PERIMETER INSTITUTE FOR THEORETICAL PHYSICS

EXECUTIVE BRIEF

CHIEF ADVANCEMENT OFFICER

PERIMETER INSTITUTE FOR THEORETICAL PHYSICS

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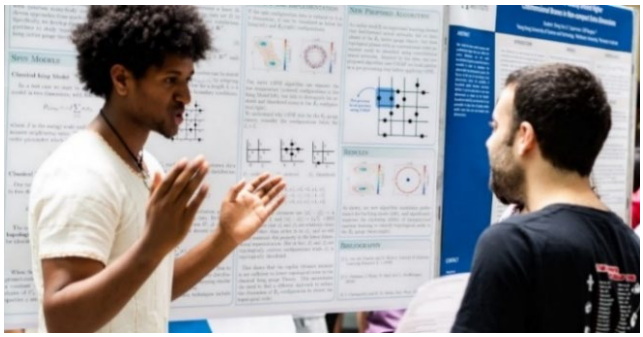
KCI

PERIMETER INSTITUTE FOR THEORETICAL PHYSICS

Chief Advancement Officer

THE OPPORTUNITY



The Chief Advancement Officer (CAO) will lead Perimeter's advancement effort in the strategic development and execution of Perimeter's ambitious advancement mandate. This position will report to the Managing Director and Chief Operating Officer and will be responsible for developing, leading and implementing bespoke, ambitious, sustainable, long-term private funding strategies with the goal of diversifying the Perimeter donor base, and building ongoing donor engagement and commitment to the Institute.

In addition to an external focus with donors and prospective funders, the Chief Advancement Officer will act as a trusted advisor and partner to the Board, Perimeter's Director, and the Managing Director and Chief Operating Officer, deepening internal coordination and capacity to deliver at the highest levels. The CAO will have a direct impact on Perimeter and ultimately on Canada's ability to advance diversity in the sciences and bring together the world's most brilliant minds to achieve scientific breakthroughs that will change the world.

FOR MORE INFORMATION

Perimeter Institute is working with KCI Search + Talent to recruit candidates for this important position. For more information about this opportunity, please contact Tara George, Partner / Lead, Search + Talent by email at: PICAO@kcitalent.com.

Interested candidates are invited to submit their resume and letter of interest prior to **January 9, 2024,** to the email address listed above. All inquiries will be held in strict confidence.

This is a permanent position open to all Canadian citizens, permanent residents and those legally able to work in Canada. Other individuals may be considered, per immigration laws, and such candidates should include their status when applying for the position.

Perimeter Institute is committed to diversity within its community and especially welcomes applications from racialized persons, women, Indigenous/Aboriginal People of North America, persons with disabilities, LGBTQ2S+ persons, and others who may contribute to the further diversification of ideas.

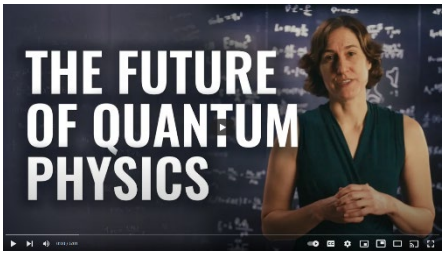
Accommodations are available on request for candidates taking part in all aspects of the selection process. If you require any accommodations, please notify the Search Consultant.

Compensation: The salary range for this position is $250,000 - $300,000 CAD. A comprehensive suite of benefits is also provided, including a pension match up to 7.5%.

ABOUT PERIMETER INSTITUTE FOR THEORETICAL PHYSICS

Founded in 1999, Perimeter Institute began as a bold idea to strategically invest in foundational physics, which is at the root of new technologies and new scientific knowledge. The vision was radical, yet simple: build an environment to foster breakthroughs that will transform our future, while sharing the power of science with the world.

[Step into the Perimeter]



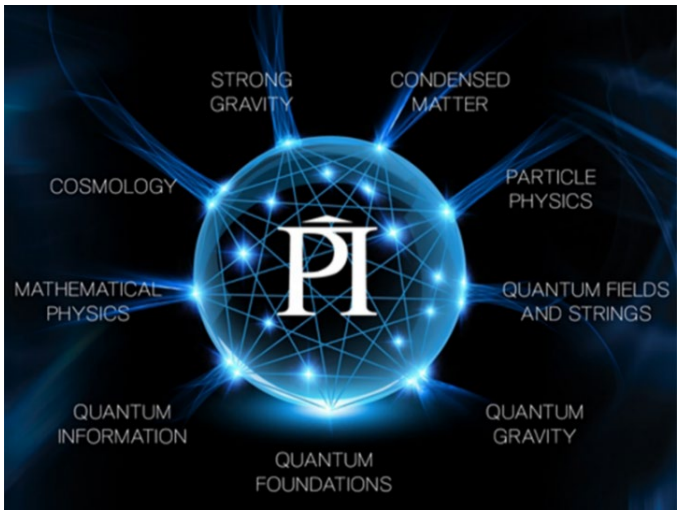
[Quantum 101 Episode 10: The Quantum Future]

[2022: A Brilliant Year at Perimeter Institute]

Perimeter Institute has quickly become a major international success story: an innovative, world-leading centre of research, training, and outreach in one of the lowest-cost, highest-impact areas of science − fundamental physics. Through visionary public and private support, sustained focus, and careful strategy, Perimeter Institute is now ranked among the top theoretical physics institutes in the world.

Perimeter Institute attracts an exceptional and diverse community of resident and visiting scientists from around the globe. Driven by curiosity, they forge new ideas about space, time, matter, and the ultimate nature of our universe, seeking to unlock its most profound secrets.

Perimeter Institute aims to set a global example in its research, training, and outreach excellence and foster an environment and culture unlike any other, providing fertile ground for cutting-edge research and breakthrough discoveries.



Perimeter is not a place for “business as usual” – they have a burning desire to discover, to recognize clearly when conventional approaches are failing, and to open and explore promising new avenues. They constantly challenge themselves to be agile, entrepreneurial, and interdisciplinary, and to look beyond narrow, overspecialized concerns towards the big picture. Over 160 resident researchers and more than 1,000 visiting scientists a year work to unlock nature’s most profound secrets hidden deep inside the atom and far across the universe. At Perimeter Institute, bold ideas flourish. It’s a culture that thrives on collaboration, bringing together great minds to achieve breakthroughs that will transform our future.

ADDITIONAL INFORMATION

- Perimeter Institute
- Who We Are
- Perimeter Institute Funding
- Annual Reports & Audits
- Donate to the Perimeter Institute
- People at the Perimeter Institute
- Governance
- Events
- News
- Perimeter Institute on YouTube
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EQUITY, DIVERSITY, AND INCLUSION AT PERIMETER INSTITUTE

Achieving Perimeter Institute's mission requires the members of its community to create a culture of curiosity, collaboration, and innovation, with the courage to tackle exceptionally difficult challenges. Equity, Diversity and Inclusion (EDI), which includes accessibility, are integral to creating and sustaining such a culture. Yet imbalances persist, both in physics generally and here at Perimeter. Diversity declines along the academic career path in many STEM fields; the decline is especially pronounced in physics.

