

Interactions

Message from the Chair



Welcome to the Spring 2019 issue of Interactions, the Department of Physics newsletter! As I write this, lectures have just ended and final exams are beginning. As is traditional for this time of year, there are a number of Outreach events coming up which you are warmly invited to attend, and are detailed in this Newsletter: in particular, the annual Welsh Lectures, Science Rendezvous, Doors Open Toronto and Kids Passport. We hope to see many of you at one or more of these activities.

Also in this newsletter you can read a profile of our newest faculty member, Miriam Diamond, whose research involves searching for Dark Matter at the SNOLAB facility in Sudbury. We also profile students Yiling Huo (Atmospheric and Planetary Physics) and Michael Poon (Astronomy and Physics), as well as alumnus Vijay Shankar Venkataraman.

At the end of June I'll be stepping down in my role as Acting Chair, and Kim Strong will begin her five-year term as Chair. It's been a pleasure being part of the administration of this department again, and working closely with the faculty and staff in Physics. I wish you all the best for the summer and the coming year.

Yours Sincerely,

Michael Luke

YOU ARE INVITED - WELSH LECTURES 2019



Anny Cazenave



Donna Strickland

Thursday, May 2, 2019
1:00pm
Earth Sciences Auditorium
1050
5 Bancroft Avenue

Speakers

Professor Anny Cazenave (French Space Agency, CNES) - is a pioneer in the field of satellite altimetry which is used to measure global sea level rise. Her work has had an enormous impact on discussions of climate change.

Professor Donna Strickland (University of Waterloo) - is a co-recipient of the 2018 Nobel Prize in Physics for her work on creating ultra-intense laser pulses with applications to medicine and technology.

Continued on next page.

Upcoming Events - you are invited!

2019 Welsh Lectures

Talk: Climate Change, Ocean Warming, Land Ice Melt and Sea Level Rise

Professor Anny Cazenave (French Space Agency, CNES)

In this presentation, we summarize the most up-to-date knowledge about climate change and associated impacts on ocean warming, land ice melt and sea level rise. We highlight the contribution of space observations, in particular from satellite altimetry and space gravimetry, to measure ice sheet mass loss and sea level rise. We also discuss the various causes of sea level rise at global and regional scales and show that in terms of global average. Finally, we discuss the importance of measuring sea level change at the coast, as well as the many complex processes at work in such regions (due to natural phenomena and anthropogenic forcing) that cause important adverse effects and significant vulnerability to coastal populations.



Talk: Generating High-Intensity Ultrashort Optical Pulses

Professor Donna Strickland (University of Waterloo)

With the invention of lasers, the intensity of a light wave was increased by orders of magnitude over what had been achieved with a light bulb or sunlight. This much higher intensity led to new phenomena being observed, such as violet light coming out when red light went into the material. After Gérard Mourou and I developed chirped pulse amplification, also known as CPA, the intensity again increased by more than a factor of 1,000 and it once again made new types of interactions possible between light and matter. We developed a laser that could deliver short pulses of light that knocked the electrons off their atoms. This new understanding of laser-matter interactions, led to the development of new machining techniques that are used in laser eye surgery or micromachining of glass used in cell phones.



Thursday, May 2, 2019

1:00-4:00pm

Earth Sciences Auditorium 1050

5 Bancroft Avenue

For more information, visit:

<https://welsh.physics.utoronto.ca/>

Science Rendezvous



Saturday, May 11, 2019

11:00am-4:00pm

Department of Physics

60 St George Street

[Science Rendezvous](#) is a free annual outreach exhibition hosted by over 30 universities and institutions across Canada, attracting over 30,000 visitors last year to the University of Toronto site alone. Its primary purpose is to spur children's interest in S.T.E.A.M. (Science, Technology, Engineering, Art, and Math) disciplines, and to improve scientific literacy in the general public by making science more accessible and interactive. The Department of Physics will be participating again with exciting demos for children of all ages and their parents. All are welcome to attend!

Doors Open Toronto

**Saturday, May 25 and Sunday,
May 26, 2019**

10:00am-5:00pm

Department of Physics

60 St George Street

The Department of Physics will be taking part in The 20th annual [Doors Open Toronto](#). Presented by Great Gulf, Doors Open provides an opportunity to see inside some of Toronto's most architecturally, historically, culturally and socially significant buildings across the city.



