

AN INTRODUCTION TO PHYSICS COMMUNITY LEADERS IN CANADA: MINI-PROFILES / UNE INTRODUCTION AUX LEADERS DE LA COMMUNAUTÉ PHYSIQUE AU CANADA : MINI-PROFILS

Leaders in our community provide their answers to the simple question: “Why does the physics community in Canada need to be inclusive in order to be excellent?” We hope that you find their answers inspiring, and as you read the issue, will be able to form your own response in turn. Together, we can build a stronger community for future generations of physicists in Canada.

Des leaders de notre communauté répondent à une question simple : “Pourquoi la communauté des physicien(ne)s au Canada doit-elle être inclusive pour être excellente ?”. Nous espérons que leurs réponses vous inspireront et qu’en lisant ce numéro, vous serez en mesure de formuler votre propre réponse à votre tour. Ensemble, nous pouvons bâtir une communauté plus forte pour les futures générations de physicien(ne)s au Canada.



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Hilding Neilson (he/him) is an interdisciplinary scientist, whose research focuses on stellar astrophysics and on the intersection of science, astronomy and Indigenous knowledge. He is Mi'kmaq and a member

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Why does the physics community in Canada need to be inclusive in order to be excellent?

Mi'kmaw Elders Albert and Murdena Marshall brought the concept of Two-Eyed Seeing to western science. Two-Eyed Seeing is the practice of understanding phenomena through one lens of western science and one lens of Indigenous understanding. When put together, we gain a deeper understanding of phenomena than if we use western science alone or use Indigenous ways of knowing alone. When we are not inclusive then we simply end up exploring physics through just one lens. Because Physics in Canada is not inclusive we lose the benefit the experiences, ideas, and knowledges of the people excluded and it has always been this way. If physics was historically inclusive, can you imagine the discoveries and contributions that would have been made by Black physicists or by Indigenous physicists? Can you imagine what we, as a community, would have learned from Black and Indigenous Physicists? But, physics is not inclusive and never was. We need to be inclusive because inclusion is excellence.



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Lebohang Moleko is a Lesotho diplomat. Among the many positions he has held throughout his career, he has served as Lesotho's Ambassador to the United States and as Permanent Representative to the United Nations in New York. He served as President of the UNICEF Executive Board at the international level in 2004.

Why does the physics community in Canada need to be inclusive in order to be excellent?

Diversity and inclusivity are key in achieving excellence as this enables an exchange of new ideas. About fifty years ago, it was rare to have female physics students let alone professors, now women represent 20% of the tertiary level physicists.

Following the brutal and racist murder of George Floyd in the US, the Black Lives Matter movement has ignited action for change on a global level. Currently, many institutions are taking a tokenistic approach by hiring black person's in high profile and visible positions in order to be perceived as diverse and inclusive. Although the physics community is not in the average person's scope, it is imperative to have black representation.

A good start would be training primary and secondary educators to motivate black students to study the sciences. Good teaching can attract more black post-secondary

physics students. The physics community must make a concerted effort to create more meaningful and diverse spaces for black people and other people of colour in order to achieve excellence.



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Lindsay LeBlanc is an experimental atomic physicist working with ultra-cold atoms and quantum technologies at the University of Alberta, situated in Treaty 6 territory. She is also a mom, a sister, a partner, and a

daughter; she is queer; and she embraces all of her identities with joy.

Why does the physics community in Canada need to be inclusive in order to be excellent?

Inclusivity is not a means to an end. Whether people bring different opinions, skills, and experiences to our community is not the point; whether we get “better physics” because we are diverse is not a righteous motivation. The physics community should be inclusive because we value the humanity of the people who are keen to learn and practice physics. In our quest for understanding the principles governing our physical world, let us not forget the individuals on this journey; let us welcome all who seek to join us with open arms. Though physics may exist outside of our humanity, we can only approach it through a human lens, a lens that is uniquely shaped by each of our histories. Whether someone pursues physics for its sheer beauty or for its potential to enable new technologies, whether the systems we have set up mean they earn D’s or A+’s or Nobel prizes: it is not for us to stand in anyone’s way. The physics community should be inclusive for the same reason every human community should be inclusive — because it is the path towards justice.