Through Perimeter Institute's inaugural Strategic EDI Plan, we affirm our commitment to the principles of equity, diversity, and inclusion. Building on the solid foundations we have already established, the Plan sets out tangible strategic objectives, core EDI activities, and specific measures to gauge our progress.

At Perimeter Institute, we aim to empower a community in which everyone can contribute fully to our work and culture, to our scientific advances, and to the future of physics by making EDI a shared commitment and responsibility.

Overarching EDI Goals

- Build a culture where everyone can contribute fully to Perimeter Institute's mission.
- Promote shared responsibility for EDI across the whole Perimeter Institute community.
- Support the development of a diverse pipeline of future physicists.
- Set an example that inspires change within the broader physics community.

By making these goals a priority, Perimeter will be able to attract and retain outstanding researchers, students, and staff from a wide range of backgrounds. In this effort, as in our research, we aim to be a leader and to inspire change in the wider international physics community.

For more information visit: Strategic Plan for Equity, Diversity and Inclusion.

ADVANCEMENT AT PERIMETER INSTITUTE

Perimeter is supported through a public-private partnership – which unites federal and provincial governments, individuals, corporations, and foundations in a shared venture to enable scientific breakthroughs, nurture scientific talent, and share scientific discovery with the broader public.

The impact of philanthropy at Perimeter is valued and appreciated by the internal and external community alike. An ever-growing group of public and private supporters has helped make Perimeter Institute what it is today: an independent, world-leading centre for fundamental research, scientific training, and educational outreach.

The Advancement team of fundraising professionals plays a vital role in supporting Perimeter by promoting its research agenda to visionary donors who want to support transformative global research. The department's approach is that of a bespoke boutique, focusing on customized interactions with a select group of prospective donors to form deep, long-lasting relationships, in order to secure ongoing significant philanthropic support.

Our philanthropic priority is to bring the world's brightest minds to Perimeter and fast-track promising new areas of discovery. We need to be bolder in our efforts to attract and retain top talent. To help, our founding donor has committed $30M in matching funds for senior and early-career Chairs and key initiatives. Ongoing philanthropic priorities include EDI initiatives and our award-winning educational outreach programs.

In 2022, Perimeter Institute celebrated the most successful fundraising year in its history, with over $26M in new donations and pledges.

THE IDEAL CANDIDATE

The Chief Advancement Officer (CAO) will possess a unique set of skills that include expertise in fundraising, communication, and leadership. The ideal candidate will bring the intellect, energy, curiosity and passion needed to create and lead Perimeter's engagement and advancement functions. The new incumbent will play a key role in the senior leadership of Perimeter and will lend their institutional experience and knowledge of Advancement practices to a collaborative and hands-on team.

With a strong track record in closing transformational-level philanthropic support, the successful candidate will be an advancement expert who has held progressively senior leadership roles within complex multi-stakeholder environments. Known for taking organizations to new levels and leading change and innovation, the CAO will bring experience with comprehensive campaigns, major and transformational gifts and legacy giving, along with a demonstrated record of success growing a donor base and the geographic footprint of donors.

An exceptional and persuasive communicator, the CAO will be able to engage meaningfully across Perimeter's wide network of volunteers and external partners and will develop a reputation as a trusted partner and collaborator. The new incumbent must model inclusive, empathetic, and authentic leadership through which they will inspire a team of committed professionals to be bold and visionary. The CAO will support the advancement team, colleagues, and volunteers through the sharing of knowledge, experience, guidance, and ideas.

The ideal candidate will be a champion of equity, diversity, and inclusion and passionate about developing and supporting healthy and safe workplaces. Most critically, all candidates will share in Perimeter's mission and vision to advance our understanding of the universe at the most fundamental level, stimulating the breakthroughs that will transform our future.

MAJOR RESPONSIBILITIES

The Chief Advancement Officer is the Senior Executive responsible for the Institute's full range of advancement functions, including but not limited to:

- Working collaboratively with the Senior Leadership Team, Leadership Council and Board of Directors to lead the creation and implementation of our advancement strategy.
- Working with stakeholders, partners, volunteers, donors and staff to set, meet, and exceed ambitious fundraising goals.
- Serving as a key ambassador and spokesperson for the organization in articulating our mission to key stakeholders and donors.
- Continue to build the Institute's reputation across Canada and internationally.
- Developing and implementing strategies and tactics to reinforce the engagement with new and existing donors.
- Working with the COO to ensure board members are engaged and energized by their association with the organization and understand the advancement strategy.
- Continue to grow the Institute's senior volunteer structure (Leadership Council) and participate in the identification, recruitment, training and ongoing relationship management of the volunteers.
- Strengthening the culture of philanthropy across the organization and continuing to evolve our advancement strategy.
- Owning responsibility for continuing to build on existing lean, targeted and collegial advancement functions, providing leadership throughout the organization.
- Attracting, leading, retaining, and inspiring a team of highly dedicated, creative professionals.
- Working proactively, openly and productively with members of the senior leadership team.

REQUIRED EXPERIENCE, SKILLS AND QUALITIES

- Exceptional interpersonal and communication skills, with a demonstrated ability to build and nurture relationships.
- A proven track record of transforming high-level institutional priorities into efficient day-to-day objectives.
- Reputation and experience working within a collaborative senior management team.
- Prior success and experience managing and progressing multiple, and sometimes competing priorities within a complex institutional environment.
- Direct experience as a sophisticated and diplomatic lead contact for donors and volunteers.
- A strong track record of raising funds from varied sources, including major and transformational-level donations at the 7- and 8-figure level.
- Extensive leadership experience building motivated collaborative teams, developing governance structures, engaging with Board and key stakeholders, and recruiting top talent.

EXPERIENCE AND EDUCATION:

- Minimum of 10 years of experience in developing and delivering strategic, high-quality, institutional leadership, including being part of an institutional leadership team, and experience leading and coaching a team of advancement professionals.
- Minimum of 10 years of experience leading successful major campaigns and fundraising programs, including major and transformational giving.
- A Bachelor's degree at minimum, or equivalent related work experience plus ongoing professional development that supports and underpins strategic capacity, communication expertise, and advancement knowledge.
- While a degree in Science (especially Physics) would be an asset, it is not required for this role. However, candidates must demonstrate their passion for and interest in science, and how science advances society.

WORK LOCATION AND TRAVEL REQUIREMENTS:

Perimeter Institute for Theoretical Physics is located at 31 Caroline St North, in the heart of Waterloo, Ontario, Canada, approximately one hour southwest of Toronto. The centre is steps away from Waterloo Park and Uptown Waterloo's plentiful restaurants, shops and cafés, as well as a 10-minute walk from the University of Waterloo and Wilfrid Laurier University.