Kids Passport

Saturday, June 1, 2019

9:30am-12:30pm

Department of Physics

60 St George Street

Alumni and their children are invited to Kids Passport to check out everything physics, from motion to superconductivity to discovering the amazing way the world works by playing with light and colour!



For more information on these events and other Outreach initiatives, visit:

www.physics.utoronto.ca/physics-at-uoft/outreach

Faculty Profile

Miriam Diamond

Assistant Professor

Astroparticle Physics



Welcome back to U of T Physics Dr. Diamond! You did your PhD in Elementary Particle Physics here at U of T Physics. What drew you to this field?

Ever since high school, I have been fascinated with trying to figure out how the universe works at its most fundamental level. The world seems so messy and nonsensical, and I have always thought, “there must be something more to it than this”. The laws of elementary particles and forces seem bizarre and counterintuitive at first, because of the way our minds are conditioned to process day-to-day life. But it’s nature that holds the truth, and it’s our worldview that is confused. Particle physics isn’t just a subject; it’s a window into the order that lies beneath the mess, it’s a way of perceiving what lies beyond the capacity of our senses, it’s a whole different perspective and mode of thought, it’s wonder and discovery and unravelling enigmas.

What was the best part of studying physics at U of T?

The camaraderie, supportive environment, and free exchange of ideas in the Physics Department. I enjoyed the frequent colloquia and seminars in various other interesting fields of physics, as well as in my own field. I was given the opportunity to

mentor undergraduate students, and also receive advice myself from faculty members. I found friends to offer me encouragement when I needed it. And of course, there was the PGSA Coffee Hour.

You just spent time at Stanford Linear Accelerator Center in Palo Alto, California. Can you tell our readers what type of work you did there?

I worked on the Heavy Photon Search experiment, which conducted engineering runs at Jefferson National Laboratory in 2015 and 2016 and is currently being upgraded for a full physics run in June. The experiment involves shooting a high-energy electron beam into a tungsten target, in hopes of producing low-mass dark matter or perhaps hypothetical new force carriers called “dark photons”. A highly sensitive silicon tracker and electromagnetic calorimeter placed behind the target aim to detect the decay products, namely electron-positron pairs, of this dark-sector stuff. The engineering runs demonstrated the experiment’s ability to perform two types of dark-sector searches, and the upgrade is proceeding on schedule.

In the Spring 2015 issue of Interactions, you appeared in the Graduate Student Profile:

<https://newsletter.physics.utoronto.ca/2016-spring/pdf/2016-04-Newsletter.pdf>

You told our readers about your work as an official author on the ATLAS collaboration. Has there been any updates to your work since then and are you still involved?

I am no longer a member of the ATLAS collaboration, and the Large Hadron Collider recently began a two-year-long shutdown for upgrades and repairs. That being said, research teams are currently analyzing data from the run that the collider just completed. My work, looking for dark photons using “lepton-jets” produced in the particle collisions, is one of many searches now being extended by these teams using the new data. Stay tuned for the results – with the huge volumes of data involved, the analyses take time.

Faculty Profile continued....

What research and or discoveries are interesting to you today?

The decades-long search for dark matter particularly fascinates me, because it's essentially the greatest treasure hunt in history to find what makes up a quarter of the universe. Thanks to my work at SNOLAB (Sudbury Neutrino Observatory), Canada's world-leading astroparticle physics facility, I closely follow neutrino research as well. Neutrinos are invisible subatomic particles with tiny masses, which hardly interact with other matter and spontaneously switch back and forth between at least three different flavours – in other words, neutrinos are mysterious, mischievous, and small, somewhat like me! Still in the world of particle physics but outside my particular field, I follow the Large Hadron Collider analyses of the properties of the recently discovered Higgs Boson. On the astrophysics side, gravitational waves and multi-messenger astronomy constitute by far the biggest news of the past couple years. I also keep up with news from the space exploration missions, most recently New Horizons. Then there's my "hobby", reading about the

ongoing quest for the quantum computer and bugging the Quantum Optics folks in the McLennan basement.

What are your research plans at the University of Toronto?