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Lisa Cole is the Director of Programming — K2I Academy, Lassonde School of Engineering at York University. She is a passionate

educator and system leader, committed to equity, diversity and inclusion in STEM. Lisa is an award-winning physics and mathematics teacher with diverse experiences including President of the Ontario Association of Physics Teachers, Science & Technology Program Facilitator for Durham District School Board, and Education Officer at the Ontario Ministry of Education.

Why does the physics community in Canada need to be inclusive in order to be excellent?

If physics is a field of study that provides unlimited opportunities to explore, discover and ultimately create solutions to societal challenges, then inclusivity in the physics community is a critical component for its success. Inclusion goes beyond inviting those who are under-represented in our field. Rather, it requires constructing a new space — a creative space that respects diverse perspectives, values unique ways of knowing and makes room for individuals with unusual skill sets. Creating inclusive solutions for humanity requires a physics community that believes there is strength and unity to be found in diversity.

Diversity matters but does not happen by chance. Anyone who knows me will tell you that I love teaching physics. It is my true passion. What people may not know however, is that I came to physics by chance — as an outsider. We must no longer rely on chance. We must foster environments in which under-represented students thrive in physics. Inclusive curriculum-based STEM programming can provide that kind of open-ended environment.



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Marie D'Iorio is a Senior Strategy Advisor at the University of Ottawa. Dr. D'Iorio is a Past-President of the Canadian Association of Physicists and served as President of the Academy of Science of the Royal Society of Canada. She leads NanoCanada, a not-for-profit network in advanced materials and nanotechnology.

Why does the physics community in Canada need to be inclusive in order to be excellent?

With the challenges facing our planet, can we afford not to rise to a new standard of excellence which is inclusive? I feel a sense of urgency (and the despair of not getting there fast enough) to embrace different if not disruptive approaches, to seek understanding of other knowledge systems (like those of our Indigenous people), to collaborate across disciplines/Faculties/Institutions, to train the next generation of physicists to help save the planet, and to drive for more immediate impact of our work. While this is not necessarily practical for all research endeavours, we have much to learn from our Arts, Humanities and Social Sciences colleagues who are adept at crossing disciplinary boundaries and effecting change in society-take, for example, ethical and legal considerations of artificial intelligence. I believe that the richness that stems from inclusion can only raise the bar of excellence. ‘TOUTES les mains à la pâte’ as we say in french!



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Mubdi Rahman is a Research Associate at the Dunlap Institute for Astronomy and Astrophysics at the University of Toronto. His research interests span a wide range of data-

intensive astronomy from understanding the formation of stars to the structure of matter on cosmic scales. He is an advocate for the community engagement with science, through astronomy.

Why does the physics community in Canada need to be inclusive in order to be excellent?

Growing up as a kid of immigrant parents in Northwest Toronto in the 1990s, we had a set of Golden Book Encyclopedias that had been passed on to us. One of the volumes contained an entry on race which broke all of humanity up into the “scientific” categorizations of “Caucasoid, Mongoloid, and Negroid”. I had internalized this racist and wildly inaccurate concept for much longer than I’m willing to admit, long before I learned of the history of scientific racism and the horrors of eugenics. Advocates of this theory crossed scientific disciplines, including many celebrated physicists.

Physics, at its best, can improve our understanding of the universe and better the human condition. At its worst, however, physics can provide scientific cover for some of the most damaging notions in humanity. Historically, we’ve seen both.

We need an inclusive Canadian Physics community as to quickly identify when we’re chasing these false flags, and to make sure we’re building a body of knowledge that is open and accessible to all of our diverse communities throughout Canada.



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Dr. Nadia Octave is a clinical medical physicist in radiation oncology.

Her current challenge is to build from blueprints to full operation, a new cancer centre that values each individual (patients and healthcare professionals). Her interest also involves IGRT, adaptive RT, radiation protection and new clinical tools for brachytherapy.

Why does the physics community in Canada need to be inclusive in order to be excellent?

Physics is the field of science that understands, models and explains nature in all its subtle ways. The questions that physics tackle are universal and require a multi-angle collective effort in order to be successfully answered. Canada is a country with rich and diverse pool of scientists. As Dr. Shohini Ghose once said “the next Marie Curie might be among us” and we do not want to miss that opportunity. In order to maximize the possibility in finding that next extraordinary individual, the Canadian physics community needs to actively create a safe, encouraging space, invite all individuals of all race, gender, origin, sexual orientation, religion, physical status to contribute to the scientific conversation where innovative expressions are welcomed, valued and respected. But inviting is just the start. We need to be more assertive in the support we provide to retain and encourage all our scientists. It is not a question of “either/or” — to solve the complex questions at hand we need a *diversity of excellence*, and that can only be achieved by tapping into all our resources, not just those that fit our perceptions. Only by combining multiple perspectives are we likely to both understand the multi-variate problems we face and find the optimal solutions to them.



