# UNIVERSITY OF OTTAWA



CANADIAN CONFERENCE FOR UNDERGRADUATE WOMEN IN PHYSICS

# PROGRAM



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uOttawa

# WELCOME



## Message from the Chairs

On behalf of the CCUWiP 2019 Executive Team, we are pleased to welcome you to the University of Ottawa for this year's Canadian Conference for Undergraduate Women in Physics!

We are proud to be hosting this event in the heart of Canada's capital, at the University of Ottawa campus, the Lord Elgin Hotel, and the National Arts Centre. We extend our welcome to delegates from all across the country, as well as our international speakers. It is our goal to create an inclusive and diverse environment in which all our attendees can network, learn, and share their experiences.

Alongside our delegates, this conference would not be possible without the support of the Canadian Association of Physicists, the Physics Department at the University of Ottawa, the Americal Physical Society, and our generous sponsors. We thank you all for your contributions.

We hope everyone is looking forward to our enriching weekend full of panels, presentations, open discussions, and socializing!

Sincerely,

Amina Berrada Co-Chair Courtney Tower Co-Chair Emily Zhang Co-Chair

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# Schedule

# Friday, 18th

**Registration** 4:00 pm to 9:00 pm Lord Elgin

Hotel 100 Elgin street

Our team will have a registration table in the hotel foyer

**Ice Breaker** 7:00 pm to 10:00 pm Lord Elgin Hotel 100 Elgin street

Pearson Room Pizza will be provided



# Schedule

Saturday, 19th			
Breakfast	7:00 am to 8:00 am Lord Elgin Hotel - 100 Elgin street		
Plenary Lecture Shohini Ghose	8:40 am - 9:25 am uOttawa STEM Building room STM 224		
Career Panel	9:25 am - 10:10 am uOttawa STEM Building room STM 224		
Plenary Lecture LeeAnn Janissen	10:40 am - 11:25 am uOttawa STEM Building room STM 224		
Workshops Grad School in Canada Grad School in US Tinkering Networking Mental Health LGBTQ+ Roundtable	11:25 am - 12:10 pm uOttawa STEM Building room STM 364 uOttawa STEM Building room STM 564 uOttawa STEM Building room STM 117 uOttawa STEM Building room STM 201 uOttawa STEM Building room STM 224 uOttawa STEM Building room STM 664		
Lunch Break	12:10 pm - 1:10 pm uOttawa STEM Building Floor 0		
Workshops	1:10 am - 1:55 pm Same as above		
APS Plenary Lecture	2:00 pm - 3:30 pm uOttawa STEM Building room STM 117		
Grad and Industry Fair	3:30 pm - 5:30 pm uOttawa STEM Building room STM 117		
Banquet Dinner	7:00 pm - 10:00 pm National Arts Centre NAC - Canada Room		
Pub Crawl	10:00 pm - Meet in hotel lobby		

# Schedule

Sunday, 20th		
Breakfast	7:00 am to 8:00 am Lord Elgin Hotel - 100 Elgin street	
Diversity Panel Guided Discussion	8:30 am - 10:00 am uOttawa STEM Building room STM 224	
Coffee Break	10:00 am - 10:30 am uOttawa STEM Building room STM 117	
Student Posters	10:30 am - 11:30 am uOttawa STEM Building room STM 117	
Lunch	11:30 am - 12:30 pm uOttawa STEM Building room STM 117	
Student Presentations	12:30 pm - 2:00 pm uOttawa STEM Building rooms 224 201 364 564 664	
Award Ceremony	2:00 pm - 2:15 pm uOttawa STEM Building room STM 224	
Lab Tours and Museum	2:15 pm - 3:45 pm Meet on floor 0 of STEM	

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**MOMENTE** 

# **APS Speaker**

## Fabiola Gianotti

Fabiola Gianotti received a Ph.D. in experimental particle physics from the University of Milano in 1989. Since 1994 she has been a research physicist at CERN, the European Organisation for Nuclear Research, and since August 2013 an honorary Professor at the University of Edinburgh. Dr Gianotti has worked on several CERN experiments, being involved in detector R&D and construction, software development and data analysis. From March 2009 to February 2013 she held the elected position of project leader ("Spokesperson") of the ATLAS experiment. The ATLAS Collaboration consists of 3000 physicists from some 38 countries.