I will be dedicating most of my research time and resources to SuperCDMS, a "direct-detection" experiment that looks for interactions of WIMPs (Weakly Interacting Massive Particles) and lower-mass dark matter particles in germanium and silicon crystals. Sensors attached to the crystals detect vibrations and electric charges from these interactions. They are operated in well-shielded units deep underground, to avoid bombardments of cosmic rays that could confuse the detectors, and are kept at liquid helium temperatures. SuperCDMS operated in a Soudan, Minnesota laboratory until 2015, performing world-leading dark matter research. Now, the collaboration is building an even more powerful version of the experiment in SNOLAB, located 2 km underground

in the Vale Creighton Mine near Sudbury. Much of the project's construction is now complete, with commissioning scheduled to begin in early 2020. A test facility will be operating even sooner in SNOLAB to support the detector development and characterization. My SuperCDMS group at the University of Toronto will be working alongside groups from several other Canadian universities, playing a leading role in the international collaboration. We will focus on scientific computing, data acquisition, and data analysis, and will provide on-site support to commission the equipment and take operations shifts. Our team will be deeply engaged in the search for evidence of dark matter in the data collected by the experiment starting in 2020 and spanning the next decade.

What is one thing that you missed about Toronto while you were in California?

All my Torontonians friends and colleagues!

Emeritus Update



Congratulations to Professor Emeritus Rashmi Desai, a fellow of the American Physical Society (APS), who was recognized by the APS in 2018 for his 50th year as a member (1968-2018). Since 2009, Professor Desai has also been a fellow of the Senior College at the University of Toronto.

When asked what else he has been up to, Professor Desai told Interactions "I am just enjoying my retirement by learning more Physics from other people's research!"

We would love to hear from more of our Emeritus Faculty and include updates in our newsletter. Please email newsletter@physics.utoronto.ca and let us know what you have been up to!

Graduate Student Profile

Yiling Huo Ph.D. Atmospheric and Planetary Physics



Yiling Huo

Yiling Huo is a Ph.D. student with Professor W. Richard Peltier in the Earth, Atmospheric and Planetary Physics group. Her research is focused on the global warming impact on the monsoon system over Asia. She was inspired to pursue physics by her high school physics teacher, who was great at using seemingly trivial everyday situations to illustrate fundamental physics laws. His infectious passion and curiosity motivated Yiling to

continue the path down to physics. Growing up in a city strongly affected by the East Asian monsoon, she then decided to specialize in atmospheric physics.

She did her undergraduate degree in Atmospheric Sciences at Nanjing University, China. While writing her thesis, she read about Prof Peltier's pioneer work in Earth system science. After visiting U of T and talking to him, his broad research interests and his openness to all sorts of questions and discussion made his research group more appealing to Yiling.

During her tour of U of T, she also found that the Physics Department has many people who are excited about and devoted to global climate studies, and was impressed by the various research opportunities and the advanced computing resources, which are essential to climate modeling. This, combined with Yiling's personal interest in the impact of global warming, made U of T a great place for her graduate studies.

Her current research focuses on understanding how the global warming process is expected to change the Asian monsoon system. More specifically, she runs regional and global climate models at the SciNet High Performance Computing facility in Toronto. Based on these model output, she investigates the sensitivity of the projected change of the Asian monsoon to the implementation of different parameterization schemes for processes that are not explicitly resolved at the spatial resolution at which the regional climate model is integrated. She is also interested in analyzing the impact of the warming process on average monsoon precipitation and extreme precipitation events. She finds the topic very interesting and critical, given the complex orography and the extreme concentration of population over Asia. This makes the future evolution of the Asian monsoon both challenging to project technically and critical to accurately understand.

When not working, Yiling likes to go hiking, play table tennis and badminton. Her new hobby is teaching herself French through online courses.

Undergraduate Student Profile

Name: Michael Poon

Program: Astronomy and
Physics Specialist



Michael Poon

Why did you decide to major in Physics? What was your inspiration?

