

CAP High School Teachers Workshop-Western University
Friday, May 31st, 2024

Time	Sessions <i>(All sessions are in PAB 100, except the Parallel Plenary Session)</i>
8:00 -	Registration
8:30	Welcome
8:30-9:30	1) Mark Richardson – McDonald Institute <i>“An Art and Physics Program for your classroom”</i>
8:15-9:00	1) <i>(Parallel Plenary Session)</i> Catherine Neish – Western University <i>“Dragonfly: A Rotorcraft Lander at Titan”</i> <i>(Location: Social Science Centre (SSC) Rm 2050)</i>
9:30-9:40	Break
9:40-10:40	2) Blaire Flynn - SNOLAB <i>“SNOLAB science for educators”</i>
10:40-10:50	Break
10:50-11:50	3) Ania Harlick – University of Toronto <i>“Employing existing online simulations and visualizations in design of formative and summative assessment activities.”</i>
11:50-12:00	Break
12:00-12:30	4) Svetlana Barkanova – Memorial University of Newfoundland and Labrador <i>“Physics for Everyone! “Physics in Rural Classrooms” Pilot Program”</i>
12:30-13:30	Lunch
13:30-14:30	5) Dave Fish and Kelly Foyle – Perimeter Institute <i>“Beyond Bohr: A Quantum Approach to the Atom”</i>
14:30-15:00	6) Sara Cormier – McMaster University <i>“The persistent and nuanced gender gaps in STEM – what do we know and what can we learn?”</i>
15:00-15:10	Break
15:10-16:10	7) Dave Fish and Kelly Foyle – Perimeter Institute <i>“JWST Classroom Connections”</i>
16:10-16:40	8) John Donohue – Institute for Quantum Computing, University of Waterloo <i>“Qubits 101”</i>
TBA 17:00-19:00	Lab Tours Cronyn Observatory Tour

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An Art and Physics Program for your classroom

Dr. Mark Richardson

McDonald Institute

(8:30-9:30, PAB 100)

Description: Building on the Drift: Art and Dark Matter artist residency at the McDonald Institute, SNOLAB, and the Agnes Art Centre, we piloted Drifting Together: Art & Science. Designed for high school students to embrace the commonalities of Science & Art and how they approach inquiry and knowledge, it includes clear curriculum connections and flexibility to embed the program within existing class content. Students found it rewarding and challenging, and teachers found it invaluable. I will introduce the program and take teachers through a condensed version of the workshop, and show how it can be implemented in your schools.

Biography of the Presenter: Dr. Mark Richardson is the Manager for Education & Public Outreach at the Arthur B. McDonald Canadian Astroparticle Physics Research Institute. Mark works with scientists to share their science with the public and with teachers, bolstering the Canadian education community with resources to incorporate contemporary and local science breakthroughs in their practice.

SNOLAB science for educators

Blaire Flynn

SNOLAB

(9:40-10:40am, PAB 100)

Description: Dive deep into the science taking place 2km underground at SNOLAB; Canada's underground science laboratory specializing in astroparticle physics. In this session educators will get an update on SNOLAB science and try out a selection of resources and hands-on demonstrations.

Biography of the Presenter: Blaire Flynn leads the Education and Outreach team at SNOLAB. Her team shares the excitement and innovation of the research underway at this unique institute with students, educators, and members of the public. Blaire strives to bridge the gap between active research and life beyond the lab bench. She works on breaking down complex information into digestible pieces with the goal of improving public understanding of science and creating accessible STEM opportunities. Blaire specialized in environmental science and is currently completing a masters in Science Communication at Laurentian University. When she is not sharing science you can find her exploring the land and waterways of Northern Ontario.

**Employing existing online simulations and visualizations
in design of formative and summative assessment activities**

Dr. Ania Harlick
University of Toronto
(10:50-11:50am, PAB 100)

Description: Critical overview of existing online simulations and visualizations, with possibilities and risks associated with them. Practical approach to assessing the resources and implementing them into practice, and assessment of student mastery of the concepts.

Biography of the Presenter: Ania Harlick is an Assistant Professor, Teaching Stream at the University of Toronto. Originally from Poland, she completed her master's in experimental physics at AMU in Poznan, Poland and her M.Sc. and Ph.D. in Physics and Memorial University of Newfoundland. She considers herself an accidental physicist with a passion for education. As her primary responsibilities are teaching university courses, most of her research focuses on implementing modern pedagogy into the design of course and laboratory components. As far as she is concerned, she has her dream job.

Physics for Everyone! "Physics in Rural Classrooms" Pilot Program

Dr. Svetlana Barkanova
Memorial University of Newfoundland and Labrador,
NSERC Chair for Inclusion in Science and Engineering (Atlantic)
(12:00-12:30pm, PAB 100)

Description: Many rural and remote communities in Canada do not have physics teachers or teachers assigned to teach physics may struggle with some of the topics. By directly connecting presenters working in physical sciences or engineering from all over Canada with remote schools online, we are providing a welcome resource to teachers and exciting role models to students. Where relevant, the curriculum may refer to the regional priorities and include Indigenous knowledge. The program offers four virtual guest talks per year to address specific curriculum selected by teachers for students in Grades 7 to 11. We will discuss motivation and logistics and explore possible ways for science and physics teachers to participate in the program.

