Taillefer (Université de Sherbrooke) and his team [established](#) in a paper published *Nature Physics* that the carriers of heat responsible for the thermal Hall effect in cuprates are phonons. This has led to a series of theoretical studies by Co-Director Leon Balents (University of California, Santa Barbara), Fellow Subir Sachdev (Harvard University) and Advisors Allan MacDonald (University of Texas at Austin) and Roser Valentí (Goethe-Universität Frankfurt am Main), as well as further experimental tests by Taillefer.

Creating a path to the first high-temperature topological superconductor

Fellow Andrea Damascelli (University of British Columbia) predicted that combining thin sheets of copper-based materials in a twisted configuration will lead to topological superconductivity at much higher temperatures than researchers have achieved so far.

Rebuilding Canada's capacity for research with neutron beams

A virtual [roundtable](#) led by program members and held in partnership with the Canadian Neutron Initiative working group, sought input on key elements of a national neutron strategy from a range of stakeholders, including researchers, university executives, policy experts, leaders of domestic and international major research infrastructure, government agencies and funders, and the nuclear industry.

“CIFAR's approach enables the exchange of ideas in a way that few other organizations have been able to achieve. In scientific meetings, there is always a balance to strike between the promotion of new ideas, and the reevaluation of old concepts. CIFAR enables both to be heard.”

JAMES ANALYTIS

CIFAR Fellow, University of California, Berkeley

FOUNDED

1987 (formerly Superconductivity until 2002)

PROGRAM DIRECTORS

Leon Balents
University of
California, Santa
Barbara

Louis Taillefer
Université de
Sherbrooke

FELLOWS

13

CIFAR AZRIELI GLOBAL SCHOLARS

3

ADVISORS

3

Establishing long-term intellectual engagement between two programs

CIFAR is proud to partner with the Center for Computational Quantum Physics (CCQ), part of the Simons Foundation's [Flatiron Institute](#). In 2020, CCQ members joined the Quantum Materials program's first virtual fall meeting, building on an earlier joint workshop held at the Flatiron Institute in New York City. CIFAR alumni Antoine Georges (Collège de France) and Andrew Millis (Columbia University) are Directors of the CCQ.

CIFAR Supporters

We express our sincere thanks to our partners and donors for helping us to address science and humanity's most important questions.

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The Benefactors' Circle recognizes the extraordinary philanthropic commitments of donors whose lifetime giving exceeds \$1 million.

\$10,000,000 AND ABOVE

The Azrieli Foundation

One anonymous donor

\$5,000,000 - \$9,999,999

RBC Foundation

\$1,000,000 - \$4,999,999

Arthur J.E. Child Foundation

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Gerald Heffernan

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CIFAR thanks the following donors for sharing their intention to leave a Legacy gift in their Will.

Elizabeth Gerrits
Richard W. Ivey

Lawrence Tanenbaum

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CIFAR is grateful for commitments and investments made between July 1, 2020 and March 31, 2021.

