



Conference 2018



Western
Science



Western
Education



Western
Engineering

**May 10-12, Western University
Physics At The Boundaries**

Conference Schedule

THURSDAY, MAY 10

Time	Description
5:00-7:30 pm	Registration
6:00-7:30 pm	Dinner
7:30-8:00 pm	Activity: Game Show (Student vs. Teacher Panel)
8:00-8:40 pm	Tours: First Year Labs, Medical Physics Lab, Meteor Lab, Tandatron Accelerator

FRIDAY, MAY 11

Time	Description
8:00 - 10:00	Registration
8:45 - 8:55	Welcome and Introduction
8:55 - 9:45	Keynote Speaker - Paula Heron, Physics Education Group, U. of Washington: "Phys21: Preparing Physics Students for 21st Century Careers"

Time	Session Title	Presenter(s)
Session A 10:00 - 10:45	How Can Philosophy Help in Teaching Mechanics?	Marie Gueguen, Doreen Fraser
	Improv for Scientists	Joanne O'Meara
	An Authentic Introduction to Interactions and Forces	Edward Gissing
	Beyond the Traditional Lab: Student Planned, Peer-Reviewed, Presented	Andrea McPhee
10:45 - 11:15	Physics in the news as a vector for classroom engagement	Kelly Meissner
	Break and Exhibitors	
	Refreshment break sponsored by	

NELSON

Session B 11:15 - 12:15	Indigenous Science and Ways of Knowing	Robert Cockcroft, Isha DeCoito, David Kanatawakhon-Maracle
	Colliding Adventures with Innovation Design	Lisa Cole
	How Zombies Changed My Classroom!	Kelsey Lavigne
	Pre-packaged vs. make your own simulations: lesson learned	Tasha Richardson
	Using Online Simulations to Improve Conceptual Understanding in Physics and Science	Saarah Broadbent
	Evaluating Excellent Estimations: Fermi Problems in the Classroom	Greg Macdonald
	Advanced Curve Fitting in Excel	Eric Haller
	Integrating Google Quizzes into your teaching practice	Steve Fotheringham
	How To Use Video Calls Effectively to Enhance Your Teaching	Stacey Joyce
12:15-1:30	Lunch and Exhibitors	
Session C 1:30 - 2:30	Impact Earth	Parshati Patel
	Writing Assignments for Peer Review in a First Year University Physics Course: Initial Experience	Eugene Wong
	Introducing Units through Storytelling	Tony Martinez
	Making First Year Physics Fun	Ben Davis-Purcell
	We Are All Made of Stardust	Nathan Chow
	Hands-on Physics Culminating Projects	Sandy Evans
	Computer and Mobile App Simulations for Physics - Student Engagement and Inquiry	Matthew Craig
3:00 - 3:00	Break and Exhibitors	
Session D 3:00 - 4:10	Maker Space Activities: Coding, Computational Thinking, and Maker Space Tools and Activities in Schools	Immaculate K. Namukasa, Derek Tangredi, Brendan Roy, Shawn Macintosh, Asha Banks, Marja Miller and the Computational Thinking Team at Western
	Bringing the Maker Movement into Your Classroom	Joanne Moniz, Amber Crooby (Western Engineering Outreach)
	Incorporating Robotics with Grade 9 Electricity	Terry Brown
	Physics of Stunt Action	Dave Doucette
	Quantum cryptography to teach quantum mechanics	Martin LaForest
	Hands-on Gravitational Waves	Dave Fish
	A New Way to Teach Motion and Force: Models, Metacognition, and Mathematical Sense-Making	Chris Meyer
4:15 - 4:30	Great Giveaway	
6:30	Dinner (various restaurants)	

SATURDAY, MAY 12

Time	Session Title	Presenter(s)
Session E 9:00 - 10:10	Bridging Implicit Physics Boundaries with Inclusive Improv	Carolyn Sealton, Nancy Watt
	Smartphones for Smart Physics	Sheldon Valeda
	Hands-On Fields for 12U Physics	Roberta Tevlin
10:10 - 10:20	Break and Networking	
Session F 10:20 - 11:30	A pattern for 2 variable Physics experiments	Richard Taylor
	Let Gravity Assist You	Milica Rakic

	Analyzing Cool Physics Videos!	Andrew Moffat
	Designing Educational Games & Simulations	Robert Prior
11:30 - 12:00	OAPT General Meeting Everyone Welcome!	

While at Western on Saturday make sure to check out the Science Rendezvous Event on campus from 10AM - 4PM, a free, all-ages event! [Click here for details](#)

Directions

Our conference will take place at the **Physics and Astronomy Building** indicated on the [campus map](#).

Campus accommodations are available at **Ontario Hall**.

Car and Parking: Parking is available at the **Medway** and **Springett** lots for visitors, see the [campus map](#). Parking is complimentary after 5pm on Friday and all day Saturday but will require a credit card for entry Thursday night/Friday daytime. Rates are \$1.50/hr to a daily maximum of \$12.00, more details [here](#)



Meals

The Thursday night BBQ, Friday lunch, and coffee breaks are included as part of your conference fee. For the exact times, please refer to the conference program.

Accommodations

Do you need a place to stay for Thursday or Friday night?