If you have questions for Dr. Gionatti share them on social media with the #CCUWiPKeynote and we'll ask them during the Q&A

# **Plenary Lectures**

## LeeAnn Janissen

LeeAnn Janissen received her PhD in particle physics from Carleton University in 1993. Her doctoral work was the measurement of the tau-lepton lifetime with the OPAL experiment at the LEP accelerator at CERN. During this time, Dr. Janissen obtained an MBA from the Roman School of Business at the University of Toronto. During a 6 year hiatus between capital market roles, LeeAnn pursued a long time interest in ceramics. Dr. Janissen currently divides her time between her ceramic art practice and her role as Managing Director of Research at East Coast Fund Management Inc. where she is a quantitative research specialist and oversees the firm's research team.



## **Shohini Ghose**

uOttawa



Shohini Ghose is a Professor of Physics and Computer Science at Wilfrid Laurier University and the founding Director of Laurier's University Research Centre for Women in Science. She is a theoretical physicist who examines how the laws of quantum physics can be harnessed to transform computation and communication. She and her colleagues first observed a connection between chaos theory and quantum entanglement. She is the Vice-President of the Canadian Association of Physicists, and the first Canadian member of the Working Group on Women in Physics of the International Union of Pure and Applied Physics (IUPAP).

**UIUMAWA** 

# **Banquet Speaker**

## **Donna Strickland**

Dr. Donna Strickland is one of the recipients of the Nobel Prize in Physics 2018 for co-inventing Chirped Pulse Amplification with Dr. Gérard Mourou, her PhD supervisor at the time of the discovery. She earned her PhD in optics from the University of Rochester and her B. Eng. from McMaster University. Dr. Strickland was a research associate at the National Research Council Canada, a physicist at Lawrence Livermore National Laboratory and a member of technical staff at Princeton University. In 1997, she joined the University of Waterloo, where her ultrafast laser group develops high-intensity laser systems for nonlinear optics investigations. She is a recipient of a Sloan Research Fellowship, a Premier's Research Excellence Award and a Cottrell Scholar Award. She served as the president of the Optical Society (OSA) in 2013 and is an OSA Fellow.



The Banquet dinner is taking place at The Canada Room in the National Arts Centre (1 Elgin St) January 19 at 7:00pm

# **Career Panel**

## Ghada I. Koleilat

Ghada I. Koleilat received her BASc (2006) in Electrical Engineering from Concordia University, her MASc (2008) and her PhD (2012) in Electrical Engineering from the University of Toronto. During her graduate studies, she developed the world's first functional colloidal quantum dot tandem solar cell employing a single quantum tuned material. She also conceived a material processing that enabled prolonged stability and improved electrical properties in photovoltaic junctions based on colloidal quantum dots. That process is now patented and licensed to InVisage, Inc. Before joining Dalhousie University in August 2016, Koleilat did her postdoctoral training at Stanford University where she investigated the properties of single walled carbon nanotubes and their potential in photovoltaics.



## Suzanne Grant



BSc Physics, CD Chair, Co-founder & CEO iBIONICS. Suzanne's curious and adventurous nature propelled her through a diverse career of discovery, travel and pushing boundaries. From Canadian Military engineering officer she pivoted to entrepreneurship creating – The Art of Business in a frontier market. This strategic communications agency helped fortune 1000 C Suite executives launch companies in emerging markets. Today, as CEO and cofounder of iBIONICS, Suzanne's mission is to return sight to blind people. She lives by her mantra – The Art of the Possible blending cutting edge technology and social change with making the world better. Suzanne has been frequently described as the person who makes things happen.

# **Career Panel**

#### **Patricia Burchat**

Patricia Burchat is the Gabilan Professor in the Physics Department at Stanford University. Her research focuses on studies of the Universe at both the smallest and largest scales, to probe two questions: What is the Universe made of? What are the laws of physics that govern the constituents of the Universe? She is part of a large international team of scientists preparing for analysis of data from the Large Synoptic Survey Telescope, which will provide the most extensive census of the Universe to date. She and her collaborators will use these data to investigate the nature of dark matter and dark energy, and the cosmological evolution of the Universe.

Patricia Burchat grew up in Barry's Bay, Ontario (a couple of hours west of Ottawa). She is a "first-gen" high school graduate. She received her Bachelors degree in Engineering Science at University of Toronto in 1981, and her PhD in Physics from Stanford University in 1986.