Biography of the Presenter: Dr. Svetlana Barkanova a Professor of Physics at Grenfell Campus of Memorial University of Newfoundland and Labrador. An internationally acknowledged researcher and NSERC Chair for Inclusion in Science and Engineering (Atlantic), Svetlana brings the EDI lens in all her leadership roles at the regional, national, and international level, striving to improve climate for underrepresented groups in both research and education. A popular public presenter, Dr. Barkanova is passionate about sharing the mysteries and beauty of our Universe with audiences at all levels, from K-12 to the general public.

Beyond Bohr: A Quantum Approach to the Atom
Dave Fish and Kelly Foyle
Perimeter Institute
(13:30-14:30am, PAB 100)

Description: Take your students *Beyond Bohr* in this workshop featuring a resource designed by educators in physics and chemistry in collaboration with researchers from Perimeter Institute. Most high school physics and chemistry classes culminate their discussion of the atom with the Bohr Model even though Bohr himself knew the model was wrong. In this workshop we will show you how you can introduce the quantum model of the atom with classroom-ready activities.

Biography of the Presenters: Dave has been a high school Physics teacher for 25+ years. His involvement with Perimeter Institute dates right back to the beginning with the initial development of ISSYP, EinsteinPlus and several other outreach activities. He has played a leading role in the production of most of the classroom resources. He has given workshops on modern physics at local, provincial, national and international levels. Dave is currently Teacher in Residence at Perimeter Institute in Waterloo. In his spare time he enjoys reading, travelling, sports and spending time with his wife and three children.

Kelly is an outreach scientist at Perimeter Institute delivering and developing science educational content for teachers, students and the public. She has co-authored many of Perimeter's educational resources and created online courses for teachers. She has given workshops on science and modern physics across Canada and internationally. Kelly has a doctorate in astrophysics from the University of Heidelberg in Germany and was a postdoctoral researcher at McMaster University working before joining Perimeter in 2013. She loves sharing her passion for physics and astronomy with students, teachers and the public.

**The persistent and nuanced gender gaps in STEM-
what do we know and what can we learn?**
Sara Cormier
McMaster University
(14:30-15:00, PAB 100)

Description: When looking at STEM at a macro level, gender parity seems to have been achieved. However, closer scrutiny unveils enduring, and in some instances growing, disparities at the subject level. Physics has historically been male dominated and remains so while biology has become female dominated. In this talk I will provide an overview of these gender gaps focusing on Dr. Eamonn Corrigan's PhD thesis work "Balancing the Equation: Examining Gender Gaps in Physics and STEM Across Canadian Classrooms". We will discuss the current state of the gender gaps in high school science courses, explore why women remain underrepresented in physics, and discuss strategies to enhance representation. As a new PhD student aspiring to continue Dr. Corrigan's work, I am keen to identify remaining questions and avenues for research. What additional data is necessary to fully understand these disparities? How can we effectively address these gender gaps? The latter part of this talk will be dedicated to exploring these unanswered questions and fostering discussion on potential solutions.

Biography of the Presenter: Sara Cormier is a first-year, part-time PhD student at the University of Guelph working under the supervision of Dr. Martin Williams (University of Guelph) and Dr. Mary Wells (University of Waterloo). She is interested in understanding the gender gaps in STEM – why do they persist? And how can we reduce them? Sara is also a full-time employee at McMaster University currently working as the Acting Program Manager for the Office of Undergraduate Research for the Faculty of Science. She is passionate about physics education and routinely teaches first-year physics for the life sciences where she focuses on creating an inclusive and accessible learning environment.

JWST Classroom Connections

Dave Fish and Kelly Foyle

Perimeter Institute

(15:10-16:10, PAB 100)

Description: Are you looking for ways to connect your students with the latest results from the JWST? Join us as we describe how JWST extends our senses and reveals new insights into our universe. Topics will include cosmological redshift, exoplanet atmospheres and the latest results from JWST.

Biography of the Presenters: Dave has been a high school Physics teacher for 25+ years. His involvement with Perimeter Institute dates right back to the beginning with the initial development of ISSYP, EinsteinPlus and several other outreach activities. He has played a leading role in the production of most of the classroom resources. He has given workshops on modern physics at local, provincial, national and international levels. Dave is currently Teacher in Residence at Perimeter Institute in Waterloo. In his spare time he enjoys reading, travelling, sports and spending time with his wife and three children.

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Qubits 101

Dr. John Donohue

Institute for Quantum Computing, University of Waterloo

(16:10-16:40, PAB 100)

Description: Quantum information is one of the fastest developing technologies today, with applications in high-performance computing, secure communication, and precision sensing. To build these technologies, we need to control, manipulate, and measure information encoded in systems that obey the rules of quantum physics. In this session, we'll overview how we can encode bits in real systems that follow quantum mechanics, how these systems differ from traditional bits, and connections to physics phenomenon already in the curriculum.

Biography of the Presenter: Dr. John Donohue is the head of scientific outreach at the Institute for Quantum Computing (IQC), a research institute at the University of Waterloo. He is the lead organizer of the long-running Quantum School for Young Students (QSYS) and Quantum for Educators (QEd) workshops, which bring ideas from quantum mechanics and quantum computing to high-school students and classrooms. His research background is in experimental quantum optics and entangled photon manipulation.