- Staff are currently working within a hybrid model.
- This position has an expectation to be in the office on average three days per week, and/or as required by project responsibilities, with flexibility depending on travel schedule.
    - Travel and off-site interactions are estimated to be 50% of the time, including regional, national, and international travel to meet with donors, partners, and volunteers.
- Travel to see donors is also required. While this will be primarily in the Greater Toronto Area and across Ontario to start, the Chief Advancement Officer will also be building relationships with donors across Canada and internationally.
- A valid driver's license and access to a reliable vehicle is necessary.
- A valid Passport is also required for this role.

BOARD OF DIRECTORS

- Michael Serbinis – Chair
- Jane Kinney – Vice Chair
- Susan Baxter
- Karen Collins
- Gabriela Gonzalez
- Michael Horgan
- Alan Nursall
- Hratch Panossian
- Donna Strickland

LEADERSHIP BIOGRAPHIES

Dr. Robert Myers currently serves as the **Director, and BMO Financial Group Isaac Newton Chair in Theoretical Physics.**

Robert is one of the leading theoretical physicists working in the area of quantum fields and strings. He received his Ph.D. at Princeton University in 1986, after which he was a postdoctoral researcher at what became the Kavli Institute for Theoretical Physics at the University of California, Santa Barbara. He moved to McGill University in 1989, where he was a Professor of Physics until moving to Perimeter Institute and the University of Waterloo in the summer of 2001.

Professor Myers was awarded the Herzberg Medal in 1999 by the Canadian Association of Physicists for seminal contributions to our understanding of black hole microphysics and D-branes. He is also the 2005 winner of Canada's top prize in theoretical and mathematical physics awarded by the Canadian Association of Physicists and the Centre de Recherches Mathématiques. More recently, he was awarded the 2012 Vogt Medal by the Canadian Association of Physicists and TRIUMF for outstanding theoretical contributions to subatomic physics.

In 2006, he was elected a Fellow of the Royal Society of Canada. He is one of the few people to have won the first-place award in the Gravity Research Foundation Essay Contest more than once (winning in 1995 and 1997). Past winners of this contest, which was established for the purpose of stimulating thought and encouraging work on gravitation, include Stephen Hawking and Roger Penrose.

Professor Myers was named as one of only three Canadian physicists on the list of the World's Most Influential Scientific Minds 2014, the Thomson Reuters list of top 1% of researchers who wrote most cited papers in their field over the period 2002 to 2012. In fact, he appeared again as the only Canadian physicist in the next edition of this list, the World's Most Influential Scientific Minds 2015, covering the period 2003 to 2013.

Professor Myers is also an associate fellow of the Cosmology and Gravity Program of the Canadian Institute For Advanced Research, a uniquely Canadian enterprise devoted to networking top-flight researchers from across the country. From 2001 to 2005, he was a founding member on the scientific advisory board of the Banff International Research Station, a facility devoted to hosting workshops and meetings in the mathematical sciences and related areas.

Professor Myers has also served on the editorial boards of the following research journals: Annals of Physics (January 2002 - July 2012) and Journal of High Energy Physics (May 2007 - present). Though his current activities are centered at Perimeter Institute, Professor Myers remains active in both teaching and supervising graduate students with his cross-appointment as an Adjunct Professor in the Physics Department at the University of Waterloo.

Dr. Paul Smith is a leader who works at the intersections of science and economy, of creative discovery and commercialization.

Smith joined Perimeter Institute in the fall of 2021 as the **Managing Director and Chief Operating Officer**, bringing with him a wealth of experience in both scientific research and management. He holds a PhD in chemistry from the University of Bath, as well as an MBA from the Rotman School of Management at the University of Toronto. Smith is also a named inventor on 78 US patents.

As a member of the Xerox Senior Leadership Team and Vice President and Centre Director of Xerox Global Materials Research Centre from 2011 to 2021, he was responsible for the development of devices for IoT, CleanTech and 3D materials.

In partnership with the National Research Council of Canada (NRC), Smith helped create the Canadian Campus for Advanced Materials and Manufacturing, a partnership between government and industry for leading-edge research and development focused on the commercialization of devices for the Internet of Everything and CleanTech.

Smith is the Past Chair of the Chemical Institute of Canada. He was the inaugural Chairman of IntelliFLEX, the Canadian Printed Electronics Industry Association, a former Director of the Board of NGen Canada, and a past Chair of the Conference Board of Canada's Council for Innovation and Commercialization. He sat on the Editorial Advisory Board for the Canadian Science Policy Centre and was on the Dean's Advisory Board for the Southern Alberta Institute of Technology (SAIT). From 2014 to 2018, he served on Canada's Natural Sciences and Engineering Research Council (NSERC) Committee on Research Partnerships.

Tony Lee is the **Strategic Philanthropy Lead.** After receiving his degree in engineering from McGill University, Tony began his working career by building simulation models for particle physics at DESY (Germany). He later returned to Canada and worked at IREQ (Hydro Quebec) on research in nuclear fusion.

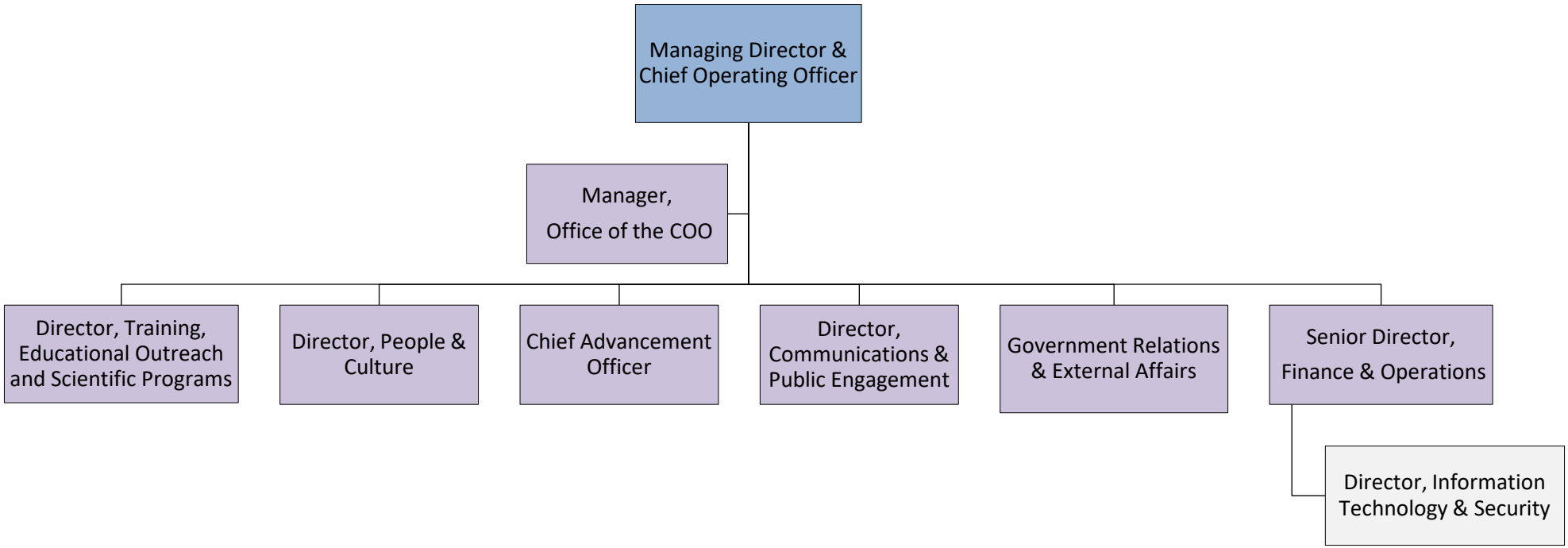
Fascinated by the early use of “Big” Data, Tony entered the field of Marketing and Sales. However, Tony soon realized that fundraising at non-profits is really an expression of marketing and sales. Seeking to have a greater social impact, Tony entered the non-profit sector. He has worked at charities such as World Vision, Habitat for Humanity, and the Canadian Cancer Society in his 15+ years as a fundraiser.