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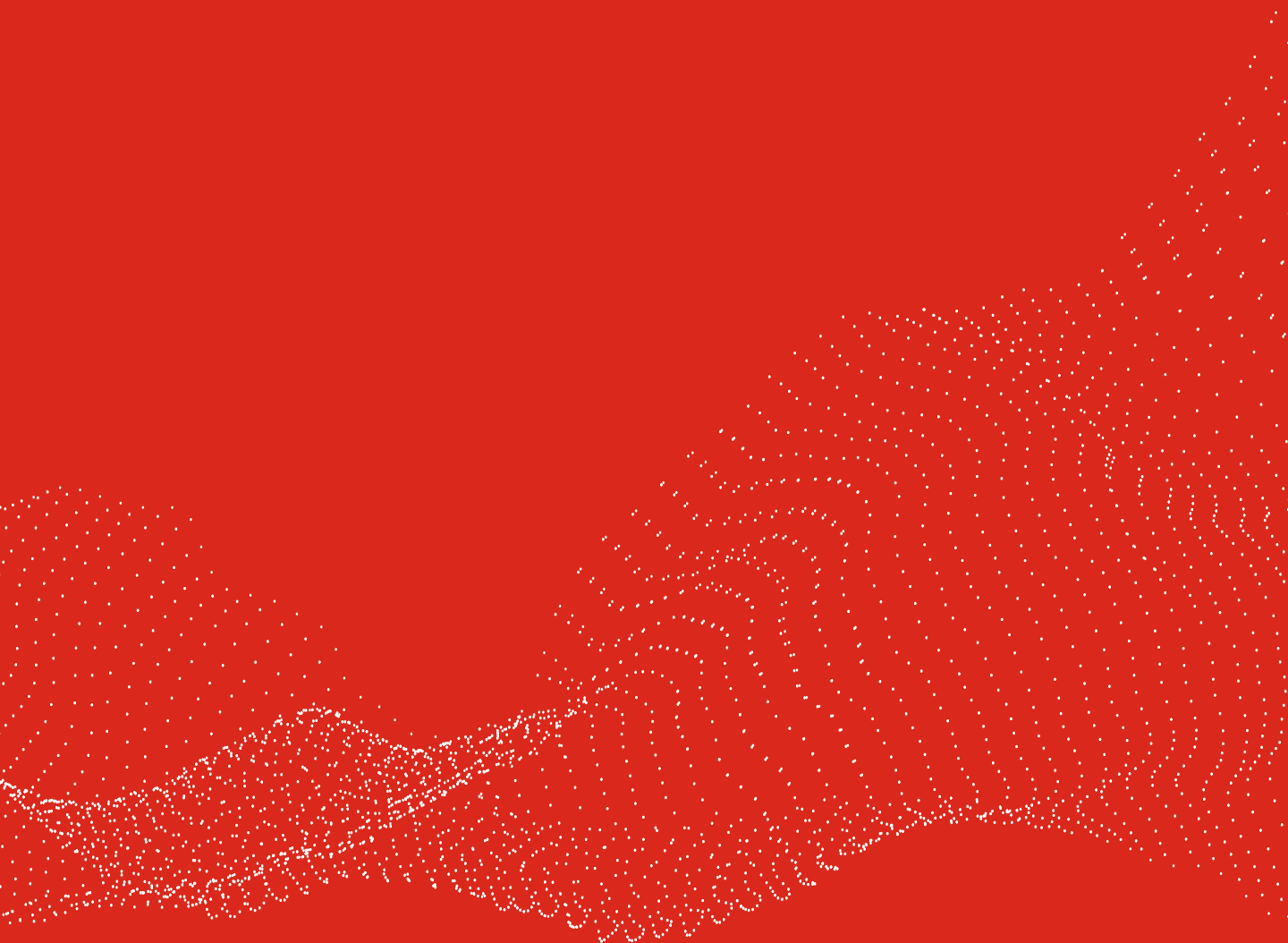
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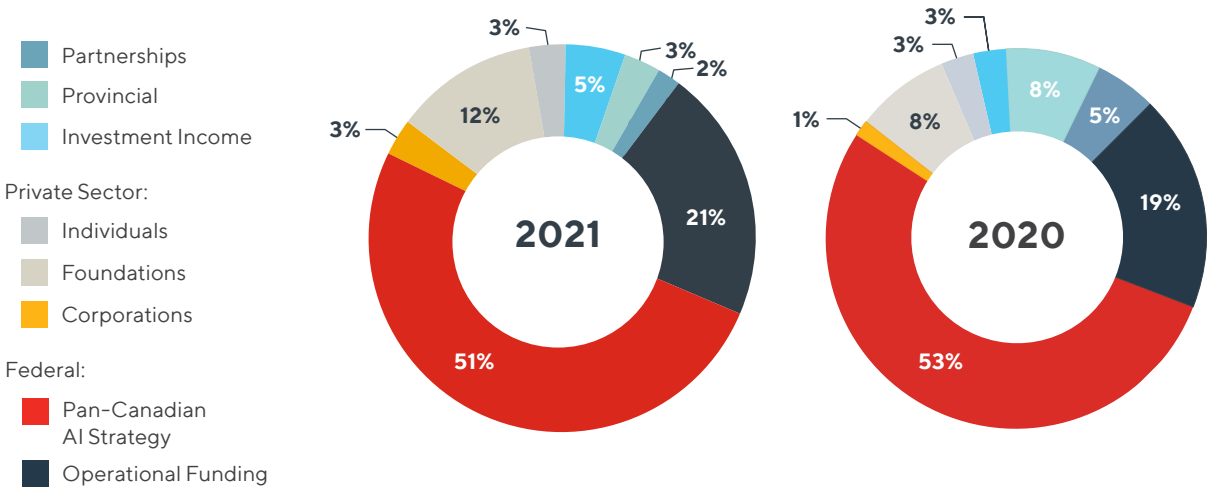
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Financial Overview, & Appendices