## Christine Couture Moderator

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Christine Couture holds an undergraduate degree in science, physics honours, from the University of Ottawa as well as an undergraduate and a master's degrees in piano performance from McGill University. She has won numerous music competitions and festivals, and taught piano privately for many years. She is now the SUNLAB research office manager and NSERC CREATE TOP-SET program coordinator at the University of Ottawa, as well as a researcher and report writer for Viridis Environmental.

# **Diversity Panel**

## **Anthony Bonato**

Anthony Bonato's research is in network science and graph theory. He has authored over 110 publications with 70 co-authors. His books "A Course on the Web Graph" (2008) and "The Game of Cops and Robbers on Graphs" (2011, joint with R. Nowakowski) were published by the American Mathematical Society, and "Graph Searching Games and Probabilistic Methods" (2017, joint with Paweł Prałat) was published by CRC Press. Dr. Bonato is currently a full Professor in the Department of Mathematics at Ryerson University, and writes the blog The Intrepid Mathematician. In addition to his blogging, he has also written articles in The Conversation which have had 100,000 views. Some of these articles were featured in the National Post, a newspaper read across Canada and globally.



## Samar Safi-Harb

**INDITATION** 



Dr. Samar Safi-Harb is a Professor in the Department of Physics and Astronomy at the University of Manitoba. She is an astrophysicist whose research focuses on understanding the aftermath of supernova explosions and probing the most extreme, exotic and energetic phenomena in the Universe. Dr. Safi-Harb received her undergraduate degree in Physics at the American University of Beirut and pursued her graduate education at the University of Wisconsin-Madison. She subsequently held a National Research Council Fellowship at NASA's Goddard Space Flight Centre in Maryland, before moving to the University of Manitoba, as NSERC University Faculty Award fellow – followed by a Canada Research Chair position – to lead to the development and establishment of a new astrophysics program.

# **Diversity Panel**

## Deanna Burgart

Deanna Burgart P.Eng, CET is self-proclaimed Indigeneer™; engineer, speaker, and mentor that has a talent for identifying gaps and providing solutions to systemic, organizational and transformational change. She brings over 20 years of experience and education in oil, gas, and pipelines and is passionate about the UN Sustainable Development Goals and UN Declaration of Rights of Indigenous People. She helps STEM (Science, Technology, Engineering and Mathematics) focused organizations and educators operationalize Indigenous inclusion in their work.



## **Adina Luican-Mayer**

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Adina Luican-Mayer started as an assistant professor in the Physics Department at uOttawa in January 2016. She received her undergraduate degree from Jacobs University Bremen in Germany (2006) and her PhD in Physics from Rutgers University in the Unites States (2012). Previously to joining uOttawa, she was the Alexei Abrikosov postdoctoral fellow at the Center for Nanoscale Materials at Argonne National Laboratory in Chicago. Her research group focuses on uncovering the novel electronic properties of low-dimensional systems custom made by stacking atomically thin sheets of van der Waals materials using scanning probe microscopy and supporting spectroscopic techniques.

# LGBTQ+ Round Table Workshop

## **Lindsay LeBlanc**

Dr. Lindsay LeBlanc is an assistant professor of Physics at the University of Alberta and Canada Research Chair in Ultracold Gases for Quantum Simulation. Her research explores the foundations and applications of quantum mechanics using ultracold quantum gases. Lindsay grew up across Canada's prairie provinces and attended the University of Alberta as an undergraduate in Engineering Physics. She turned to pure physics for her Master's and PhD degrees at the University of Toronto, and completed a postdoctoral fellowship with the Joint Quantum Institute at the NIST labs in Gaithersburg, MD, USA.



## A.W. Peet

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A.W. Peet is a Professor of Physics and Mathematics at the University of Toronto in Ontario, Canada. They grew up in the South Pacific archipelago of Aotearoa/New Zealand, and earned a B.Sc.(Hons) in physics from the University of Canterbury there before moving to the USA in 1990 to pursue a Ph.D. in physics at Stanford University. They then did postdocs at Princeton University and at the University of California Santa Barbara, before moving to Toronto in 2000. Their research expertise is in theoretical subatomic physics, and their work in gravitational string theory focuses on quantum black hole physics and AdS/CFT holography.