Accommodations are available at **Ontario Hall: \$30 per person per night including hot breakfast** based on 1 person per bedroom and 2 persons per suite (suites have 2-4 bedrooms but max 2 bedrooms will be used per suite with 1 person per bedroom, and 1 shared bathroom per suite). Ontario Hall is a 15-20 min walk from the Physics & Astronomy Building. Parking is included for Thursday, Friday, Saturday at Ontario Hall or Althouse College (Zone N,H). Wi-fi is also included. Rooms will be assigned by the residence staff upon arrival.

Full details on Western's website [here](#) (Ontario Hall: 230 Samia Road, London, ON N6G ON2. Front desk [519-661-2088](#).)

Session Descriptions

Friday, May 11

Time	Session Title	Presenter(s)
8:55 - 9:45	Keynote: "Phys21: Preparing Physics Students for 21st Century Careers" Undergraduate physics programs have served their students well in the past for many of the careers they have entered. However, the world is changing, students are more diverse, and the needs of today's employers are rapidly evolving. In 2014 the American Physical Society (APS) and American Association of Physics Teachers (AAPT) formed the <i>Joint Task Force on Undergraduate Physics Programs</i> to provide guidance to physics departments seeking to improve career readiness of their graduates. The task force consisted of leaders in academic physics, physics	Paula R.L. Heron Paula R.L. Heron is a Professor of Physics at the University of Washington. She holds a B.Sc. and an M.Sc. in physics from the University of Ottawa and a Ph.D. in theoretical physics from Western University. She joined the Physics Department at the University of

	<p>education, industry, and national labs, and produced the report: <i>Phys21: Preparing Physics Students for 21st-Century Careers</i>. We believe Phys21 will allow physics faculty to see beyond the "standard model" of preparing majors for physics graduate school. The recommendations build on existing curricula and propose ways to enhance and improve physics programs for the diverse careers that our students take, from engineer to entrepreneur to high school physics teacher to physics researcher.</p>	<p>Washington in 1995. Dr. Heron's research focuses primarily on student ability to apply what they have learned about the dynamics of point particles in more advanced contexts involving elastic media, rigid bodies, etc. She has given numerous invited talks on her research at national and international meetings and in university science departments. Dr. Heron is co-Founder and co-Chair of the biannual "Foundations and Frontiers in Physics Education Research" conference series, the premier venue for physics education researchers in North America. She has served on the Executive Committee of the Forum on Education of the American Physical Society (APS), the Executive Committee of the Topical Group on Physics Education Research of the APS, the Committee on Research in Physics Education of the American Association of Physics Teachers (AAPT) and on the <i>ad hoc</i> National Research Council committee on the status and outlook for undergraduate physics education. She co-chaired the Joint Task Force on Undergraduate Physics Programs of the APS and AAPT, which produced the report <i>Phys21: Preparing Physics Students for 21st Century Careers</i>. She also serves as Associate Editor of <i>Physical Review – PER</i>. She was elected Fellow of the APS In 2007 and in 2008 she shared the APS Education award with colleagues Peter Shaffer and Lillian McDermott. Dr. Heron is a co-author on the upcoming 2nd Edition of <i>Tutorials in Introductory Physics</i>, a set of instructional materials that has been used in over 200 institutions in the US and that has been translated into German and Spanish.</p>
<p>Session A</p>	<p>How can philosophy help in teaching mechanics?</p>	<p>Marie Gueguen (Rotman Institute of Philosophy, Western University), Doreen Fraser (University of Waterloo)</p>
<p>10:00 - 10:45</p>	<p>It is natural to think of time as something that flows uniformly, independently of motion. But physics knows nothing of this and teaches us that time cannot be defined independently of motion and force. The relations among these concepts, although they constitute the foundations of mechanics itself, are not easy to explain only using the resources of physics and were actually developed by way of philosophical analysis by Isaac Newton himself. The aim of this activity is thus to show how philosophical analysis of concepts can help students have a better grasp of this conceptual interplay.</p>	<p>Marie Gueguen is currently a PhD student in the philosophy department, beginning in 2015-2016. Her research interests are primarily in the history and philosophy of science, particularly the philosophical foundations of physics and cosmology.</p>
<p>Session A</p> <p>10:00 - 10:45</p>	<p>We will present a simple discovery activity that you can use in your physics classroom to introduce the basic concepts of mechanics. The activity consists of: 1. A brief introduction to the questions that led to the development of the first reliable, high-precision clocks, with a focus on Huygens' four significant figure measurement of the strength of terrestrial gravity; 2. The building of your own simple pendulum clock, with the material available in the 17th century; 3. From this, you will be confronted with the problem of measuring time if you don't already have a clock. 4. The session will close with a discussion of how the first good clocks were actually a measure of gravity and that the same clock will give different time, depending on the latitude.</p>	<p>Doreen Fraser's areas of interest are Philosophy of Physics, Philosophy of Science, Applicability of Mathematics, History of Physics (especially 17th, 19th and 20th Centuries)</p>
	<p>Improv for Scientists</p>	<p>Joanne O'Meara</p>
<p>Session A</p>	<p>Improvisational exercises have been used in theatre training for decades. With minor modification, these exercises can be used in training scientists (and future scientists) to be better communicators. I'll discuss my use of these exercises with our physics majors at U of G and give some examples.</p>	<p>I have been a faculty member at the University of Guelph since 2002, teaching physics courses at all levels of the undergraduate program. As the Associate Chair of the department, I am also responsible for curricular matters for our undergraduate program. These improv exercises are used in our new science communication course taken by all third year physics majors in our program.</p>