Tony is thrilled to be part of the Perimeter Institute. Never in his wildest dreams did he think he could once again support his first love of theoretical physics and in such a different way!

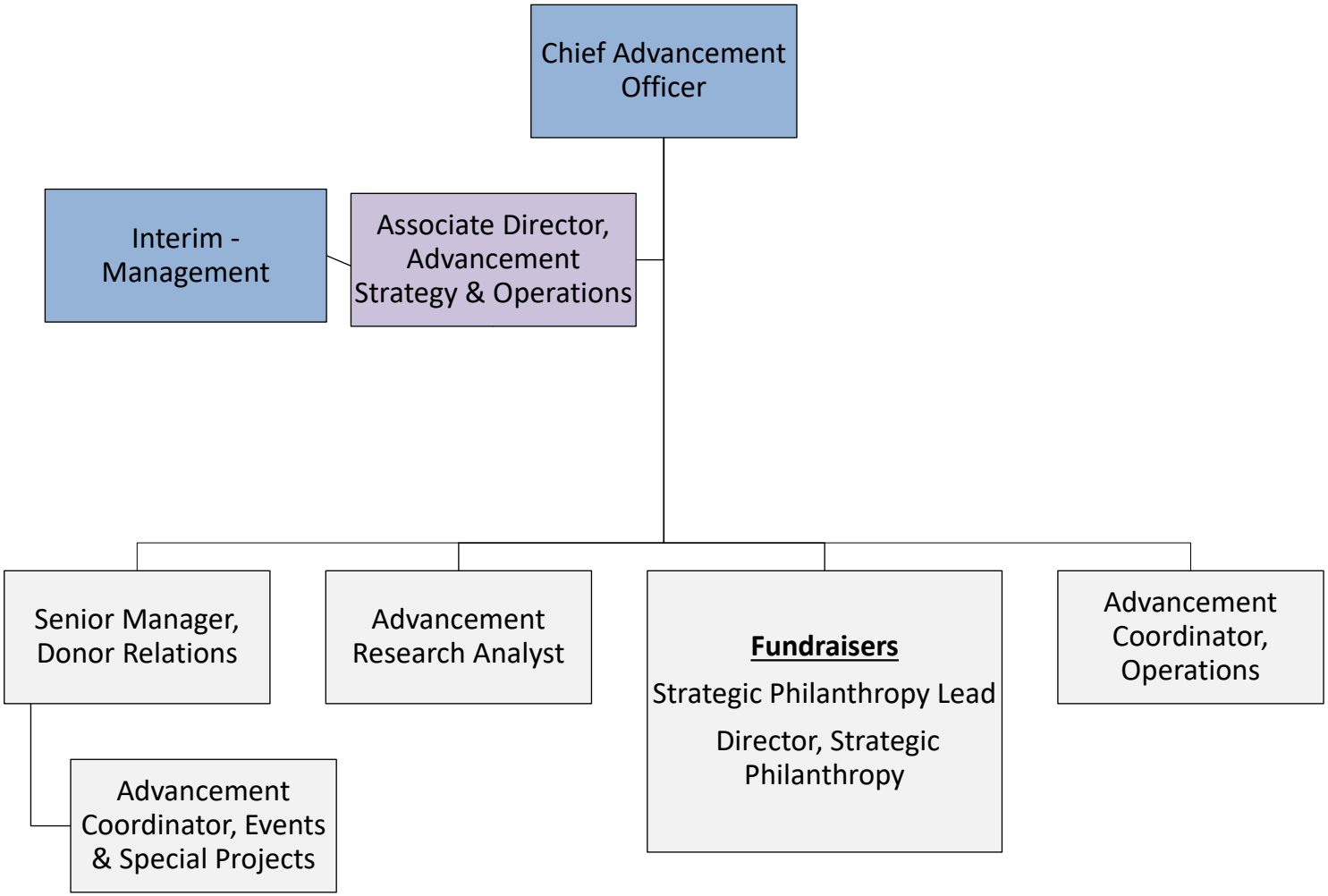
Tania Framst is the **Interim Director, Advancement** at Perimeter Institute. Previously, she led advancement operations providing strategic leadership and tactical direction on Perimeter’s ambitious advancement campaign, and oversaw advancement services, stewardship, annual giving and advancement communications. She also spent a year as the associate director of Perimeter’s academic and research programs and has broad institutional knowledge and expertise.

Before joining Perimeter, she was the Vice-President, Operations and Sales at Lucky Iron Fish, a Canadian social enterprise helping to alleviate iron deficiency worldwide. Tania played a crucial role in the company’s growth from a small start-up to an award-winning B Corporation recognized by Forbes, Oprah, E&Y and many others.