# LGBTQ+ Round Table Workshop

## **James Maldaner**

James received his undergraduate degree in Engineering Physics from the University of Alberta in 2015. After taking 2 years off to work he started his post-graduate work in the Department of Electrical Engineering and Department of Physics as part of the Quanta Program at the University of Alberta.



## **Mel Abler**

u Ottawa



Mel Abler is a fifth year doctoral researcher at Columbia University focusing on experimental studies of turbulence and nonlinear wave coupling in plasmas, particularly as these studies relate to planetary magnetospheres and other astrophysical phenomena. They graduated from the University of Wisconsin – Madison in 2014 with degrees in Engineering Physics and Astronomy-Physics. Both inside and outside the lab, Mel is a passionate and successful advocate for increased inclusion in physics. They co-founded student chapters of oSTEM (out in Science, Technology, Engineering, and Mathematics) at both Wisconsin and Columbia, brought the You Are Welcome Here campaign to Columbia, and served on the local organizing committee for the 2018 CUWiP NYC site.

## Vincent Tabard-Cossa Tinkering/DIY Workshop

Vincent Tabard-Cossa is an Associate Professor in the Department of Physics with a cross- appointment in Electrical Engineering and Computer Science at the University of Ottawa He received his B.Sc. (2000) and Ph.D. (2006) from McGill University and was a postdoctoral fellow at UBC (2006-2008) and Stanford (2008-2010) before joining uOttawa in 2010. His research program is dedicated to developing novel techniques and advanced nanofluidic devices to characterize single-molecules, to unravelling the physics governing the behaviour of biological molecules, and ultimately to translating these discoveries into new technologies.



## Karin Hinzer Networking Workshop



Karin Hinzer received her BSc, MSc, and PhD degrees in physics from the University of Ottawa, Ottawa, Ontario, Canada, in 1996, 1998, and 2002, respectively. She is a Professor at the School of Electrical Engineering and Computer Science with a cross-appointment in the department of Physics at the University of Ottawa. She has made pioneering contributions to the experimental physics of quantum dots marked by two landmarkpapers in Science. She gained extensive experience in the design and fabrication of group III-V semiconductor devices while at the National Research Council Canada, Nortel Networks and then Bookham (now Oclaro). Cost reduction strategies and liaison with remote fabrication facilities strongly feature in her industry experience.

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# **Mental Health Workshop**

## **Elisabeth Beach**

Elisabeth Beach is the Student Mental Health Counsellor with the University of Ottawa Health Services. She provides support for students with their academic and mental health needs. Previously, she worked at The Royal Ottawa Mental Health Centre and with the University of Ottawa Student Academic Success Services (SASS). She graduated from the University of Ottawa with a Masters in Counselling Psychology in 2015.



## Dasa Riadi Kamarwan Moderator

Dasa Riadi is a BSc student currently studying Mathematics and Economics at the University of Ottawa and is one of the executives of CCUWiP 2019. He has worked with numerous student organizations and campus organizations; namely the Science Students' Association and the University of Ottawa Human Rights Office. Currently, he is the fundraising co-ordinator for the SSA, and a sexual harassment prevention workshop leader at the human rights office, and as such he is a passionate advocate for equality of every human being.





Elisabeth Girgis-McEwen is a professional engineer active in advancement of science for public interest. She has technical expertise in modeling of energy consumption of Canada buildings and combustion of wood. She has worked for over 15 years often as the only women on technical teams. She holds a Master's of Applied Science and a graduate diploma in public management and governance both from the University of Ottawa. She has received awards from the National Research Council and Natural Resources Canada for advancing energy efficiency in Canada as well as a Bromley fellowship to share in Washington D.C. her observations on stakeholders involvement at the science policy interface.