<p>10:00 - 10:45</p> <p>Session A</p> <p>10:00 - 10:45</p>	<p>An Authentic Introduction to Interactions and Forces</p> <p>The concept of an "interaction" and the concept of a "force" are foundational to all of physics. During this session, participants will be introduced to an authentic (hands-on) set of inquiry based lessons, through which; students will construct a deep understanding of the concepts of; force and interaction. During the workshop; participants will experience each of the hands-on activities themselves. As they do so, they will also replicate the thinking process that their own students would go through – to develop a deep and meaningful understanding of the concepts of; force and interaction.</p>	<p>Edward Gissing</p> <p>Teaching physics has always been a lifelong passion of Edward's, he just got a little sidetracked along the way. Edward trained as a Mechanical Engineer at the University of Waterloo. He then worked in a variety of fields ranging from automotive production, aircraft design, financial consulting, through to beer sales. Eventually Edward got around to pursuing his passion and is now a physics teacher at Richmond Hill High School. Edward has always been fascinated by complex problems. He believes that there is no problem more challenging than attempting to find a solution to the problem of; designing engaging and effective learning environments for young people.</p>
<p>Session A</p> <p>10:00 - 10:45</p>	<p>Beyond the Traditional Lab: Student Planned, Peer-Reviewed, Presented</p> <p>Evidence shows that having more student-led inquiry means for better learning in physics and development of 21st century global competencies, while traditional textbook labs seem to have no benefit. But some of those classic labs are, well, classic, so why get rid of them? Fear not: we don't need to toss them out completely. Come explore how small tweaks to pre-existing labs can turn them from cookbook to true inquiry. A dash of peer-review along the way improves the quality of the results, and presentations mean you won't be stuck marking more not-so-great lab reports. Physics wins all around!</p>	<p>Andrea McPhee</p> <p>Andrea teaches physics and math at Jarvis Collegiate in Toronto. Using PER, she has been transforming her classrooms into student-centred and inquiry-driven so the learning sticks. As a TDSB Digital Lead Learner, she thinks technology can be a valuable tool to enhance student learning and collaboration, as well as making many processes more efficient. She is constantly refining her teaching style to help her avoid marking the dreaded lab report. It's an ongoing battle.</p>
<p>Session A</p> <p>10:00 - 10:45</p> <p>Session A</p> <p>10:00 - 10:45</p>	<p>Physics in the news as a vector for classroom engagement</p> <p>There is so much cool stuff in happening in physics research! In this session, Kelly will lead a collaborative group to establish creative ways teachers can bring current physics in the news to engage students with the curriculum. This is an interactive session where attendees share ideas and will leave with a resource that will help them strengthen their repertoire and ignite some excitement for physics in their students.</p>	<p>Kelly Meissner</p> <p>Kelly has a Master's degree in neuroscience and is a high school physics teacher in the WRDSB. She has attended OAPT conferences and summer camps, IQC's Schrodinger's Class, workshops at the Perimeter Institute, and partnered with another teacher for a TLLP on inquiry in the science classroom. Kelly is the founder and CEO of Kate's Kause, a local charity that raised over \$1 million for an inclusive and accessible playground and splash pad in Elmira. She also runs workshops that teach parents and educators how to include students with significant disabilities in the Ontario curriculum. Kelly loves to collaborate and share with other teachers.</p>
<p>10:45 - 11:15</p>	<p>Break and Exhibitors</p>	
<p>Session B</p>	<p>Indigenous Science and Ways of Knowing</p> <p>Western has recently released its Indigenous Strategic Plan and, under new directorship, is in the process of restructuring its First Nations Studies Program. As such, there are more readily available opportunities for collaborations</p>	<p>Robert Cockcroft, Isha DeCoito, David Kanatawakhon-Maracle</p> <p>ROBERT COCKCROFT is an Assistant Professor in the Department of Physics</p>