SENIOR LEADERSHIP TEAM ORGANIZATIONAL CHART



ADVANCEMENT TEAM ORGANIZATIONAL CHART

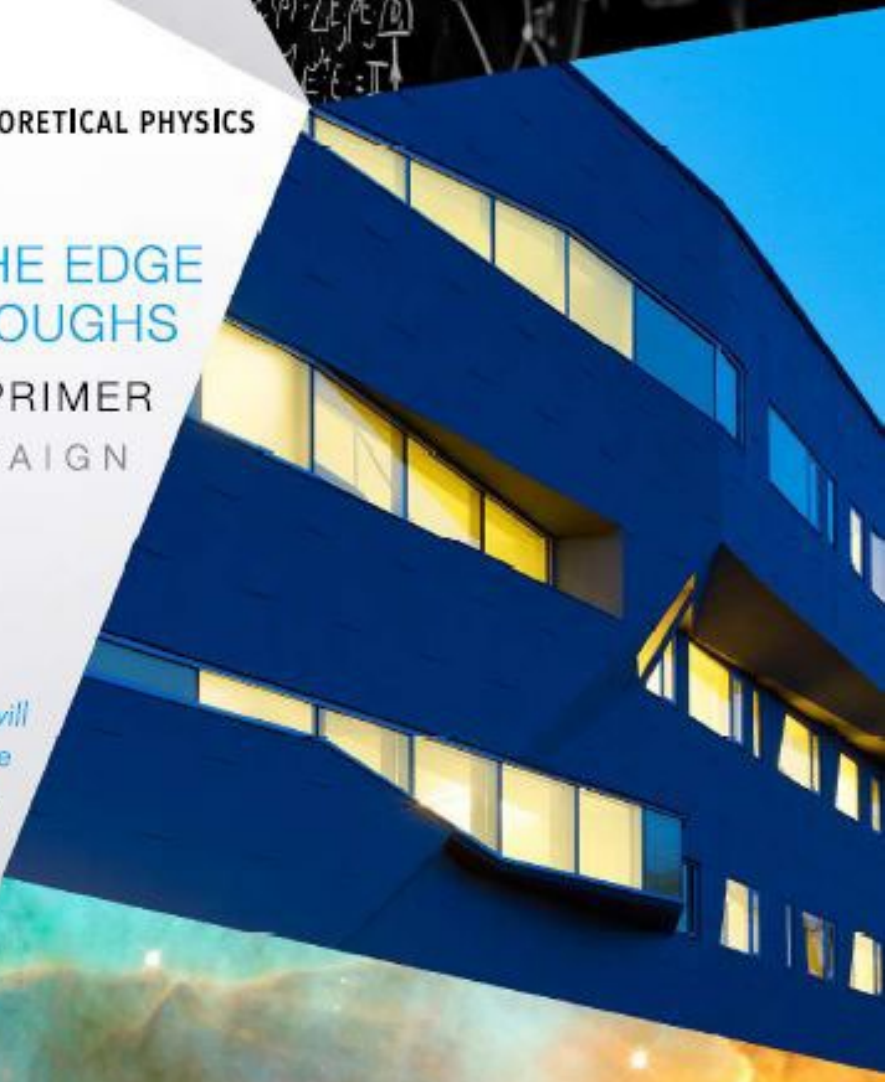


PERIMETER INSTITUTE FOR THEORETICAL PHYSICS

AT THE EDGE OF BREAKTHROUGHS

THE PERIMETER PRIMER

/ CAMPAIGN



"Perimeter is a long-term investment that will pay off exponentially. The work we do here will yield profound results – not only for the future of technology, but for the future of Canada and all of humanity."

– Mike Serbinis,
Chair of Perimeter's Board of Directors

WHAT IS PERIMETER INSTITUTE?

- Perimeter is the world's largest independent centre devoted to theoretical physics research, training, and educational outreach.
- In just 20 years, it has become a Canadian success story in advanced science. Today, it is one of the top fundamental research centres in the world – a peer to Harvard, Stanford, Princeton, and Cambridge.
- Our scientists work to unlock nature's most profound secrets hidden deep inside the atom and far across the universe. They are the audacious risk-takers who aren't daunted by the phrase "It can't be done."
- Perimeter was founded in Waterloo, Ontario, Canada, in 1999 through the personal philanthropy and vision of Mike Lazaridis, inventor of the BlackBerry. Its scientific operations began in 2001.
- Perimeter's vision is to create the world's foremost centre for research, graduate training, and educational outreach in theoretical physics, uniting public and private partners, and the world's best scientific minds, in a shared enterprise to achieve breakthroughs that will transform our future.
- Perimeter has a three-part mandate:

RESEARCH

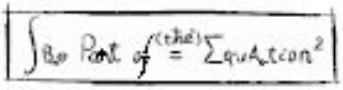
Perimeter researchers – as well as hundreds of associated researchers and scientific visitors each year – work collaboratively at the interfaces of the most promising subfields of physics.

TRAINING

Perimeter training programs produce critical thinkers with widely applicable skill sets. Our master's and PhD graduates have become leaders in diverse areas such as academia, government, and industry – including the high-tech, aerospace, and finance sectors – and, of course, in pure research.

OUTREACH

Perimeter outreach programs and resources engage, inspire, and empower millions of students, teachers, and members of the public with the power, joy, and importance of science.

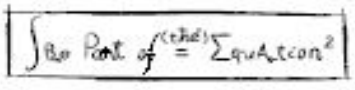


WHY FUNDAMENTAL PHYSICS MATTERS?

- **Today's theoretical physics is tomorrow's technology**. Theoretical physics is an incredibly low-cost, high-impact field. It doesn't require billion-dollar experiments – it runs on brilliance and blackboards. Breakthroughs in theoretical physics drive advances across all of science and technology. A single major discovery can change the world. Quantum mechanics, for example, led directly to computers, lasers, and the near-infinite array of modern electronic devices.
- **"New physics always creates new industry. They go hand in hand."** – Mike Lazaridis.
- Nobel Laureate Leon Lederman estimated that one quarter of all wealth created in the 20th century was created thanks to technologies based on quantum mechanics.

WHAT DO SCIENTISTS AT PERIMETER DO?

- Theoretical physicists uncover what the universe is made of and the forces that govern it.
- To do this, they build "models" – logical frameworks based on what we know so far, plus brainpower, creativity, and mathematics – to "see" further and explain puzzling data, observations, and inconsistencies. Questions that can't be explained with current knowledge are like light coming through a cracked wall: they show where current understanding is weakest and where the possibility of breakthroughs is high.
- Theorists' models are written down in equations (e.g., $E=mc^2$) and tested through experiments and observations. When a model passes all the tests anyone can devise, it becomes a "theory," a new piece of human knowledge about how the universe works, subject to further scrutiny and testing.
- New theories can be applied in nearly infinite ways: to develop new technologies or to, in turn, gain more knowledge. For example:
    - Einstein's **theory of relativity:** Einstein's theory led to a dazzling revolution of the then-current understanding of space and time. From purely theoretical calculations, Einstein developed a theory that overturned our traditional understanding of the universe. The theory of relativity also made possible technologies such as GPS navigation and spurred vast amounts of new scientific knowledge, including predictions of the existence of black holes and the evolution of galaxies.
    - **Quantum mechanics** explains the behaviour and interactions of the world of particles – like atoms electrons, and photons – and now is used in all microelectronic technologies (computers, phones, etc.).



THEORY → EXPERIMENT → APPLICATION → COMMERCIALIZATION:

THE "INNOVATION CHAIN"

- Perimeter is the first link in the innovation chain. The theories developed here are tested by experimentalists. An application for the idea is then developed, and that application is eventually commercialized.
- Fundamental discoveries about nature are the first vital steps to commercialization.

QUICK FACTS

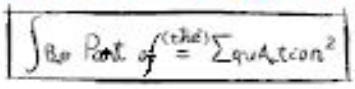
- Who is Perimeter's Director? **Dr. Robert C. Myers.**
    - Robert Myers is an internationally renowned theoretical physicist who has been named one of the "world's most influential scientists" many times. He is also one of Perimeter's founding faculty members.

      A proud Canadian born in Deep River, Ontario, Myers deliberately built his career in Canada, after completing a PhD at Princeton University and postdoctoral work at the University of California, Santa Barbara. In 2001, he left a tenured position at McGill University to join Perimeter because he saw it as a chance to "do something special, for Canada, and for the world."

      He researches new approaches to quantum field theory – the framework of ideas and equations we use to understand matter and energy. He holds the BMO Financial Group Isaac Newton Chair in Theoretical Physics.