Like many, I've always had a wonder and marvel for the night sky above. We understand many things pretty well here on Earth but are still quite naïve when it comes to the large-scale universe. What drew me into physics is how we can develop a detailed understanding of the phenomena around us from first principles. For example, let's consider the detection of extrasolar planets. Looking at how the light from a star changes over time, we can detect these exoplanets by observing dips in brightness as they pass by their star! That's pretty amazing, being able to use basic principles like light, velocity and time to geometrically learn about a whole new world many light years away. And recently, I learned that we can also detect the rings of these exoplanets by looking at sharp upward peaks within it's dips! Physics is this wonderful tool that allows us to bridge the gap between child-like wonder and deeper understanding.

What do you enjoy most about the physics program?

I was initially attracted to the University of Toronto St. George campus due to its big name and mentions of rich opportunities in research. When I approached various professors while in first year to do summer research in astronomy, I was quite amazed at how empathetic and down-to-earth they were. Although I didn't have the best marks,

I realized that the child-like wonder I mentioned and consistent initiative in reaching out was much more important and valued. Just by showing interest in their field, two professors invited me to their research group meetings where I was able to peek behind the scenes of research. I was very humbled and amazed to realize that academics weren't the stark stereotypical caricature that the media often portrays, but diverse, light-hearted (and often joking-around) ordinary people that shared my similar child-like wonder and wanted to develop a deeper understanding of the universe around them.

What other extra-curricular activities are you involved in during your degree?

I'm an active member of the University of Toronto Breakdance Club and enjoy entering dance battles organized in the GTA. Surprisingly, most of the members are engineers and we spend a lot of time talking about the details of angular momentum and how it helps us spin faster on our heads!

What are your research interests?

I'm primarily interested in exoplanets, that is, the study of planets around stars excluding the sun. I think studying them is a lot like looking in the mirror, and learning about our planet Earth's past and future. Our lifetimes are merely a snapshot in the life of the universe and by studying distant worlds, we can better understand the life cycle of our own, and how it fits into the bigger picture. Turns out, the planets in our solar system are much like mismatched jigsaw puzzle. We don't observe many planets similar to ours and I think that's quite interesting.

What is your favorite course and why?

Definitely AST221 – Stars and Planets. Prof. Yanqin Wu pushed our class to develop a deep physical understanding and intuition of the stellar and interstellar world around us, making timescales such as thermal cooling of a star and processes like nuclear fusion second nature.

What are your future plans?

I'd like to pursue astronomy research as much as possible in undergrad. I got super lucky to work at the Canadian Light Source Synchrotron in high school, research with Prof. Jo Bovy on galactic dynamics in first year and develop data visualization tools for the Dragonfly telescope in second year. I hope this inspires fellow undergrads that research is possible early on and that there are many friendly faces in faculty that love working with imaginative and inspired students.

Where do you see yourself in 10 years?

Hopefully still doing astronomy research, and on the verge of discovering something new every day!

Tell me something interesting about yourself.

I was a finalist in the Breakthrough Junior Challenge in 2015. Competing to make the best scientific educational video, I talked about chromatic aberration in an image I took of Saturn and almost won \$400,000!

Alumni Profile

Vijay Shankar Venkataraman

PhD



Vijay Shankar Venkataraman

Alumni Vijay did his PhD under the supervision of Professor Hae-Young Kee.

Thanks for talking to Interactions Vijay. Why or how did you become interested in physics

Growing up, I was always tinkering with something or another, so I guess I had some sort of natural interest in figuring out how things worked. One of my friends in middle school was really into geometry puzzles, and got me hooked on to mathematics. Looking back, physics seemed like a natural progression, but the catalyst was a high school teacher who opened me up to the world of how simple mathematical models can explain natural phenomena. He also had the ability to convey the fun that can be had while trying to solve physics problems.

What you are doing now?

After my Ph.D., I transitioned to the private sector and currently work as a data scientist at PagerDuty, where I help build data driven solutions to business problems. Data science is a challenging field that uses mix of statistical modeling and computer science techniques to solve business problems. This area attracts a lot of physics grads now because of their comfort level with mathematical modeling and

programming, although a physics background can sometimes be a hindrance because of the years spent thinking about building causal models.

You also mentor undergraduate students in the Physics Mentorship Program. Tell us why did decided to be a mentor?

A lot of mentors have helped me navigate the choices involved as one begins a career. Mentorship is my way of paying some of that debt forward, by sharing the key questions that have helped me make career decisions.