<p>11:15 - 12:15</p> <p>Session B</p> <p>11:15 - 12:15</p>	<p>between units across campus to generate new ideas at every level of education and outreach. But how do we in science respectfully and appropriately include Indigenous science and ways of knowing in our classes - not just as a "box-ticking" exercise to fulfill diversity requirements, but as a genuine effort to increase Indigenous awareness and representation?</p>	<p>and Astronomy at Western University. He currently teaches in the new Western Integrated Science Program (WISc), in addition to a medium-sized (~400) introductory astronomy full-year course. He is collaborating with Six Nations to help incorporate Indigenous astronomy into university education and outreach, and is looking to expand this effort.</p> <p>ISHA DECOITO is an Assistant Professor in the Faculty of Education at Western University. Currently, she teaches in the graduate program and she is a STEM educator and Coordinator of the STEM Specialty Focus in Teacher Education at Western University. She is also working with the Centre for Planetary Science and Space Exploration to develop a new professional masters program. She has been involved as principal investigator on over 16 projects in STEM education in various contexts, including medical programs, Aboriginal reservations, teacher education programs, and schools.</p> <p>DAVID KANATAWAKHON-MARACLE is a long serving lecturer in the First Nations Studies program at Western University. He currently teaches Indigenous knowledge and language courses, and he has developed pedagogical materials including five Mohawk language dictionaries, four textbooks and 70 children's books. He is credited with playing a significant role in saving the Mohawk language, and has received an honorary Doctor of Laws honoris causa from Brock University for this role.</p>
<p>Session B</p> <p>11:15 - 12:15</p>	<p>Colliding Adventures with Innovation Design</p> <p>Join the Innovation Design & Implementation Team from the Ministry of Education in an active learning session that explores adventures from CERN, Collaboration, Innovation Design Thinking and persistent problems in education. We will explore hands on activities as a way to explore the innovation design process. During this session, you will also be given an opportunity to share your ideas and concerns about persistent problems in education. Come share your ideas with us!</p>	<p>Lisa Cole</p> <p>Lisa Cole is a passionate secondary science/physics teacher. She is the former Science & Technology Program Facilitator (K-12) at the Durham District School Board and was the lead on creating and implementing the DDSB STEM Plan. Lisa Cole is also the past president of the Ontario Association of Physics Teachers and was the Eastern Ontario Teacher Network Coordinator for the Perimeter Institute for Theoretical Physics. Recently, Lisa was awarded the Excellence in High School Physics Teaching award by the Canadian Association of Physicists. Lisa currently is on secondment to the Ministry of Education as an Education Officer in the Incubation & Design Branch on the Innovation Design & Implementation (IDI) Team.</p>
<p>Session B</p> <p>11:15 - 12:15</p>	<p>How Zombies Changed My Classroom!</p> <p>Join the 400+ teachers that have discovered how zombies and a host of other design challenges have transformed their classroom. Offering a cross-curricular approach to teaching - these activities cover math, language, science, art and social studies. Even better, the resources are FREE at www.wemadeit.ca/teachers</p>	<p>Kelsey Lavigne</p> <p>Kelsey has been working with Western Engineering Outreach (WEO) since 2016 and comes from a background in medical cell biology and experiential education. Her past roles include working for Camp Trillium, the Bronte Creek Project and City of Brampton Outdoor Education Centre. Kelsey is responsible for day to day operations, Just for Girls programming, WEMADEIT and curriculum development.</p>

<p>Session B</p> <p>11:15 - 12:15</p>	<p>Pre-packaged vs. make your own simulations: lesson learned</p> <p>Simulations are a great way to help students engage with physics concepts in a way that may not otherwise be possible due to safety concerns, limited resources, or unrealistic access. This year I have had students use simulation engines, including Physion and Algodoo, to produce their own simulations. In this session, participants are asked to BYOD with Algodoo already loaded to try out building some examples. I will also share some student work, and discuss the challenges of implementing the project, as well as some of the surprising successes along the way.</p> <p>Using Online Simulations to Improve Conceptual Understanding in Physics and Science</p> <p>Learn how online simulations help teachers take advantage of research-proven instructional strategies and help students of all ability levels develop conceptual understanding in physics and science. Teachers can supplement and enhance instruction with powerful interactive visualizations of concepts. Students can manipulate key variables, generate and test hypotheses, and engage in extensive "what-if" experimentation.</p>	<p>Tasha Richardson</p> <p>Tasha Richardson (@tadric3EM) is a senior teacher with the TDSB. For the past decade, she has juggled teaching and being a graduate student with OISE/UT. Her research interests focus on physics education, and exploring ways technology can be used to support student learning.</p> <p>Sarah Broadbent</p> <p>A former secondary Chemistry and science teacher and currently the Implementation Coordinator of Professional Development in Ontario with ExploreLearning (past five years). Science and learning have been my passion from the time I was a young child and continues to be to this day. Excited to share with teachers about new and exciting ways of teaching science to the generations to come as they will shape our world.</p>
<p>Session B</p> <p>11:15 - 12:15</p>	<p>Evaluating Excellent Estimations: Fermi Problems in the Classroom</p> <p>Fermi problems provide a way for our students in all grades to practice their estimation skills as they work with order of magnitudes, scientific notation, creative thinking and good old 'educated guesswork'. What makes a good Fermi question, and how can they be used to evaluate student progress? Let's figure it out together!</p> <p>Advanced Curve Fitting in Excel</p> <p>In this workshop attendees will learn how to do a least-squares fit to find the best equation describing a curve through a set of given data points. We will work together to first fit a simple linear set of data, and then tackle the more challenging damped harmonic oscillator. This is a great way to teach grade 12 students how to analyze complicated lab data and provides teachers with a lab that covers sections C2.3, C3.2 and C3.4 of the SPH4U curriculum. Attendees should bring a laptop with Excel so that they can follow along!</p>	<p>Greg Macdonald</p> <p>Greg has taught Physics and high school Science for 19 years, most recently at Thorold Secondary School. He has attended the OAPT conference regularly and co-facilitated the 2017 OTF Summer Institute at Laurentian University. Astronomy is his favourite subject but he has recently started to dabble in biophysics. Greg enjoys reading on a large variety of subjects and sharing 'interesting' science facts with his wife and three daughters, plus playing hockey really badly.</p> <p>Eric Haller</p> <p>Mr. Haller is a young physics teacher who, after working abroad, has returned to Ontario and is now teaching for the Peel District School Board. If his name sounds familiar, it may be because you've read one of his articles in the OAPT newsletter, or seen him at previous conferences. Mr. Haller likes to use technology in his classroom and enjoys showing students (and other teachers) how to do various things with technology.</p>
<p>Session B</p> <p>11:15 - 12:15</p>	<p>Integrating Google Quizzes into Your Teaching Practice</p> <p>As with most teachers, I struggle to provide enough feedback to my students to allow them to gauge their understanding of the material. In addition, I regularly receive e-mails from parents asking about their child's progress and requesting elaborate details in response to their enquiry. To resolve both issues, I have turned to Google Quizzes for help.</p> <p>How To Use Video Calls Effectively to Enhance Your Teaching</p> <p>Join us for examples, tips & tricks to help you add video calls to your teaching plan! We'll share Teacher experiences including classroom & lesson setup, preparing students & best practices for video calls from any provider. We'll also call a Canadian scientist LIVE using the free Zoom app for PC/Mac/Linux/Android/iOS/ChromeOS so you can see #VROCinAction & ask your Questions in real time.</p>	<p>Steve Fotheringham</p> <p>Steve has been teaching all of the sciences at Oakville Trafalgar for the past 9 years. In his free time, he enjoys ultimate frisbee, jogging & learning new skills.</p> <p>Stacey Joyce</p> <p>Stacey Joyce has been a Program Manager at Partners In Research Canada for 6 years, working with K-12 Teachers and Canadian researchers/professionals to facilitate</p>