- **How large is Perimeter's research community?** Perimeter's research community includes more than 125 resident researchers (faculty and postdoctoral researchers) and approximately 90 graduate students.[1] Nearly 1,000 additional researchers from around the world visit every year.

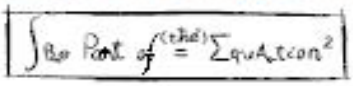
[1] As of July 31, 2021: 25 faculty, 21 associate faculty, 44 Distinguished Visiting Research Chairs, 52 Visiting Fellows, 7 Perimeter Scholars International Teaching Fellows, 79 postdoctoral researchers, 50 associate postdoctoral researchers, and 96 graduate students.



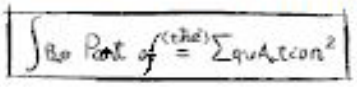
- **Is Perimeter part of a university?** No, Perimeter is a fully independent research institute. However, it does partner with many universities and research institutions across Canada and around the world.
- **How is Perimeter governed?** Perimeter Institute is an independent, not-for-profit corporation governed by a volunteer Board of Directors drawn from the private sector and academic community. A Scientific Advisory Committee made up of eminent international scientists provides third-party, independent reviews, and reports to the Board on the Institute's scientific progress. Regular independent financial and peer-reviewed scientific audits provide accountability to the Institute's funders and stakeholders.
- **How is Perimeter funded?** Perimeter's funding model unites public and private partners.
    - The Government of Canada and the Province of Ontario contribute to Perimeter's annual operating budget.
    - The Institute is also supported by an ever-growing group of private sector donors.

INCLUSION, DIVERSITY, EQUITY, AND ACCESSIBILITY (IDEA) AT PERIMETER

- Recognizing that imbalances persist, both in physics and in workplaces in general, the Institute is currently developing its inaugural inclusion, diversity, equity, and accessibility (IDEA) strategy in partnership with Shift Health and the Laurier Centre for Women in Science.
    - The aim is to lay out a vision of IDEA goals that will act as a roadmap toward making Perimeter a place where all can thrive in a welcoming, supportive environment. This strategy will build on and complement other ongoing efforts further described below.
    - The IDEA project is led by the IDEA strategy project team, which includes representation from Perimeter faculty, staff, postdocs, and graduate students.
    - The IDEA strategy project team is supported by Shift Health and the Laurier Centre for Women in Science, both leaders in this field with experience in bringing IDEA to life in research-intensive organizations.
    - All members of the Perimeter community will have opportunities to provide input.
- Perimeter aims to be a leader and to effect concerted, positive change in physics. We are focused on making breakthroughs in the culture of research.