I find that being a mentor also helps me keep in touch with how the younger generation is thinking about their choices and opens me up to some new perspectives.

What are your hobbies or non-physics interests?

Outside of work, I love reading science fiction, biking around the city, and exploring the outdoors.

I also seek out opportunities to work with various volunteer-driven educational organizations that aim to make science and mathematics more engaging (primarily for school aged children) by incorporating play-driven activities.

Interactions encourages all alumni to reach out and tell us what they are up to.

Email :

newsletter@physics.utoronto.ca

Let us know where your physics degree took you!

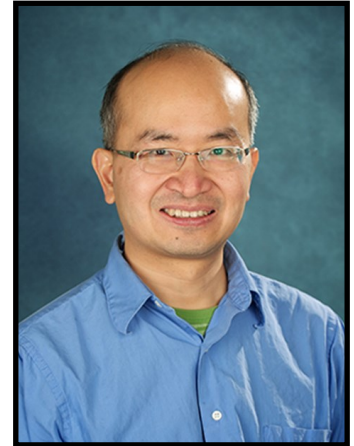
Awards and Recognitions

Professor Hoi-Kwong Lo has been elected Fellow of the American Physical Society

Department of Physics Professor Hoi-Kwong Lo has been elected Fellow of the American Physical Society (APS) by the APS Council of Representatives at its September meeting upon the recommendation of the APS Division of Quantum Information (DQI).

This prestigious recognition by his peers is for Professor Lo's numerous fundamental contributions to the theory and practice of quantum cryptography, as well as contributions to the theory of entanglement and quantum communications.

The number of APS Fellows elected each year is limited to no more than one half of one percent of the membership. Congratulations Professor Lo!



Professor Hae-Young Kee has been elected Fellow of the American Physical Society

This prestigious recognition by her peers is for Professor Kee's contributions to the theory of quantum materials including unconventional superconductors, nematic electronic phases, and novel topological phases that result from interplay between strong electron-electron interactions and spin-orbit coupling.

The number of [APS](#) Fellows elected each year is limited to no more than one half of one percent of the membership. Congratulations Professor Kee!

Please visit Professor Kee's website for more information on her research:
<http://hykee.cqm-uoft.ca/>



Professor Pierre Savard among those named new Canada Research Chairs

Created two decades ago, the Canada Research Chairs program is the centre piece of the federal government's strategy to make Canada a leader in research and development. The program seeks to attract and retain researchers in engineering and the natural sciences, health sciences, humanities and social sciences.

U of T holds the largest allocation of research chairs in the country, with some 275 chairs awarded to the university and its partner hospitals. Of the 21 new and renewed chairs awarded to U of T, half went to women and nearly 60 per cent supported emerging researchers.

Among the recipients is U of T Physics Professor of Experimental High Energy Physics, Pierre Savard.

The full article from The Faculty of Arts and Science as well as the full recipient list can be found here:

<https://news.artsci.utoronto.ca/all-news/research-action-u-t-awarded-21-canada-research-chairs/>



Professor Pekka Sinervo Named to the Order of Canada

Pekka Sinervo was named to the Order of Canada for his contributions to particle physics and for his groundbreaking research in the study of heavier quarks.

About the Order of Canada

Created in 1967, the Order of Canada is one of our country's highest honours. Presented by the governor general, the Order honours people whose service shapes our society; whose innovations ignite our imaginations; and whose compassion unites our communities.

Close to 7 000 people from all sectors of society have been invested into the Order of Canada. Their contributions are varied, yet they have all enriched the lives of others and have taken to heart the motto of the Order: DESIDERANTES MELIOREM PATRIAM ("They desire a better country"). The striking six-point white enamel insignia they wear symbolizes our northern heritage and our diversity, because no two snowflakes are alike.