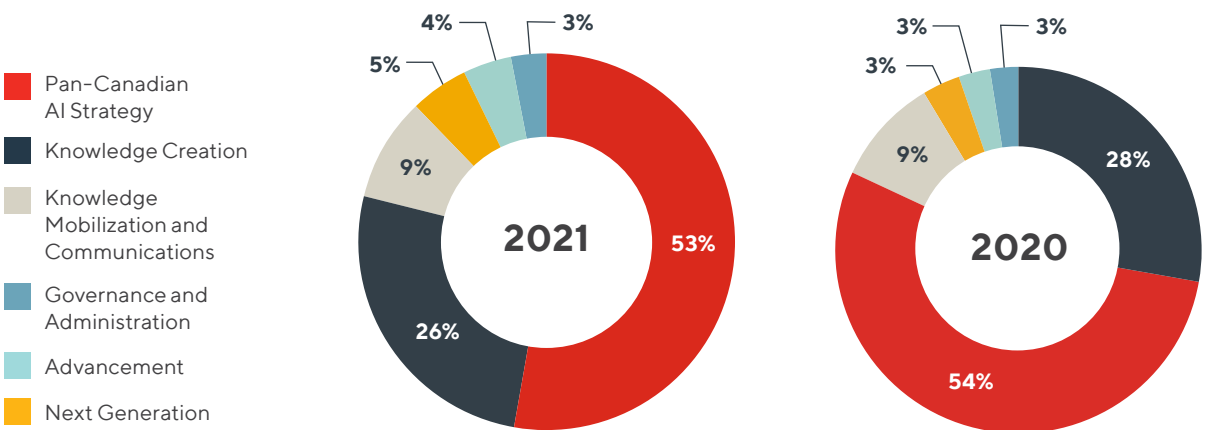


FINANCIAL OVERVIEW

Revenue



Expenses



STATEMENT OF OPERATIONS

Year ended March 31, 2021

Revenue	2021 (000s)	2020 (000s)
GOVERNMENT FUNDING		
Federal		
Operational funding	6,500	7,550
Pan-Canadian AI Strategy	15,721	21,792
Provincial	1,000	3,362
	23,221	32,704
PARTNERSHIPS		
Research organizations	456	2,079
Universities and others	—	2
	456	2,081
PRIVATE SECTOR		
Corporations	890	562
Foundations	3,747	3,283
Individuals	1,003	1,067
	5,640	4,912
Investment income	1,434	1,132
	30,751	40,829
Expenses		
PROGRAM EXPENSES		
Knowledge creation	8,021	11,409
Pan-Canadian AI Strategy	16,030	22,117
Knowledge mobilization and communications	2,646	3,769
Next generation	1,616	1,381
	28,313	38,676
NON-PROGRAM EXPENSES		
	2,046	2,125
	30,359	40,801
Excess (deficiency) of revenue over expenses	392	28
Unrealized gain (loss) on investments	3,995	(1,416)
(DEFICIENCY) SURPLUS OF REVENUE OVER EXPENSES	4,387	(1,388)

STATEMENT OF FINANCIAL POSITION

Year ended March 31, 2021

Assets	2021 (000S)	2020 (000S)
CURRENT ASSETS		
Cash	19,656	9,226
Accounts receivable	1,959	6,850
Prepaid expenses	371	320
	21,986	16,396
Investments	24,498	19,099
Property, equipment, and leasehold improvements	1,134	1,273
Intangible assets	376	502
	47,994	37,270

Liabilities

Accounts payable and accrued liabilities	14,249	9,978
Deferred revenue	6,212	5,844
Deferred tenant allowance	40	40
	20,501	15,862
Deferred revenue	3,499	1,771
Deferred tenant allowance	210	240
	24,210	17,873

Net Assets

Invested in property, equipment, leasehold improvements, and intangible assets	1,260	1,495
Externally restricted endowment fund	500	500
Internally restricted reserve	11,000	10,000
Unrestricted	11,024	7,402
	23,784	19,397
	47,994	37,270

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OSMAR ZAÏANE

(University of Alberta)
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RICHARD ZEMEL

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SANDRA ZILLES

(University of Regina)
Aii

SELECTED AWARDS & HONOURS RECEIVED

In 2020/2021, CIFAR Fellows, Advisors, CIFAR Azrieli Global Scholars and Canada CIFAR AI Chairs received 91 major awards and honours.