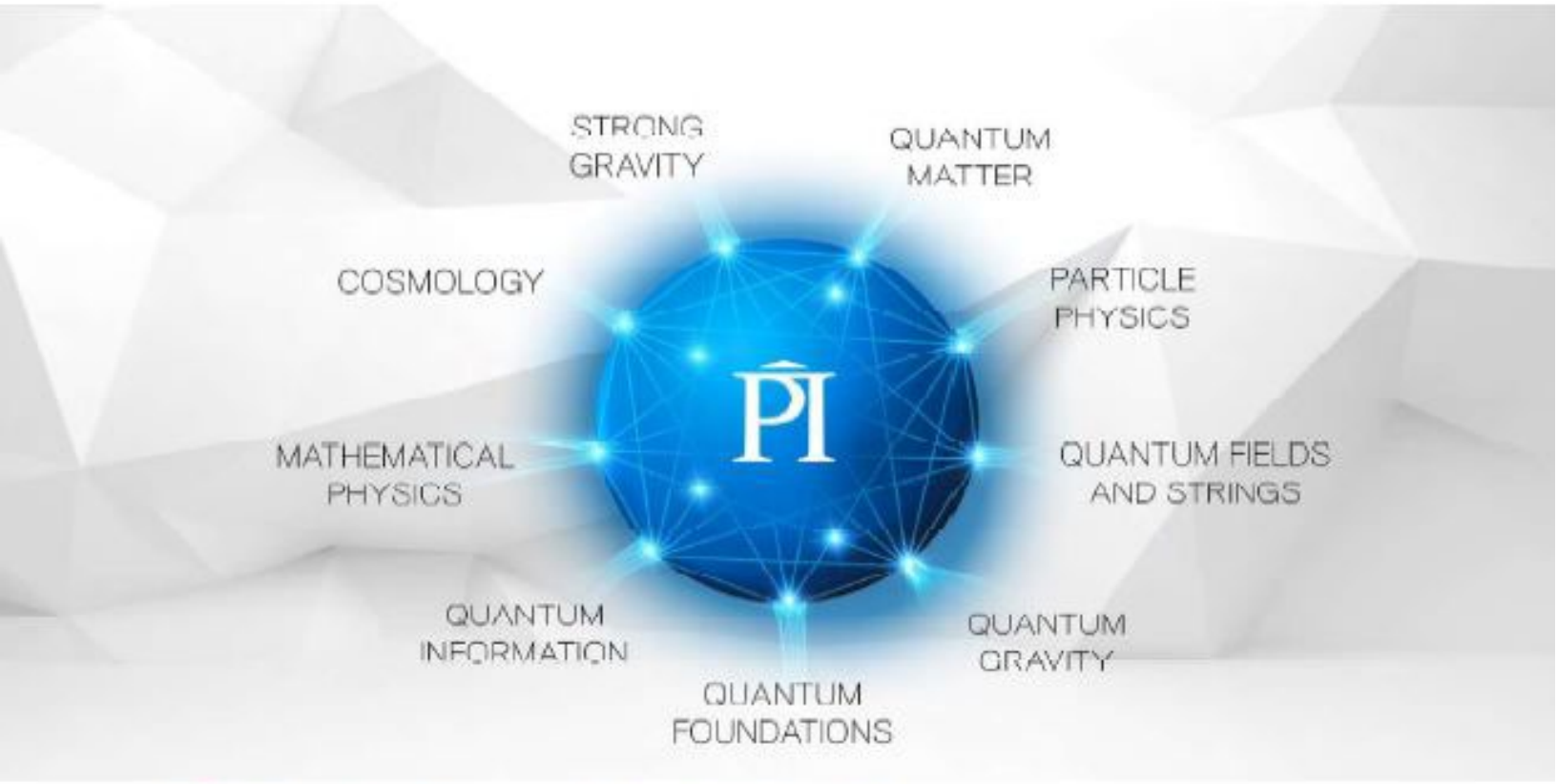


- Making scientific breakthroughs that define the future will take all the world's talent. This field has been historically dominated by men, with barriers to entry for under-represented groups. Aware of these obstacles, we have developed initiatives to spur progress, including:
    - **Emmy Noether Initiatives**, Named after Emmy Noether, the influential German mathematician whose work underpins much of modern physics, these initiatives support women at every stage of their careers, from high school students through to senior scientists.
    - **Simons Emmy Noether Fellowships**. This program supports and encourages early- and mid-career women in physics. These fellowships enable visiting scientists to spend up to a year at Perimeter. Flexibility is a key feature of the program and one that helps mitigate barriers faced by women pursuing careers in physics. Perimeter works with fellows to tailor their stays, which may include providing teaching buyouts from their home institutions and arranging for nearby accommodation and childcare.
    - **Outreach initiatives**. Perimeter's outreach mandate is to share the power and joy of physics with the public and to enhance science literacy and engagement. The International Summer School for Young Physicists has brought high school students from around the world to Perimeter for nearly two decades. Our teacher training programs have engaged teachers from as far away as China, Japan, Rwanda, and Turkey. Every high school physics curriculum in Canada has been impacted by Perimeter scientists through our outreach channels. We continually adapt our programs and resources for better engagement, particularly in remote and underserved areas of Canada. We teach other physics institutions how to adapt our outreach model to reach the next generation in their home countries. We are creating a sophisticated global physics talent pipeline for a better tomorrow.
    - **The Inclusive PI Platform**. The platform was created in 2018 as a grassroots, volunteer-led effort whose mission is to identify ways in which life at Perimeter can be more inclusive, diverse, equitable, and accessible for all. The platform has approximately 60 members, drawn from every level of the organization (staff, students, faculty), who engage in honest discussions and drive change and growth in a meaningful way.



RESEARCH: OVERVIEW AND SCOPE

There are nine research fields at Perimeter, which span the breadth of modern theoretical physics:

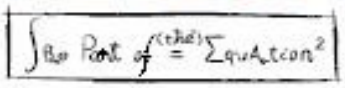


From the quantum (the very small, the sub-atomic world) ...

- The quantum world is not intuitive. (Einstein called it "spooky.") and it is extremely powerful. Our understanding of it is deep, but there's so much more to learn. Quantum mechanics governs how all computing technologies and microelectronics work.
- Understanding and harnessing quantum properties is leading to the next generation of transformational technologies, from medical sensors to new materials to quantum computers.
- Quantum systems explore multiple possibilities simultaneously; this presents promising avenues for powerful new technologies.

...to the cosmos (the very large, the whole universe).

- Exploring the grandest questions ranging from the origins of the universe to dark matter and dark energy, to black holes and how they work.



- Advanced experiments (e.g., telescopes) enrich modern cosmology with a plethora of high-quality astronomical data sets. With effective scientific inquiry and analysis, these data can reveal new and unexpected phenomena.
- It is long understood that the universe itself presents a unique opportunity to understand new physics on the smallest scales from observations on the largest scales

RESEARCH: QUANTUM FOCUS

- **Perimeter saw the potential of quantum science and technology very early.** We jump-started the Quantum Valley, a vibrant, fast-growing ecosystem that spans theory to commercialization in the burgeoning field of quantum science. We've given Canada a leading position in the high-stakes race for quantum tech dominance. Many Perimeter researchers are involved in new quantum enterprises in Canada and the US, at Google's X -The Moonshot Factory the Amazon Quantum Solutions Lab, Xanadu, and others.
- **How high are the stakes?** A "quantum goldrush" is now on. Quantum supremacy (proof that a quantum computer can be better than a classical computer) was achieved in 2019, validating the incredible power of quantum computing. Governments and private investors around the world are pouring billions into quantum research and technology.
- **Many expect quantum computing to be transformative.**[2] The National Research Council of Canada has cited forecasts that the country's quantum tech industry could generate $8.2 billion and 16,000 jobs by 2030, rising to $142 billion and 229,000 jobs by 2040.
- **Global demand for quantum expertise already outstrips supply, and competition is rising fast.** Perimeter produces the extremely rare talent Canada needs to be competitive in this area.
- **There's much more to quantum science and technology than quantum computing.** Other exciting avenues of research include extremely powerful new materials (quantum matter) and, potentially, new sources of energy. Perimeter scientists are exploring every aspect of quantum science.

RESEARCH: COSMOLOGY FOCUS

- What is the universe made of? How did it begin? Will it ever end? **In recent decades, a flood of astronomical data has led cosmologists to a strikingly simple picture of the universe.** Big gaps remain between what we see and what we know. Perimeter researchers expand what we know about the universe by developing new theories and by collaborating on international experiments involving the most powerful astronomical observation instruments in existence.

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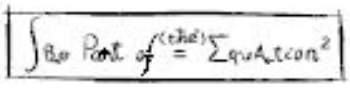
[1] Source: https://policyoptions.irpp.org/magazines/august-2021/how-to-ensure-canadas-quantum-computing-strategy-is-a-success

- The cosmology group at Perimeter works on developing new theoretical ideas and mathematical models to address the universe's most fundamental questions, and on developing new ways to test these ideas observationally and experimentally.
- Perimeter scientists are connected to some of the most important experiments of our time, including:
    - The Laser Interferometer Gravitational-Wave Observatory (LIGO), operated by Caltech and MIT (https://www.ligo.caltech.edu)
    - The Canadian Hydrogen Intensity Mapping Experiment (CHIME), operated by the National Research Council of Canada (https://chime-experiment.ca/en)
    - SNOLAB, Canada's deep underground research laboratory, located near Sudbury, Ontario (https://www.snolab.ca)
    - The Event Horizon Telescope (EHT), an international collaboration capturing images of black holes (https://eventhorizontelescope.org)

RESEARCH: WHERE PERIMETER IS HEADED

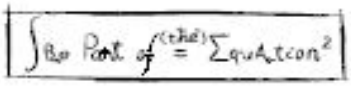
- We're making several focused pushes in areas ripe for breakthroughs: Quantum science. Particle physics that can be done without accelerators. Braiding machine intelligence with quantum computing to uncover new states of matter. Multi-pronged explorations of the limits of gravity, driving for unification beyond Einstein. Understanding our amazing universe.
    - **Quantum AI:** The Perimeter Institute Quantum Intelligence Lab (P|Qu|L) is the first artificial intelligence (AI) lab spun out of a physics institute. It is a unique research and training hub that combines AI with quantum science to develop next-generation algorithms and to design near-term quantum devices for research and industry.
    - **Quantum materials: The Clay Riddell Centre for Quantum Matter** aims to investigate and uncover powerful new states of matter with potential uses in research, manufacturing, and business.
    - **Quantum simulation:** This exciting avenue of research involves the simulation of complex quantum systems that are impossible to model even with supercomputers. Capitalizing on hybrid systems combining both conventional and quantum computers, quantum simulation is expected to start delivering major innovations in drug discovery, chemistry, eco-friendly fertilizers, advanced materials, and more in the coming years.
    - **Quantum Causal Inference Initiative:** Perimeter scientists have pioneered this new field and lead it globally. Causal inference develops new ways to understand cause and effect in the quantum realm. This work is crucial to future quantum computing but could also be game-changing for data science and related applications (finance, medicine, epidemiology, risk modelling, climate science, AI).