		<p>interactive video connections for relevant, authentic and student-driven learning. Stacey is an Ontario Certified Teacher with experience in academic research & industry R&D. In recent years, Stacey has developed a new educational program, managed the implementation of a new videoconferencing platform, and delivered numerous professional development workshops to educators.</p>
	<p>Ten Simple Electrical Circuits and Demonstrations</p> <p>With a focus on hypothesis generation and inquiry, participants will add practical activities to their repertoire. From beginner to expert, something for everyone.</p>	<p>David Gervais</p> <p>With an emphasis on participation, students have enjoyed the electricity units in my technology and science courses. They bought into making predictions as to measurements in voltages and current at different sites in the circuits. This happened no matter their technical background.</p>
12:15-1:30	Lunch and Exhibitors	
<p>Session C</p> <p>1:30 - 2:30</p>	<p>Impact Earth</p> <p>In this workshop, learn about Centre for Planetary Science and Exploration's newest initiative, Impact Earth. The goal of this initiative to provide a holistic view of meteorite impacts, from fireballs, to meteorite falls, to the largest crater-forming events. The program features a unique and interactive web portal, meteorite and impact crater rock kits for loan to schools and museums, three citizen science projects ("Find a Crater", "Meteorite Hunter Club", "Fireball Sighting"), as well as inquiry-based activities for students. You will have a chance to work through the inquiry based 'Impact Cratering' activity as well as an activity developed using the rock kits, which are available as loans to educators. These activities are based on the Grade 9 and Grade 12 Earth and Space Science Curriculum.</p>	<p>Parshati Patel</p> <p>Parshati Patel is the Outreach Program Coordinator at Western University's Centre for Planetary Science and Exploration. She has a PhD in Astronomy and Planetary Science and Exploration and has been involved in various space-themed outreach programs and initiatives at Western. http://cpsx.uwo.ca/</p>
<p>Session C</p> <p>1:30 - 2:30</p>	<p>Writing Assignments for Peer Review in a First Year University Physics Course: Initial Experience</p> <p>We will present our initial experience of using an online peer review essay-based assignment for a first year university physics course. This is an initiative where we focused students' attention on the process of learning physics by having them write and explain their underlying thoughts and logic before introducing equations and solving them. We emphasized the need for students to spend time on understanding/reinforcing the fundamentals and seeking out their own individual misconceptions and does not penalize incorrect final numerical answers. Pros and cons of such exercises will be summarized.</p>	<p>Eugene Wong</p>
	<p>Introducing Units through Storytelling</p> <p>A fictional land with unusual, yet dimensionally correct units, is used to introduce physical units and explain their importance.</p>	<p>Tony Martinez</p> <p>I have been a Physics teacher since the 1980s. I am currently preparing to defend a Doctoral Thesis in Astronomy.</p>
	<p>Making First Year Physics Fun</p> <p>I will talk about how we are trying to make our first year introductory physics course at McMaster University less stressful and more engaging and fun. Specifically, I will discuss and show samples of our culminating laboratory assignment where students work in groups to submit youtube videos of a <5 min creative physics experiment.</p>	<p>Ben Davis-Purcell</p> <p>Ben Davis-Purcell completed his HBSc and MSc (both in Physics) at McMaster University and is currently an Instructional Assistant at McMaster in the Department of Physics & Astronomy. He is the Course Coordinator for Physics 1A03, the new introductory physics course at McMaster designed for students in the life sciences. He also runs physics outreach activities at McMaster, including the Physics@Mac Online Physics Contest.</p>
<p>Session C</p> <p>1:30 - 2:30</p>	<p>We Are All Made of Stardust</p>	<p>Nathan Chow</p> <p>Nathan has been a high school Physics</p>