AWARDS

3M NON-TENURED FACULTY AWARD (USA)

Kwabena Bediako (University of California, Berkeley) *Quantum Materials and CIFAR Azrieli Global Scholar*

ACS AWARD IN THEORETICAL CHEMISTRY (AMERICAN CHEMICAL SOCIETY, USA)

Sharon Hammes-Schiffer (Yale University) *Bio-inspired Solar Energy*

AI 2000 TOP 10 MOST INFLUENTIAL SCHOLARS – INFORMATION RETRIEVAL AND RECOMMENDATION 2021 (AMINER, CHINA)

Jian Tang (HEC Montréal and Mila) *Canada CIFAR AI Chair*

AI 2000 TOP 10 MOST INFLUENTIAL SCHOLARS – MACHINE LEARNING 2021 (AMINER, CHINA)

Jimmy Ba (University of Toronto and Vector Institute) *Canada CIFAR AI Chair*

Yoshua Bengio (Université de Montréal and Mila) *Learning in Machines & Brains and Canada CIFAR AI Chair*

AI 2000 TOP 10 MOST INFLUENTIAL SCHOLARS – NATURAL LANGUAGE PROCESSING 2021 (AMINER, CHINA)

Yoshua Bengio (Université de Montréal and Mila) *Learning in Machines & Brains and Canada CIFAR AI Chair*

Kyunghyun Cho (New York University) *Learning in Machines & Brains and CIFAR Azrieli Global Scholar Alumnus*

Christopher Manning (Stanford University) *Learning in Machines & Brains*

AI 2000 TOP 10 MOST INFLUENTIAL SCHOLARS – ROBOTICS 2021 (AMINER, CHINA)

Pieter Abbeel (University of California, Berkeley) *Learning in Machines & Brains*

AI 2000 TOP 10 MOST INFLUENTIAL SCHOLARS – SECURITY AND PRIVACY 2021 (AMINER, CHINA)

Nicolas Papernot (University of Toronto and Vector Institute) *Canada CIFAR AI Chair*

AI 2000 MOST INFLUENTIAL SCHOLARS 2021 – TOP 100 IN 3 OR MORE FIELDS (AMINER, CHINA)

Pieter Abbeel (University of California, Berkeley) *Learning in Machines & Brains*

Yoshua Bengio (Université de Montréal and Mila) *Learning in Machines & Brains and Canada CIFAR AI Chair*

Aaron Courville (Université de Montréal and Mila) *Learning in Machines & Brains and Canada CIFAR AI Chair*

AI'S 10 TO WATCH (IEEE INTELLIGENT SYSTEMS, USA)

Martha White (University of Alberta and Amii) *Canada CIFAR AI Chair*

AI INNOVATION AWARD – NATURAL LANGUAGE PROCESSING/UNDERSTANDING (VENTUREBEAT, USA)

Siva Reddy (McGill University and Mila) *Facebook CIFAR AI Chair*

ALEXANDER VON HUMBOLDT RESEARCH AWARD (ALEXANDER VON HUMBOLDT FOUNDATION, GERMANY)

Christopher Chang (University of California, Berkeley) *Bio-inspired Solar Energy*

Angela Schoellig (University of Toronto and Vector Institute) *Canada CIFAR AI Chair*

ALFRED P. SLOAN RESEARCH FELLOW (ALFRED P. SLOAN FOUNDATION, USA)

Roger Grosse (University of Toronto and Vector Institute) *Canada CIFAR AI Chair*

Haotian Wang (Rice University) *Bio-inspired Solar Energy and CIFAR Azrieli Global Scholar*

ALLEN DISTINGUISHED INVESTIGATOR (PAUL G. ALLEN FRONTIERS GROUP, ALLEN INSTITUTE, USA)

Carolina Tropini (University of British Columbia) *Humans & the Microbiome and CIFAR Azrieli Global Scholar*

AMAZON FACULTY RESEARCH AWARD (USA)

Jian Tang (HEC Montréal and Mila) *Canada CIFAR AI Chair*

AMAZON MACHINE LEARNING RESEARCH AWARD (USA)

Gennady Pekhimenko (University of Toronto and Vector Institute) *Canada CIFAR AI Chair*

AMGEN YOUNG INVESTIGATOR AWARD (USA)