# **Grad & Industry Fair**

## Graduate Schools

University of Ottawa Carleton Queens University of Saskatoon Dalhousie Univerity of Manitoba Stanford University of Guelph/Waterloo Western University University of Toronto Simon Fraser University Université de Sherbrooke Concordia Ryerson

McMaster University York University of Alberta McGill University NYU Tandon School of Engineering Trent University



# **Student Posters**

## Floor O

# Student

## Poster Title

Anastasia Smolina	Neurvascular Dynamics of Mild Traumatic Brain Injury
Emily Knuckey	Mobile In Situ Air Measurements Throughout the GTA
Sara Evans	High-speed preparation of ultra-thin uniform polymer fibers for advanced materials development
Zoe Wright	Continuation of Overshoot Models of Delta-Scuti Stars
Samantha Crook	Low Z Elements in Human Nail Samples
Brynne Blaikie	Preparations for the Calcium Radius Experiment (CREX)
Gabrielle Fontaine	Lung Tumour Motion Tracking and Compensation With an Optical Flow Algorithm
Seery Chen	Distances to 47 Tucanae and NGC 362 with Gaia Parallaxes
Rebecca McFadden	Improving accuracy of ocular radiation treatment plans
Lindsay Babcock	Free Space Quantum Key Distribution Demonstrator
Niloufar Rostam Shirazi	Ultrasonic Characterization of bubble solutions
Jonathan Classen-Howes	The Conformal Bootstrap: An Exciting Technique in Theoretical Physics
Marisa Dusseault	FTIR: a prescreening tool for chemical analysis of archaeological mollusks
Elsie Loukiantchenko	Inkjet printing of conductive nanocellulose inks for flexible electronics
Eloise Chakour	Applying Random Matrix Theory to the SYK Model
Helena Koniar	Cavitation Bubble Dynamics in Water during Burst-Mode Ultrafast-Pulse Laser Ablation

# Student Talk Schedule

	STM224	STM364	STM201	STM564	STM664
12:30-12:40	Solid State and Quantum	Biological and Medical physics	Astrophysics or Cosmology	Biological and Medical physics	Atmospheric Physics
	The Conformal Bootstrap: An Exciting Technique in Theoretical Physics	Properties of spiral capillary water waves produced by whirligig beetles	New Tools to Analyze the Line Profiles of The Diffuse Interstellar Bands to Determine Their Carrier Molecules	The Biophysics of the Ear	Modelling of Ice Arches in a Changing Climate
	McGill University	McMaster University	St. Francis Xavier University	York University	University of Toronto
	Jonathan Classen- Howes	Yasmeen El-Rayyes	Heather MacIsaac	Tarnem Afify	Kaitlin McNeil
12:45-12:55	Solid State and Quantum	Biological and Medical physics	Astrophysics or Cosmology	Machine Learning - Other	Applied and Engineering Physics
	The first step to quantum dot (QD) quality assurance: blasting it with a laser	Mobility of the Bicoid Morphogen in Live Fly Embryos under Introduced Perturbations	The Effects of Rotation and Metallicity on Convective Overshoot in Models of Delta Scuti Stars	Machine Learning - The Future of Physics Education Research	A problem in metal 3D printing gone with the wind - optimization of inert gas flow for selective laser melting
	Queens University	McMaster University	Mount Allison University	Queens University	McGill University
	Sandra Cheng	Helena Koniar	Veronika Dornan	Hadiya Ma	Yilin Wang
13:00-13:10	Solid State and Quantum	Biological and Medical physics	Astrophysics or Cosmology	Accelerator Physics	Materials Physics
	Maximizing Time Delays for Toy Models of Quantum Scattering	Inverse Ecology using Mutual Information	A search for giant pulses in PSRB1133+16	Designing Scrapers for the Canadian Light Source	FTIR: a prescreening tool for chemical analysis of archaeological mollusks
	Queens University	Simon Fraser University	University of Toronto	University of Sasketchewan	Memorial University of Newfoundland
	Erin Crawley	Suemin Lee	Caroline El Khoury	Chelsea-Lea Randall	Marisa Dusseault
13:15-13:25	Solid State and Quantum	Biological and Medical physics	Astrophysics or Cosmology	Particle and Nuclear	Applied and Engineering physics
	Stamping suspended 2D heterostructures, towards cavities to enhance light absorption by graphene	Buckling Behavior of Hydrated Collagen Fibrill	Applying Random Matrix Theory to the SYK Model	Characterization of Radiation Damaged Silicon Microstrip Detectors	Demonstrating slot-die coating as an efficient technique to fabricate perovskite solar cells
	Concordia University	Dalhousie University	McGill University	University of Toronto	Dalhousie University
	Fernanda Rodrigues Machado	Eva Lee	Eloise Chakour	Clara Chung	Daphne Palaco-Tobia
13:30-13:40	Solid State and Quantum	Biological and Medical physics	Astrophysics or Cosmology		
	Transmission Helium Ion Microscopy: Milling Analysis	The Origin of Life: Bridging the Gap Between Nucleotides and Protocells	The intermediate-mass binary star Capella: an example of binary evolution of an evolved magnetic Ap star?		
	Simon Fraser University	McMaster University	Queens University		
	Symphony Huang	Renée-Claude Bider	Olivia Lim		
13:45-13:55		Biological and Medical physics	Astrophysics or Cosmology		
		Seeing the "Sound" of Light	Improved surface gravity and mass constraints for substellar objects from spectral line prole measurements at high resolution in the near- infrared		
		University of Waterloo	University of British Columbia		
		Martin Le	Jessica Speedie		