Please see Governor General Webpage for more information:

<https://www.gg.ca/en/media/news/2018/governor-general-announces-103-new-appointments-order-canada>

Pekka Sinervo

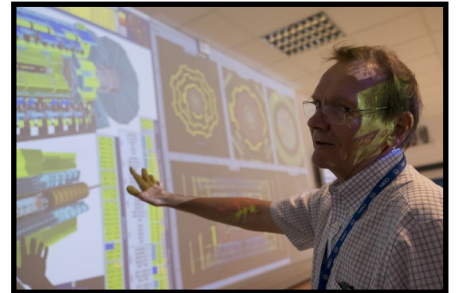
Professor Pekka Sinervo, of U of T's Department of Physics, is being recognized for decades of working to understand the basic building blocks of our universe – atoms, molecules and the like. With a focus on electromagnetic forces, Sinervo uses the Large Hadron Collider to study particle interactions at very high energies. Having written or co-written more than 1300 articles in peer-reviewed journals, his research group was involved in the discovery of the top quark, the heaviest known particle, and now uses the quark as a tool to search for evidence of new, massive particles. Sinervo is a former dean of U of T's Faculty of Arts & Science and, from 2008 to 2015, served as senior vice-president of research at the Canadian Institute for Advanced Research (CIFAR).



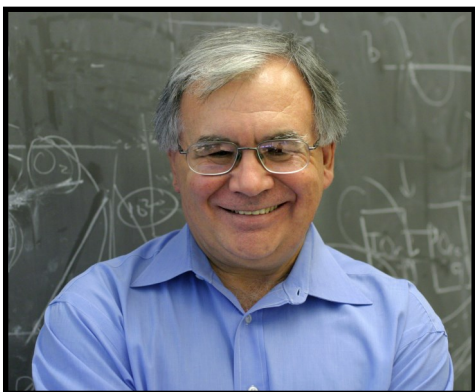
Right: Some members of the ATLAS Toronto group at CERN. From left to right facing the camera, Vincent Pascuzzi, Joey Carter, Pekka Sinervo, Laurelle Veloce and Kyle Cormier



Right: Pekka in the ATLAS Control Room at CERN explaining the monitoring data used to track the quality of the information collected by the detector



Professor Dick Peltier is the 2019 Recipient of the International Union of Geodesy and Geophysics (IUGG) Gold Medal



For his invaluable research contributions to the understanding of deep Earth physics and climate system processes, Professor Peltier of the Earth, Atmospheric and Planetary Physics Group has been awarded the IUGG Gold Medal. The medal is also a recognition for his contributions to international scientific collaboration.

Professor Peltier will be recognized at an award ceremony at the IUGG General Assembly in Montreal in July 2019 where he will also present the Gold Medal Lecture in the Symposium on the Mathematics of Planet Earth. Congratulations!

Past Events - 2018 Tuzo Wilson Lecture

Professor Stephen Morris organized his final lecture as the Tuzo-Wilson Chair on November 20, 2018.

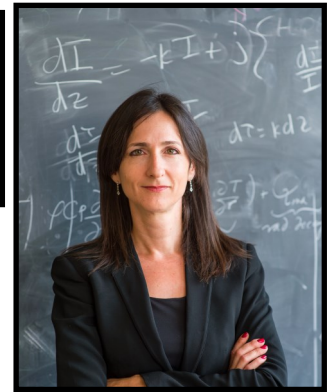
The Isabel Bader Theatre was full with members of the public, faculty and students, who were there to hear about exoplanets from astrophysicist and planetary scientist, [Professor Sara Seager](#) from MIT.

Professor Seager is one of the world's leading experts on the search for Earth-like planets that orbit nearby stars.

Professor Seager also did her undergraduate degree in Mathematics and Physics at the University of Toronto!

Did you miss the lecture or want to watch it again? You can stream it here:

https://youtu.be/J_6DiGAC_tc



Interview with Professor Stephen Morris

This was the final year of Professor Stephen Morris's Tuzo-Wilson Professorship. We asked him a few questions about his experiences over the last 5 years.

You held the Tuzo-Wilson Professorship for five years, what did this mean to you?

Being the Tuzo Wilson chair was a huge privilege. I was gobsmacked to be named chair. It was not something I had ever imagined would happen. I never knew Tuzo; only met him once for a few minutes when I was a very callow graduate student. Wish I'd taken a selfie! But of course, such things didn't exist in those days.

As chair, you were responsible for organizing the annual Tuzo-Wilson lectures, why are these lectures important?

The Wilson Lecture is one of only a few public events which the Department has to do outreach on a really large scale. We have a chance to do something really special to engage and excite people. There is nothing like a really good speaker to fire people up.