<p>Session C 1:30 - 2:30</p>	<p>Students may have heard that all elements form in stars, but what does this process actually look like? How can we make this profoundly unifying idea accessible at the high school level? Come join us as we combine the ideas of mass-energy equivalence and nucleosynthesis with the pedagogical tools of energy flow diagrams and work-energy bar charts to help students understand where all the atoms in their body come from.</p>	<p>teacher since 2011. His involvement with Perimeter Institute started over a decade ago, with volunteer work while studying as a University of Waterloo Honours Physics undergraduate. He was later a PI graduate student, researching alternative theories of gravity and possible explanations for dark energy. He was an early EinsteinPlus teacher and has participated in many outreach events in the time since. He is currently playing an integral role in the production of Perimeter Inspiration resources. He has given workshops on modern physics at local, provincial, national and international levels. Nathan is currently on leave from teaching Physics and Mathematics at Royal St. George's College in Toronto. He is an avid rock climber and strategic board game player who enjoys problem solving at every level, from the technical nitty-gritty to the nebulously abstract. Some say he's funny, while others describe him incorrectly.</p>
	<p>Hands-on Physics Culminating Projects</p> <p>The session will describe a hands-on culminating project that teachers may use with their Grade 12 physics students (or perhaps Grade 11). This will be a hands-on workshop and shortened mini builds of the project will be performed. These mini-projects will be examined for which physical principals are illustrated. The project description and rubric for evaluation will be provided so that teachers can modify them for their own later use.</p>	<p>Sandy Evans</p> <p>Sandra Evans has been teaching for 14 years at Northview Heights, she also coaches the swim team and runs the physics club. Her background is in electrical engineering and prior to teaching she worked in the business world as Director Finance Ontario Consumer Markets at Bell Canada and Director Outside Plant Engineering Inventory at 360networks.</p>
<p>Session C 1:30 - 2:30</p>	<p>Computer and Mobile App Simulations for Physics - Student Engagement and Inquiry</p> <p>In this session I will present physics simulations I have developed for PC/Mac/Android. They are designed for the Ontario physics curriculum in grades 9 through 12 and are a combination of visual demonstrations for teaching as well as labs students can perform on their laptops. They will be available for free through either the Google Play Store, or through a link to my Google drive where I keep the computer-ready versions. Two samples can be found by searching the play store for "Matthew Craig".</p>	<p>Matthew Craig</p> <p>Matthew Craig trained at the Ontario Institute for Studies in Education and has been a physics teacher at the Community Hebrew Academy of Toronto for the past 10 years. This past year, he has developed a suite of physics simulations which have since become an important part of his teaching pedagogy.</p>
<p>Session C 1:30 - 2:30</p>	<p>Momentum, Energy and Rocket Engines</p> <p>Why not sneak in some rocket science into your physics lessons. A great and simple extension to a lesson. Go as deep as you or your students want to go. Basics and extensions will be addressed. Play with some sims to drive home concepts. Simple web based sim, so a phone is all that is needed. Other resources will be discussed. Sample worksheets will be available.</p>	<p>John Berrigan</p> <p>A teacher for 30 years and a rocket geek! Happy to pass on what I have found to work, and not work so well, in the classroom.</p>
<p>2:30 - 3:00</p>	<p>Break and Exhibitors</p>	
<p>Session D 3:00 - 4:10</p>	<p>Maker Space Activities</p> <p>Engaging school learners in maker space, computational thinking, programming and coding activities is of current interest to educators, teachers and governments. Over the past 4 years instructors and researchers in Western's faculty of education, in collaboration with teachers in schools, have implemented</p>	<p>Immaculate K. Namukasa, Derek Tangredi, Brendan Roy, Shawn Macintosh, Asha Banks, Marja Miller, and the Computational Thinking Team at Western</p>

and researched Coding, Computational Thinking and Maker Space Activities. Engaging school learners in maker space, computational thinking, programming and coding activities is of current interest to educators, teachers and governments. Over the past 4 years instructors and researchers in Western's faculty of education, in collaboration with teachers in schools, have implemented and researched Coding, Computational Thinking and Maker Space Activities. We will provide an outline of how to incorporate maker technology and maker thinking into your lessons, as well as provide an activity that you can do in your class on Monday.

Session D
3:00 - 4:10

Immaculate K. Namukasa is an associate professor of education at Western University in Ontario and distinguished as a teaching fellow (2017 to 2020) with the Teaching Support Center at Western University based on her work on pedagogies incorporating maker activities in teaching. She is a past journal editor for the Ontario Mathematics Gazette – a magazine for teachers and educators and a current editor Math + code 'Zine. For more information see <http://bit.ly/IKNamukasaWesternEducation>

Derek Tangredi is the Director of Integrated STEAM Education with Fair Chance Learning as well as an award winning teacher with the Thames Valley District School Board (TVDSB) committed to progressive Education through student centered actions. He is also founder of Hacked Education, a non-profit venture to assist in providing resources and information to educators throughout the world.

Brendan Roy is a 2017 graduate of Western University's Bachelor of Education Program with basic qualifications in intermediate and senior level math, general science and environmental science. Prior to teaching he studied environmental engineering where he was first introduced to coding. Since then he has worked on developing and teaching math and science activities

Session D
3:00 - 4:10

Shawn McIntosh is a recent graduate of Althouse Faculty of Education at Western University. Prior to this he attended the University of Waterloo where he first took computer programming classes. Shawn is currently employed by the London district Catholic school board where he teaches math, physics, and computer science.

Asha Banks is a teacher candidate at Western University.

Marja Miller is a Graduate Student at Western University and a teacher with over 10 years of teaching experience in Mathematics, Science, Biology, Chemistry and Physics. Presently she is teaching for the Thames Valley District School Board K-8 and teaching Grade 12 Chemistry. Besides her work experience, her research interests are in STEAM education, Maker Spaces and Coding/Computational Thinking.

Bringing the Maker Movement into Your Classroom

Session D
3:00 - 4:10

The maker movement is taking the world by storm and while 3D printers and coding are at the forefront of education, how does this translate into senior sciences? Our 30-minute session will provide an outline of how to incorporate maker technology and maker thinking into your lessons, as well as provide an activity that you can do in your class on Monday. Brought to you by Western Engineering Outreach, this session will unlock the inner maker within you and your students.