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Renée Hložek is an Assistant Professor in the David A. Dunlap Department of Astronomy and Astrophysics, and the Dunlap Institute at the University of Toronto.

Her research focuses on understanding what the Universe is made of, its structure and how it is changing with time. Originally from South Africa, Hložek is grateful and proud to be living and working in Canada.

Why does the physics community in Canada need to be inclusive in order to be excellent?

One of the greatest drivers in my life is the belief that physics can help us understand the natural world quantitatively. Another is that the right to ask, and answer, questions about the nature of the cosmos belongs to all people. In order to ensure that right for all Canadians, we need to build a physics community that looks like Canada. I believe that the Canadian physics community needs to be inclusive *because all people deserve the chance to be physicists* if that is their dream. We should not only push for inclusivity in pursuit of excellence, we should push for it as a foundation of equity — then excellence will follow. We need a community that truly supports and empowers all people to unravel the mysteries of the Universe. We must create a

community that takes into account the needs and perspectives of those within it. If we can do this, we will become more flexible in our thinking, more open to new ideas and better able to solve fundamental problems in physics.



RYAN COLE

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Ryan Cole is a legally blind graduate student and Vanier Scholar studying under the supervision of Dr. Aaron Slepke in the Department of Physics and Astronomy at Trent University. His research involves both theoretical and experimental work in the field of nonlinear optical microscopy.

Why does the physics community in Canada need to be inclusive in order to be excellent?

As a legally blind student pursuing a doctoral degree in materials science, I have had to overcome many unique and interesting challenges. I have learned that teamwork, an openness to accommodate others, and a willingness to try creative and unconventional solutions are critical in overcoming the greatest of barriers. My aspirations of studying physics beyond high school would have ended if I failed to find a university open to instructing a legally blind student in physics. Instead, the inclusiveness of the physics department at Trent University, and of the broader physics community in Canada, has helped me follow my passion, excel as an academic, and change people's perceptions of students with disabilities. The physics community in Canada needs to be inclusive, supportive, and creative to ensure that all its members, regardless of their individual backgrounds or circumstances, are able to achieve the highest level of success. This is vital in ensuring a strong and diverse Canadian physics community.



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Dr. Sara Mazrouei is a planetary scientist, educational developer and a science communicator. Sara is passionate about increasing the status of women and minorities in STEM as well as equity, diversity and meaningful inclusion. She is the co-founder of Women in Space Conference and currently works as an Educational Developer in STEM at Ryerson University.

Why does the physics community in Canada need to be inclusive in order to be excellent?

In physics, we want to solve cutting-edge problems, and to do that we need everybody at the table. If we don't provide more access to have everyone at the table, then we might miss the mind that has the solution. It is not enough to encourage young people to go into STEM fields if they cannot see themselves in that environment. Diversity means seeing yourself reflected, being included, and being provided with access to achieve your true full potential. It means having the opportunity to pursue careers beyond the stereotypes of your community. Women and minorities often face many micro-aggressions, death by a thousand cuts. It's a chilly climate in physics for us and the imposter syndrome is real, because we have been told for so long that we don't look like scientists, that we don't belong or we don't fit in. We need to break down barriers and remove stereotypes, starting by identifying and addressing our own implicit bias.



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Why does the physics community in Canada need to be inclusive in order to be excellent?

The scientific research enterprise is both highly challenging and of utmost importance to society. Addressing our problems and puzzles, many of which lie on the borders of traditional research domains, demands the attention of the best minds bearing a diverse range of skills, experience and point of view. Inclusivity is a cornerstone of diversity. Without it we risk staid, conservative thinking, and can miss solutions that could be borne of creativity and thinking outside the box. The research community has a responsibility to the citizens that rely upon us to do our utmost to solve society's challenges using novel science, technologies and ways of thinking. Inclusivity is a key to doing this job properly and hence ensuring a healthy, safe future for all of us.