How do the lectures honour the life and work of J. Tuzo Wilson?

They keep his name current and remind people of the foundational work he did. Last year, we were able to bring a speaker who talked in detail about where plate tectonics is today, on the (approximate) 50th anniversary of Tuzo's work in the late 60's.

How have the lectures evolved over the years?

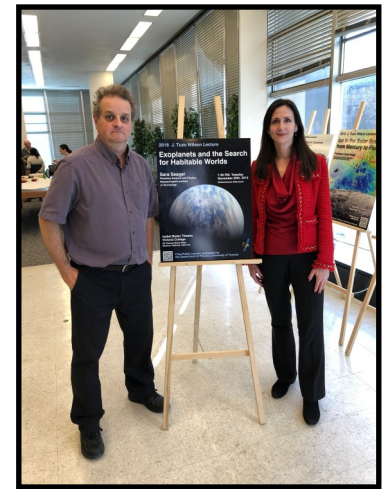
I am the last Tuzo Wilson chair who didn't know Tuzo well. We are entering the era when both chairs and speakers belong to a world in which exoplanets are hot and plate tectonics is textbook stuff. Science marches on!

Finally, in 2014, you delivered the first lecture at the start of your five year professorship, do you remember what it was about?

Of course I remember! It was a significant moment in my lecture-giving life! I talked about my work with Lucas Goehring on the dynamic cracking phenomenon that creates columnar joints - the famous lava columns found at places like the Giant's Causeway in Ireland.

What else do you remember about it?

Giving a big formal talk in a giant hall like Isabel Bader Theatre (500 seats) is quite a production. It focusses the mind wonderfully. It makes you appreciate just how much you are asking invited Wilson lecturers to do.



*Professor Stephen Morris and
2018 Wilson lecturer,
Professor Sara Seager*



*Five years of Tuzo-Wilson
Lecture posters from Stephen
Morris' time as chair*

For more information on the Tuzo-Wilson Lectures, visit:

<https://www.physics.utoronto.ca/news-and-events/special-events/lectures/tuzo-wilson>

Mentorship Program Mid-Term Party

The Mentorship Program Mid-Term Party was held on January 23, 2019. Prior to the party, students took part in a resume workshop that was facilitated by Jonathan Turner from U of T [Career Exploration and Education](#).

The Mentorship Program is a valuable program for 3rd/4th year physics students. Students are paired up with alumni, faculty and graduate student mentors to gain career advice.

Want to be a mentor? Contact: mentorship@physics.utoronto.ca



The Great Picture – Philosophical Issues in Modern Physics

On February 8th from 4-6pm in the Physics Grad Lounge, a panel of physics and philosophy professors discussed several issues in physics that are surprisingly philosophical: the nature of dark matter and dark energy, the role of observation in physics, and the status of physical laws. Several students and professors from various departments attended to enjoy some sushi and hear the discussion.

This event was organized by upper-year undergraduate students in the joint specialist program in physics and philosophy. This program is quite unique – it is the only joint specialist program between physics and a humanity, and one of two between philosophy and a STEM discipline.

The Greater Picture aims to showcase this joint specialist program and to increase awareness of the mutual benefit that physics and philosophy can offer to one another.



Panel (Left to Right) Michael Miller, David Curtin, and Michael Luke. Students standing at the podium introducing the discussion topics were Valentina Pentcheva and Hannah Fronenberg.

Prime Minister's Science Fair

First Year Physics student Zachary Trefler presented his research at the Prime Minister's Science Fair on Sep. 20, 2018. His poster was titled "VoiceShield: Teaching Computers to Distinguish Real Data from Fake".

Zachary attended high school at Waterloo Collegiate Institute where he had a great physics teacher (Mr. Burns). He entered his project in the school science fair and then into regional fair. The regional fair sent him to the Canada-Wide Science Fair, at which he received the Senior Challenge Award for Information and \$1000 from the Canadian Acoustical Association. From here, he received an invitation to the Prime Minister's Science Fair on Parliament Hill.



Science Minister Kirsty Duncan, Justin Trudeau and student Zachary Trefler

2018 Undergraduate Research Fair

The Undergraduate Research Fair was held on September 27, 2018 and was hosted by Jason Harlow and Pekka Sinervo. Results of undergraduate student research projects in Physics from the summer of 2018, and the 2017/18 academic year were showcased. Posters were judged and prizes were awarded for the top three posters. The event was well attended by faculty and graduate students.