- **The Centre for the Universe** gathers Perimeter's strengths in cosmology, astrophysics, gravity, and simulation. Researchers in this group collaborate with experimental partners worldwide in seeking to understand the universe's grandest mysteries, including:
    - **Gravitational waves:** Advanced instruments such as LIGO have opened a new window on the universe. Perimeter's experts in advanced computational modelling are collaborating with theorists to advance our understanding of extreme gravity and are driving widely applicable innovations in computing and mathematics.
    - **Fast radio bursts:** Working with partners at the CHIME radio telescope and the Dominion Radio Astrophysical Observatory, Perimeter researchers are pioneering a new type of "software telescope" capable of solving the mystery of fast radio bursts and are developing pioneering algorithms with many potential applications in big-data mining.
    - **Black holes:** The EHT Initiative at Perimeter is the analytical brain behind the instrument's retina. We are developing advanced simulations to produce not only static pictures but "black hole movies," powering discoveries about how black holes form and how they drive large structures such as galaxies.

TRAINING: OVERVIEW

- **Perimeter is training a new breed of brilliant scientific talent.** Our training programs range from our undergraduate enrichment program through to graduate programs (master's, PhD) and a world-leading postdoctoral program.
- **More than 1,000 young scientists from over 60 countries have trained at Perimeter to date.**
- **Perimeter training is different. We turn brilliant students into the next generation of scientific stars.** Students learn to improvise, to collaborate, and to reach beyond what they "know" to solve hard problems. Our graduates are now industry leaders, company founders, and rising-star researchers at places like MIT, Princeton, Caltech, and Cambridge.
    - **Postdoctoral fellows:** Perimeter has one of the largest and most competitive postdoctoral researcher programs in theoretical physics worldwide. Postdoctoral training (obtained after completing a PhD, in preparation for an academic career) is often the most scientifically productive stage of a researcher's career. Perimeter uniquely offers postdocs total research freedom – they pursue their own research, rather than being a junior research employee for a faculty member. Alumni stay connected to Perimeter, becoming collaborators and part of our global network.



- **PhD students:** Perimeter trains approximately 65-70 PhD candidates at any given time. Supervised by a faculty member located at Perimeter, graduates receive their degree from the partnering university where their supervisor has a cross-appointment. PhD students at Perimeter are supported by the Perimeter Residency Doctoral Award.
- **Perimeter Scholars International (master's level; 25 students per year):** One of the most sought-after physics graduate programs in the world, PSI is a unique, year-long master's-level theoretical physics bootcamp. Students are given problems to solve collaboratively, and together they learn, explore, and grow. Approximately 30 percent stay at Perimeter for PhD training; others pursue PhD studies at other institutions or begin careers in industry.
    - The program is nearly gender balanced, and we actively recruit candidates from low- and middle-income countries. Students accepted into PSI are awarded a scholarship that covers costs such as tuition, meals, and accommodation, among other necessities.

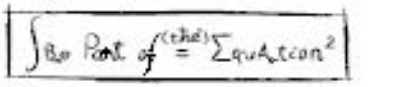
TRAINING: WHERE WE ARE HEADED

We're growing our programs to increase capacity and build the critical mass we need for making breakthroughs. Over the next five years we plan to:

- Grow the PhD program to 85 PhD students by 2025.
- Expand our resources and support for graduates who wish to pursue non-academic careers through the Career Trajectories program.
- Launch and expand the new PSI— Students' Training Accelerator for Research in Theory (PSI START) and PSI START Bridge programs for undergraduate students and others who intend to apply to a physics graduate program. Exceptional students will be selected for internships.

OUTREACH: OVERVIEW

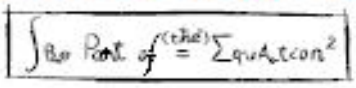
- **Educational outreach is core to Perimeter's mission because we're future focused in everything we do.** We reach out to students, teachers, and curious minds everywhere. With our authentic approach, we are moving the needle on public understanding of the value of basic research, the joy of discovery, and the enduring power of ideas.
- **Our award-winning educational resources** for students and teachers have been used over 80 million times in 125 countries.
- Every **high school physics curriculum in Canada** has been impacted by Perimeter scientists through our outreach channels.



- We create and nurture a **talent pipeline** by attracting and retaining exceptional students early in their academic path.
- Perimeter's **award-winning Outreach** team brings physics to life and boosts scientific literacy with:
    - Teacher training workshops that train approximately 3,500 teachers each year (both in-person and online).
    - Annual intensive **EinsteinPlus teacher training camps**, delivered to 40 educators from Canada and abroad.
    - The gender-balanced **International Summer School for Young Physicists**, which each year trains high school students from around the world who intend to pursue physics at the university level.
    - Annual **"Inspiring Future Women in Science"** conferences, which draw 200 high school students to Perimeter, and more via livestream, connecting them with successful women at various stages of their careers.
    - **Collaborations** with educators and students in Canadian Indigenous communities, with a focus on northern Ontario.
    - **Continual adaptation** of our programs and resources for better engagement, particularly in remote and underserved areas of Canada.
    - A **strategic science communication and social media plan** that educates, engages, and inspires all audiences, especially youth. Our content attracts millions of views each year, anywhere there is access to internet.

OUTREACH: WHERE WE ARE HEADED

- Perimeter's Outreach team is structured to be nimble and to engage with the best current resources. Whatever the challenges are – adapting new knowledge, leveraging new communication platforms, or pivoting delivery models to accommodate a once-in-a-century pandemic – our team has what it takes to continue to serve its audiences. Upcoming programs include:
    - **Student programming: Go Physics!**
        - Provides an enrichment opportunity for high school students that provides a deep dive into modern physics concepts.
        - Aims for engagement with underserved groups (including areas with poor internet access), through in-person camps in each Canadian province and territory.
        - Includes an online version of the program for students around the world.



- **Teacher programming: Online professional development courses for teachers (pilot)**
  - Provide high school teachers the opportunity to expand their understanding of modern physics concepts and to create safe learning spaces that inspire and educate students, for the world of tomorrow.
  - Illustrate ways teachers can bring this new understanding into their classroom.
- **General public programming**
  - Pilots the transition of public live lectures to a pre-recorded format that can be distributed through the Perimeter YouTube and podcast channels.
  - Encompasses festivals with hands-on science exhibits, as well as tours, lectures, and other events celebrating theoretical physics.

THANK YOU FOR BEING PART OF THE EQUATION

"I've known the Institute from the very beginning, and I saw it grow up very quickly, with a fantastic reputation. Many of my colleagues don't consider themselves really up-to-date if they haven't visited this Institute many times."

– Gerard 't Hooft, 1999 Nobel Laureate and Perimeter Distinguished Visiting Research Chair

"Since graduating, I've had a very exciting career, first as a government scientist at National Defence, and now as a data scientist. Perimeter's unique ethos and atmosphere allowed me to build foundational skills that are crucial to success in the real world."

– Ross Diener, Data Scientist, Shopify (PSI 2010; PhD 2016)

"Sitting at my computer in Bangalore, I opened a portal to Perimeter that changed my life."

– Vasudev Shyam (PSI 2015 and PhD 2020 with Perimeter; current postdoctoral fellow at Stanford University)

"If we can make more teachers feel like this, and they can share that feeling with their students, it can be contagious and help change education."

– Ana Serio, Escola Vera Cruz, São Paulo, Brazil, EinsteinPlus 2018 participant