Joanne Moniz, Amber Crooby (Western Engineering Outreach)

Providing science, technology, engineering and mathematics (STEM) outreach in the London & Middlesex Area for the last 28 years, WESTERN ENGINEERING OUTREACH reaches 9500+ students and 100+ teachers annually through their programs. Using an engineering design framework, all their activities strive to help students, families and teachers

		explore STEM in a fun and approachable way. To learn more please visit their website at: www.eng.uwo.ca/outreach
	<p>Incorporating Robotics with Grade 9 Electricity</p> <p>Participants will use Arduino micro-controllers and coding to control simple electrical circuits. As robotics and coding become more prevalent in K-8 a gap exists once students enter secondary school. This investigation can make electricity more engaging for students through robotics and coding.</p>	<p>Terry Brown</p> <p>I am a Science & Technology learning coordinator for TVDSB. My focus has been to help teachers shift towards Student Centered Inquiry (DRiVe Inquiry). Recently I have been developing Robotic investigations (WeDo, EV3 and Arduino) for K-12 students.</p>
<p>Session D 3:00 - 4:10</p>	<p>Physics of Stunt Action</p> <p>This highly interactive session connects dynamic movie & television stunt action to gr 11/12 motion, forces, acceleration, energy and momentum. "Without context there is no learning," is a current education mantra. The context of 'entertainment meets physics' will engage students and facilitate a deeper conceptual understanding of applied physics principles. This workshop will also highlight entertainment industry pathways anchored by physics and engineering. Lights, camera, action! Yagottalovephysics!</p>	<p>Dave Doucette</p> <p>Dave taught high school science (physics, chemistry) for 25 years before becoming a STEM consultant, most notably with FAST Motion Studios, a Canadian success story in international movie/television stunt action. Dave opened their studio doors to physics field trips, revealing pathways to a burgeoning industry with a rapidly aging crew population! As Education Director, Dave helped initiate relationships between FAST Motion Studios and Perimeter Institute, Ryerson University and Sir Wilfrid Laurier University. Their research depth adds to the creative synergy flowing from studio offices. Novel partnerships for generating 'creative Potential Energy'!</p>
	<p>Quantum cryptography to teach quantum mechanics</p> <p>Quantum cryptography offers a perfect narrative to introduce students to the wonders of quantum mechanics. It is simple, practical and involves a real-life example of how a specific quantum technology can do something once thought to be impossible: un-hackable information security. The essence of quantum mechanics boils down to two simple, yet intriguing, phenomena: quantum superposition and quantum measurement, and they are at the heart of quantum cryptography.</p> <p>This hands-on, interactive workshop aligns well with Grade 12 Physics because it not only teaches quantum mechanics and its applications, but also involves the wave-model of light and polarization. The cryptography narrative also connects to mathematics, computer science and information technology.</p>	<p>Martin LaForest</p> <p>Martin Laforest is the Senior Manager, Scientific Outreach at the Institute for Quantum Computing, University of Waterloo. Officially, Martin's role is to bring science out of the lab and into people's lives. Unofficially, he is the talkative guy who is passionate about quantum information science and technology and likes to share it with curious minds. He developed several world-renown educational programs and workshops to introduce students and teachers to the wonders of the quantum world and its applications to modern and future technologies. Martin earned a PhD in quantum physics from the University of Waterloo.</p>
	<p>Hands-on Gravitational Waves</p> <p>Arguably, the most exciting scientific discovery in the last few years has been the observation of gravitational waves. This topic also has deep links to high school physics through concepts such as wave interference, wave propagation, and the universal wave equation.</p> <p>In this session, we will show you how you can share some of the excitement and the underlying physics of gravitational waves with your grade 11 and 12 physics students.</p>	<p>Dave Fish</p> <p>Dave has been a high school Physics teacher for 20+ 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 both Perimeter Exploration and Perimeter Inspiration resources. He has given workshops on modern physics at local, provincial, national and international levels. In his spare time he enjoys reading, travelling, sports and spending time with his wife and three children.</p>
	<p>A New Way to Teach Motion and Force: Models, Metacognition, and Mathematical Sense-Making</p> <p>Explore a new way of thinking about and teaching physics (models!). Explore how you can train students to monitor their learning process (metacognition!). Explore the challenges of understanding the mathematics students see in</p>	<p>Chris Meyer</p>

physics class (sense-making!). All this and more as Chris shares with you his new-and-improved units on motion and force for grade 11 physics.