First Place:

Helena Koniar

Cavitation Bubble Dynamics in Water during Burst-Mode Ultrafast-Pulse Laser Ablation

Supervisor: Robin Marjoribanks



Second Place:

Georgia Thomas

Impact of Ultra-High Contrast Optical and XFEL Laser Pulses on Ni Nanowire Targets, for High-Energy-Density Atomic Physics Studies

Supervisor: Robin Marjoribanks



Third Place:

Vanessa Clayton

Superconductivity and the Search for a Higher Critical Temperature

Supervisor: John Wei



Outreach in Action - Fall Campus Day

U of T's recruitment event, Fall Campus Day took place on Saturday, October 20, 2018 and it was a huge success. Around 3,000 people, consisting of parents and children came to campus throughout the day to learn about what U of T has to offer.

It is through events and interactions such as these, that U of T is able to attract the brightest students.

The Physics table was organized by Professor David Bailey and consisted of faculty and student volunteers and the



Outreach in Action - School Visits

Albert Campbell Collegiate Institute

On November 12, 2018, 65 grade 11 students were given a workshop on diffraction by graduate student Vijin Venu with assistance from Professor David Bailey. They were also given a full campus tour by undergraduate student Sasha Manu. The teacher of the class, Ann Tourleau said that students had a great day here!



Leaside High School

On November 19, 2018, 45 grade 11 students were given a workshop on Gravitational Lensing and Black Holes. The workshop was organized by graduate student CJ Woodford and run by graduate students: Eli Bourassa, Garrett Brown, Ilan Tzitrin and Laurelle Veloce. The students were also shown the telescopes and had a campus tour.



Victoria Park Collegiate Institute

On December 13, 2018, grade 11 and 12 students from Victoria Park Collegiate Institute were given a workshop on Gravitational Lensing and Black Holes. The workshop was organized by graduate student CJ Woodford and run by graduate students: Eli Bourassa, Garrett Brown, Ilan Tzitrin and Laurelle Veloce. They also got a glimpse of the telescopes and listened to talk by graduate student Haider Abidi, who went to Victoria Park when he was in high school.



In Memorium - Professor Roland List



Professor Roland List passed away on January 26, 2019.

Roland List was a professor in the Atmospheric Physics group from 1963 until his retirement in 1994. A graduate of ETH Zurich, he was a world expert in cloud microphysics, particularly the ice phase, and remained very active in research and service well into his retirement. The long list of honours achieved during his career include Fellowship in the Royal Meteorological Society UK, the American Meteorological Society and the Royal Society of Canada, as well as holding the position of Deputy Secretary-General of the UN World Meteorological Organization in Geneva from 1982-84. During his career he supervised 44 M.Sc. and 33 Ph.D. students.

Fall 2018 Interactions Newsletter Letters to the Editor

I have just read all of this publication and congratulate the editor, and the entire department for its numerous achievements in research, academics and accessibility to all its students. - Pat Sinervo

"I was a secretary for Geophysics Group for 20 years. I took an early retirement in 2008 and this year is my 10th year anniversary. In these 10 years, I did a lot of travelling: I visited countries in Northern Europe, Western Europe, Portugal & Spain. I visited Beijing, Nanking, Shanghai & Hong Kong. I took the bus tour from Toronto to Vancouver, then down to Seattle, across Yosemite all the way to Chicago, back to Toronto. I have a good time in my retirement. In November, Barbara organized a Dim Sum meeting for some of the retired Physics colleagues and we had a good time together. Do you still recognize us? We all love U of T especially Physics Dept., our family" - Maria Wong



Left to right:

Jennifer Tam, Barbara Chu, Maria Wong, Stephen Wong, Albert Chu, Cheryl Chen, Paul Chen.

"We wish the Dept.: all the professors, students, administrative staffs and technical staffs good health, happy and prosperity in the year 2019." - Paul Chen, Barbara Chu, Maria Wong and Jennifer Tam

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Physics Funny

What is a physicist's favourite food?

Answer: Fission Chips