Jean-Philippe Julien (The Hospital for Sick Children) *Humans & the Microbiome and CIFAR Azrieli Global Scholar*

BAKERIAN MEDAL AND LECTURE (ROYAL SOCIETY, UNITED KINGDOM)

Victoria Kaspi (McGill University) *Gravity & the Extreme Universe*

CANADA EXCELLENCE RESEARCH CHAIR (GOVERNMENT OF CANADA)

Irina Rish (Université de Montréal and Mila) *Canada CIFAR AI Chair*

**CANADA RESEARCH CHAIR
(GOVERNMENT OF CANADA)**

Daniel Ansari (Western University)
Child & Brain Development

Hae-Young Kee (University of Toronto)
Quantum Materials

Mark Schmidt (University of British Columbia and Amii)
Canada CIFAR AI Chair

Robert Zatorre (McGill University)
Brain, Mind & Consciousness

**CANADA'S MOST POWERFUL
WOMEN: TOP 100 AWARD
(WXN - WOMEN'S EXECUTIVE
NETWORK, CANADA)**

Meghan Azad (University of Manitoba)
Humans & the Microbiome

Lisa Saksida (Western University)
Brain, Mind & Consciousness

**CANADA'S TOP 40 UNDER
40 (CALDWELL PARTNERS,
CANADA)**

Stephanie Simmons (Simon Fraser University)
Quantum Information Science

**CAP/DCMMP BROCKHOUSE
MEDAL (CANADIAN
ASSOCIATION OF PHYSICISTS)**

Alexandre Blais (Université de Sherbrooke)
Quantum Information Science

**DANIEL M. WEGNER
THEORETICAL INNOVATION
PRIZE (SOCIETY FOR
PERSONALITY AND SOCIAL
PSYCHOLOGY, USA)**

Stephen Reicher (University of St. Andrews)
Boundaries, Membership & Belonging

**DISTINGUISHED AFRICANIST
AWARD (AFRICAN STUDIES
ASSOCIATION, USA)**

Frederick Cooper (New York University)
Boundaries, Membership & Belonging

**EARLY CAREER PUBLIC
ACHIEVEMENT MEDAL
(NATIONAL AERONAUTICS AND
SPACE ADMINISTRATION, USA)**

Vlada Stamenković (Blue Origin)
Earth 4D: Subsurface Science & Exploration

**EATCS DISTINGUISHED
ACHIEVEMENTS AWARD
(EUROPEAN ASSOCIATION
FOR THEORETICAL COMPUTER
SCIENCE)**

Toniann Pitassi (University of Toronto and Vector Institute)
Canada CIFAR AI Chair

**FACEBOOK AI SYSTEM
HARDWARE/SOFTWARE
CO-DESIGN RESEARCH
AWARD (USA)**

Gennady Pekhimenko (University of Toronto and Vector Institute)
Canada CIFAR AI Chair

**FACULTY EARLY CAREER
DEVELOPMENT (CAREER)
AWARD (NATIONAL SCIENCE
FOUNDATION, USA)**

Allyson Mackey (University of Pennsylvania)
Child & Brain Development and CIFAR Azrieli Global Scholar

**FLAVELLE MEDAL (ROYAL
SOCIETY OF CANADA)**

Marla Sokolowski (University of Toronto)
Child & Brain Development

**GALILEO GALILEI MEDAL
(NATIONAL INSTITUTE FOR
NUCLEAR PHYSICS, ITALY)**

Frans Pretorius (Princeton University)
Gravity & the Extreme Universe

**GERMAN AI INNOVATION PRIZE
(WELT, GERMANY)**

Bernhard Schölkopf (Max Planck Institute for Intelligent Systems)
Learning in Machines & Brains

**GIUSEPPE AND VANNA
COCCONI PRIZE FOR
PARTICLE ASTROPHYSICS
AND COSMOLOGY (EUROPEAN
PHYSICAL SOCIETY)**

J. Richard Bond (University of Toronto)
Gravity & the Extreme Universe

**GOOGLE FACULTY RESEARCH
AWARD (USA)**

Guillaume Lajoie (Université de Montréal and Mila)
Canada CIFAR AI Chair

**GOVERNOR GENERAL'S
INNOVATION AWARD
(GOVERNOR GENERAL
OF CANADA)**

Matt Dobbs (McGill University)
Gravity & the Extreme Universe

Mark Halpern (University of British Columbia)
Gravity & the Extreme Universe

Victoria Kaspi (McGill University)
Gravity & the Extreme Universe

Ue-Li Pen (University of Toronto)
Gravity & the Extreme Universe

Ingrid Stairs (University of British Columbia)
Gravity & the Extreme Universe

The CIFAR program members shared this award with other members of the Canadian Hydrogen Intensity Mapping Experiment (CHIME)