SATURDAY, MAY 12

Time	Session Title	Presenter(s)
<p>Session E 9:00 - 10:10</p>	<p>Bridging Implicit Physics Boundaries with Inclusive Improv</p> <p>As physics educators, we must not only challenge our students' preconceptions about the physical world but also preconceptions about the limits of people's math and science abilities. Combining tools and techniques from physics education research and improvisational theatre (improv), we will explore strategies to foster community and inclusivity in physics with activities we can use in our classrooms. We will effectively create a camaraderie-filled laboratory to uncover implicit biases and test assumptions underlying day-to-day interactions. This workshop will be co-led by Second City graduate Nancy Watt, nancywattcomm.com.</p>	<p>Carolyn Sealfon</p> <p>Carolyn Sealfon has taught, or more accurately, facilitated learning in the University of Toronto Department of Physics, at Princeton University as Associate Director of Science Education, at a Pennsylvania public university, at an inner-city high school in New Jersey, and in interactive workshops across the continent. She earned her PhD in theoretical cosmology at the University of Pennsylvania and her BA in physics from Cornell University. She aims to foster scientific reasoning, curiosity, and compassion to empower diverse demographics to realize their full potential.</p>
<p>Session E 9:00 - 10:10</p>	<p>Smartphones for Smart Physics</p> <p>Let's try to take advantage of the student smartphone pandemic and learn to turn these devices into powerful tools that work in our favour in the classroom. We will review and explore some phone camera tricks, some apps that use common built in sensors such as accelerometers, and touch on some beneficial uses of social media. A presentation and a hands-on activity will be included. It would be helpful if participants can bring a smartphone or tablet but it is not mandatory.</p>	<p>Sheldon Valeda</p> <p>Sheldon Valeda is an experienced physics teacher working in Waterloo region. He loves to invent and tinker and is always looking for new gadgets and demos to drive home difficult concepts in his grade 11 and 12 physics classes.</p>
<p>Session E 9:00 - 10:10</p>	<p>Hands-On Fields for 12U Physics</p> <p>The field unit is difficult because fields are so intangible and there are so many concepts and so many similar equations. How do we know that fields are real? What is the difference between potential difference and potential energy? Teachers will be introduced to a number of cheap or free materials that can help make this unit more visual and concrete. Teachers will actively explore these materials as their students would and they will experience how critical thinking, problem-solving, collaboration, communication and assessment can be seamlessly incorporated into these lessons.</p>	<p>Roberta Tevlin</p> <p>Roberta is the Manager of the OAPT website and a former OAPT president. She loves hanging out with other physics teachers and finding new ways to bring physics to her students. She wishes that she had heard of Physics Education Research much, much earlier in her career and is still working on incorporating more PER, more modern physics and especially more affective physics in her classes.</p>
10:10 - 10:20	Break and Networking	
	A pattern for 2 variable Physics experiments	Richard Taylor

<p>Session F 10:20-11:30</p>	<p>Over my career as a Physics teacher, I have gradually refined a pattern for Physics experiments. I now start using this pattern with my grade 11 students and continue it with grade 12, culminating in a grade 12 project where students do a complete experiment...twice. I will demonstrate this pattern, show examples of student work, and guide participants through an example.</p>	<p>Richard Taylor graduated from the University of Toronto in 1978 with an Honours Bachelor of Science in Physics. After spending 2 years teaching Science in Papua New Guinea with CUSO, he settled into a career developing software for scientific and engineering applications. After a tedious year helping to stomp out Y2K bugs, Richard decided to leave the world of software and become a high school teacher. Since September 2001 he has taught in the Ottawa-Carleton District School Board, primarily teaching senior Physics, but also some junior Science, Math and Computer Science. Having completed two careers, Richard will be retiring this June.</p>
<p>Session F 10:20-11:30</p>	<p>Let Gravity Assist You</p> <p>In September 2017 the Cassini mission ended after 20 years in space. The grand finale was comprised of 22 orbits through the gap between Saturn and its rings, slowing down, ever closer to Saturn and finally burning up in the atmosphere. Cassini was able to do this using the gravity assist maneuver, often referred to as the "slingshot maneuver". The technique uses gravity of another body to change speed or orbital path of a spacecraft. Through inquiry-based lesson and with the help of grade 12 physics, we will try to get better understanding of this maneuver.</p>	<p>Milica Rakic</p> <p>My name is Milica Rakic. I am physics teacher at Walkerville Collegiate Institute, Windsor, ON.</p>
<p>Session F 10:20-11:30</p>	<p>Analyzing Cool Physics Videos!</p> <p>Ever used a pellet gun in your classroom to demonstrate the conservation of energy and momentum with a ballistics pendulum? Probably not. Labs and activities in Physics' classes can be amazing learning opportunities, but something there are demonstrations that are just not practical, possible or safe. Using the new "Pivot Interactives" site with its video library and built-in tools we will explore the possibilities for video analysis within your classroom. We will also look at taking videos to be analyzed using LoggerPro and other video analysis tools.</p>	<p>Andrew Moffat</p> <p>Andrew has been teaching Physics and Design Technology at BSS (The Bishop Strachan School) in Toronto since 2007. He is particularly interested in teaching through inquiry, a project based approach toward classes and "building things". He is always looking for great new demonstrations, ideas and projects.</p>
<p>Session F 10:20-11:30</p>	<p>Designing Educational Games & Simulations</p> <p>For inspiration we will look at a variety of existing games and activities for junior and senior physics topics: astronomy, electricity, optics, climate science (energy), kinematics, and quantum physics. After examining the development of one game from concept to execution, participants will create a prototype of a new game on a topic they are interested in.</p> <p>Participants will leave this session with links to a wide variety of free games and resources, recommendations for affordable professional tools for production, and a prototype of their own game.</p>	<p>Robert Prior</p> <p>Robert Prior has played Traveller since it was first published. He has written for Digest Group Publications, Heliograph, the Canadian Space Agency, and Steve Jackson Games. All this gaming got him interested in physics, which after a detour through communications engineering led to his current occupation: science teacher.</p>
<p>11:30 - 12:00</p>	<p>OAPT General Meeting Everyone Welcome!</p>	