# Lab Tours



# **Planning Committee**



## Emily Zhang - Co-Chair

## Co-Chair - Amina Berrada



## Finance - Aazad Abbas



Joshua Baxter - Website





# **Planning Committee**





## **Registration-Codey Nacke**



## RJ Obhi - Sponsorship

## **Communications- Maria Ramirez**



## Jeremy Rioux - Icebreaker

## Sponsorship - Olga Shanets

# **Planning Committee**



## Kristen Stecher - Sponsorship & Delegate Relations

## Website - Ruya Tosun



Thanks to all of our wonderful volunteers, professors, advisors and staff from uOttawa, CAP and APS



# A MESSAGE FROM THE CAP:

The CAP staff are looking forward to seeing you at the 2019 CCUWiP!

We are using this event as an opportunity to engage you in a project that helps both the CAP and your local community while raising the profile/visibility of your physics department. What do we mean?

When the CAP introduced a new brand last year that included an updated logo, a supply of Congress tote bags we had on hand became obsolete. We would like your help in disposing of these bags in a positive and ecologically-friendly manner.

# We invite you to make a difference and capture your contribution in a photo for our giving wall to be posted on our website on February 14!

Instructions for the challenge are as follows:

## **STEP 1: DONATE!**

Delegates will be offered a large beige CAP Congress bag filled with your conference registration information, including a keepsake CCUWiP conference bag donated by the CAP. If you accept/keep the beige bag, you are accepting our challenge to take that bag home and have your physics department (or friends/family) fill it to capacity with items that can be used by a local charity of your choosing (e.g. food banks, homeless shelters).

## **STEP 2: PHOTO**

Take a group photo with the filled CAP bag (or bags if multiple bags are filled within the same department), either at the location where the bag(s) were filled or at the charity drop-off location. We would also ask that you prepare and include a sign that says "Physics students at the [name of university] proudly participated in the CAP Charity Challenge by supporting xxxxx". The CAP logo can be included on your sign by down-loading it from the Charity Challenge page at www.cap.ca/ccuwip.

## **STEP 3: POST!**

Post your photo to social media with the hashtag **#CAPChallenge** and make sure to tag us on Facebook or Twitter so we see it (@CAPhys, @CCUWIP2019). To initiate the challenge, we will post a group photo at CCUWiP where delegates who plan to participate are holding their tote bags. We will use the photos posted on social media – or any submitted directly to comms@cap.ca – by **FRIDAY FEBRUARY 4TH** to create a "Wall of Giving" that will be posted on our website on February 14th.

# IN PARTNERSHIP WITH



# THANK YOU TO OUR SPONSORS



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UNIVERSITY OF WATERLOO











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CINP

**GRADUATE STUDIES IN PHYSICS** 





# **IN-KIND SUPPORT**









We look forward to seeing you on January 18-20!

# **CONTACT US**



ccuwip@uottawa.ca



facebook.com/ccuwip



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# THANK YOU FOR COMING



**TOMETON** 

# **Career Panel**

## **Ruth Chmara**

Ruth Chmara, BASc in Chemical Engineering, BEd. Ruth is a senior science and math teacher at Notre Dame Catholic High School in Carleton Place. She has been sharing her passion for chemistry, physics and math with students for 20 years, hoping to inspire students to continue in the fields of science and engineering. She has served as Head of Math for six years, and continues to serve as Head of Science, a position that she has held for 15 years. Ruth knows that teaching involves more than just the classroom, and has been part of Notre Dame's drama productions for 12 years- involved in costuming and vocal coaching. This year she has launched a robotics club for the school. Ruth believes that play is an excellent method of learning, and tries to keep fun in the classroom!