**HARVEY B. RICHER GOLD MEDAL
FOR EARLY CAREER RESEARCH
IN ASTRONOMY (CANADIAN
ASTRONOMICAL SOCIETY)**

Renée Hložek (University of Toronto)
Gravity & the Extreme Universe and CIFAR Azrieli Global Scholar

**INTEL RISING STAR FACULTY
AWARD (USA)**

Chelsea Finn (Stanford University)
Learning in Machines & Brains

**JAMES MCKEEN CATTELL FELLOW
AWARD (ASSOCIATION FOR
PSYCHOLOGICAL SCIENCE, USA)**

Megan Gunnar (University of Minnesota)
Child & Brain Development

**JOE DOUPE YOUNG
INVESTIGATOR AWARD
(CANADIAN SOCIETY FOR
CLINICAL INVESTIGATION)**

Meghan Azad (University of Manitoba)
Humans & the Microbiome

**JOSEPH F. KEITHLEY
AWARD FOR ADVANCES
IN MEASUREMENT SCIENCE
(AMERICAN PHYSICAL SOCIETY)**

Irfan Siddiqi (University of California, Berkeley)
Quantum Information Science

LIFETIME CONTRIBUTION AWARD (AUSTRALASIAN COGNITIVE NEUROSCIENCE SOCIETY)

Jason Mattingley (University of Queensland) *Brain, Mind & Consciousness*

LISE MEITNER DISTINGUISHED LECTURE AND MEDAL (ROYAL SWEDISH ACADEMY OF SCIENCES)

Pablo Jarillo-Herrero (Massachusetts Institute of Technology) *Quantum Materials*

LISTER INSTITUTE RESEARCH PRIZE (LISTER INSTITUTE OF PREVENTIVE MEDICINE, UNITED KINGDOM)

Tomás Ryan (Trinity College Dublin) *Child & Brain Development and CIFAR Azrieli Global Scholar*

MARION MILLIGAN MASON AWARD FOR WOMEN IN THE CHEMICAL SCIENCES (AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE)

Gabriela Schlau-Cohen (Massachusetts Institute of Technology) *Bio-inspired Solar Energy and CIFAR Azrieli Global Scholar Alumna*

MEDAL OF THE SPANISH ROYAL PHYSICS SOCIETY

Pablo Jarillo-Herrero (Massachusetts Institute of Technology) *Quantum Materials*

MICHAEL FARADAY GOLD MEDAL FOR EXPERIMENTAL PHYSICS (INSTITUTE OF PHYSICS, UNITED KINGDOM)

Richard Ellis (University College London) *Gravity & the Extreme Universe*

NAS AWARD FOR SCIENTIFIC DISCOVERY (NATIONAL ACADEMY OF SCIENCES, USA)

Pablo Jarillo-Herrero (Massachusetts Institute of Technology) *Quantum Materials*

OUTSTANDING MID-CAREER INVESTIGATOR AWARD (INTERNATIONAL MILK GENOMICS CONSORTIUM)

Meghan Azad (University of Manitoba) *Humans & the Microbiome*

PACKARD FELLOWSHIP FOR SCIENCE AND ENGINEERING (PACKARD FOUNDATION, USA)

Haotian Wang (Rice University) *Bio-inspired Solar Energy and CIFAR Azrieli Global Scholar*

PORTER MEDAL (EUROPEAN PHOTOCHEMISTRY ASSOCIATION, INTER-AMERICAN PHOTOCHEMISTRY SOCIETY, AND ASIAN AND OCEANIAN PHOTOCHEMISTRY ASSOCIATION)

Vivian Wing-Wah Yam (University of Hong Kong) *Bio-inspired Solar Energy*

PRIX DU QUÉBEC – PRIX ARMAND-FRAPPIER (GOVERNMENT OF QUEBEC, CANADA)

Isabelle Peretz (Université de Montréal) *Brain, Mind & Consciousness*

SAMSUNG AI RESEARCHER OF THE YEAR (SOUTH KOREA)

Kyunghyun Cho (New York University) *Learning in Machines & Brains and CIFAR Azrieli Global Scholar Alumnus*

Chelsea Finn (Stanford University) *Learning in Machines & Brains*

SARAH GUND PRIZE FOR RESEARCH AND MENTORSHIP IN CHILD MENTAL HEALTH (CHILD MIND INSTITUTE, USA)

W. Thomas Boyce (University of California, San Francisco) *Child & Brain Development*

SIR FREDERICK BARTLETT LECTURE PRIZE (EXPERIMENTAL PSYCHOLOGICAL SOCIETY, UNITED KINGDOM)

Melvyn Goodale (Western University) *Brain, Mind & Consciousness*

TENCENT AI LAB RHINO-BIRD FOCUSED RESEARCH AWARD (CHINA)

Jian Tang (HEC Montréal and Mila) *Canada CIFAR AI Chair*

W. H. & W. L. BRAGG PRIZE (INTERNATIONAL UNION OF CRYSTALLOGRAPHY)

Jean-Philippe Julien (The Hospital for Sick Children) *Humans & the Microbiome and CIFAR Azrieli Global Scholar*

WILLARD GIBBS MEDAL (AMERICAN CHEMICAL SOCIETY)

Sharon Hammes-Schiffer (Yale University) *Bio-inspired Solar Energy*

WILLET G. MILLER MEDAL (ROYAL SOCIETY OF CANADA)

Barbara Sherwood Lollar (University of Toronto) *Earth 4D: Subsurface Science & Exploration*

WILLIAM JAMES FELLOW AWARD (ASSOCIATION FOR PSYCHOLOGICAL SCIENCE, USA)

Nancy Kanwisher (Massachusetts Institute of Technology) *Brain, Mind & Consciousness*

YOUNG INVESTIGATOR MEDAL (SOCIETY OF ENGINEERING SCIENCE)

Ximin He (University of California, Los Angeles) *Bio-inspired Solar Energy and CIFAR Azrieli Global Scholar*

HONOURS

CORRESPONDING FELLOW OF THE BRITISH ACADEMY

Charles Nelson (Harvard University)
Child & Brain Development

FELLOW OF THE AMERICAN ACADEMY OF MICROBIOLOGY

David Denning (University of Manchester)
Fungal Kingdom: Threats & Opportunities

FELLOW OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

Leah Cowen (University of Toronto)
Fungal Kingdom: Threats & Opportunities

Catherine Drennan (Massachusetts Institute of Technology)
Bio-inspired Solar Energy

Karen Guillemin (University of Oregon)
Humans & the Microbiome

Jason Stajich (University of California, Riverside)
Fungal Kingdom: Threats & Opportunities

FELLOW OF THE AMERICAN ASTRONOMICAL SOCIETY

Victoria Kaspi (McGill University)
Gravity & the Extreme Universe

FELLOW OF THE ASSOCIATION FOR THE ADVANCEMENT OF ARTIFICIAL INTELLIGENCE (USA)

Michael Bowling (University of Alberta and Amii)
Canada CIFAR AI Chair

FELLOW OF THE ASSOCIATION FOR COMPUTING MACHINERY (USA)

Kevin Leyton-Brown (University of British Columbia and Amii)
Canada CIFAR AI Chair

FELLOW OF THE CANADIAN ACADEMY OF HEALTH SCIENCES

Lisa Saksida (Western University)
Brain, Mind & Consciousness

FELLOW OF THE COGNITIVE SCIENCE SOCIETY (USA)

Daniel Dennett (Tufts University)
Brain, Mind & Consciousness

FELLOW OF THE MYCOLOGICAL SOCIETY OF AMERICA

Jason Stajich (University of California, Riverside)
Fungal Kingdom: Threats & Opportunities

FELLOW OF THE ROYAL SOCIETY OF CANADA

Mark Halpern (University of British Columbia)
Gravity & the Extreme Universe

Lisa Saksida (Western University)
Brain, Mind & Consciousness

INTERNATIONAL MEMBER OF THE NATIONAL ACADEMY OF ENGINEERING (USA)

Barbara Sherwood Lollar (University of Toronto)
Earth 4D: Subsurface Science & Exploration

INTERNATIONAL MEMBER OF THE NATIONAL ACADEMY OF MEDICINE (USA)

Elisabeth Binder (Max Planck Institute of Psychiatry)
Child & Brain Development

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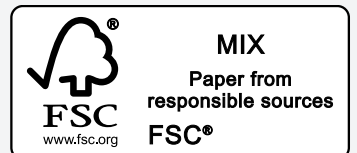
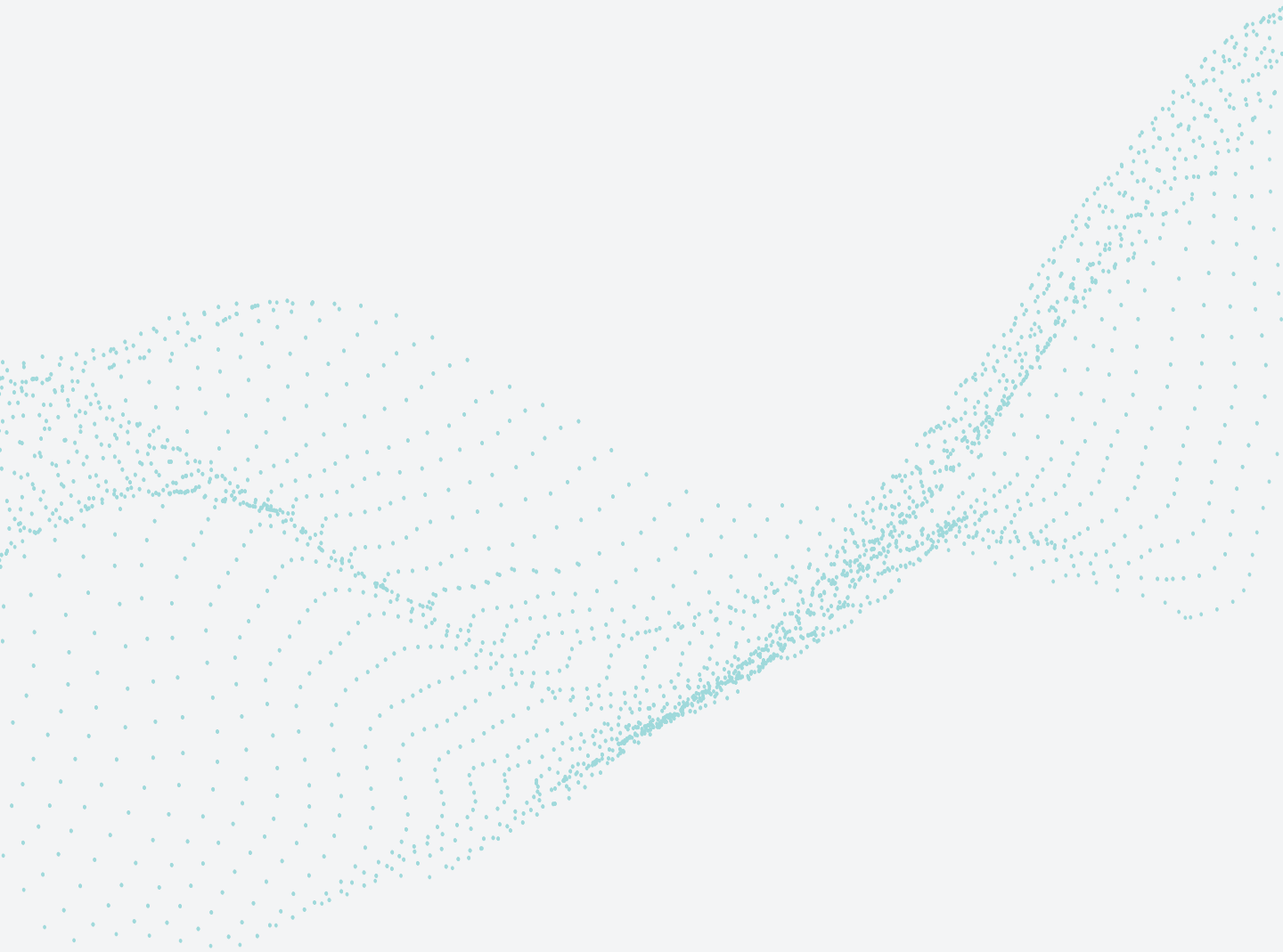
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CIFAR is a Canadian-based global research organization that convenes extraordinary minds to address the most important questions facing science and humanity. We are supported by the governments of Canada, Alberta and Quebec, as well as foundations, individuals, corporations and Canadian and international partner organizations.

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