EUREKA!

NEWSLETTER OF THE FACULTY OF SCIENCE

FALL 2012

The search for the elusive Higgs boson

CARLETON PHYSICISTS PLAY PROMINENT ROLE IN LANDMARK DISCOVERY

Carleton UNIVERSITY | Faculty of Science

Letter from the Dean

photo: Chris Strangemore

As we were pulling together stories for this issue of *Eureka!*, the latest news out of CERN, the European Organization for Nuclear Research, broke. The search for the Higgs boson took a giant leap forward this year and we updated our cover story to incorporate the latest details. The excitement around the office, and especially in our Department of Physics, was noticeable. Carleton faculty and students have been actively involved in this research project for years and we have followed their progress closely. One of our faculty members and several of our graduate students were at CERN at the time of the announcement and shared with us how exciting that was. It's times like this that remind us of the importance of banding together to search for answers to some of life's mysteries.

Our newest graduate program in Health: Science, Technology, Policy is all about collaboration as well. This program is designed specifically to bring together students from a variety of disciplines to work as a team to address current and relevant issues in the health sector. We are also welcoming the first undergraduate students in the new Neuroscience and Mental Health program, pursuing their studies in an area of great social importance.

Our students continue to make us proud as they head off in different directions to build on their studies. As you'll see in these pages, some recent graduates have moved on to medical school or master's programs. Others have gone further afield: one Biology PhD student is off to spend a year at the University of Wyoming on a Fulbright scholarship and a Chemistry PhD graduate is off to Stanford University to complete a Postdoctoral Fellowship.

Within our own office, we've had to say goodbye to two of our colleagues as Associate Dean (Undergraduate Affairs) Naomi Cappuccino finishes her three-year appointment guiding the Faculty's curriculum changes and addressing student issues and Assistant Dean (Recruitment and Retention) Sue Bertram comes to the end of her four-year term spearheading our recruitment drive and establishing a successful Science Student Success Centre. As both of them return to the classroom, we are pleased to welcome Chemistry professor Edward Lai and Computer Science professor Dwight Deugo who will take over their roles. As a new academic term begins, we look forward to the year ahead, to new partnerships, new programs and especially new discoveries.

Malcolm Butler
Dean, Faculty of Science

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On the cover

The Large Hadron Collider (LHC) is housed in a tunnel, 27 kilometres long and approximately 575 feet below the earth's surface, near the city of Geneva. Within the LHC, particle beams travel in opposite directions and collide, creating vast amounts of data which are analyzed by scientists from around the world.

photo: CERN

Your input is important!

Please send your feedback, letter to the editor or story ideas to ann_anderson@carleton.ca.

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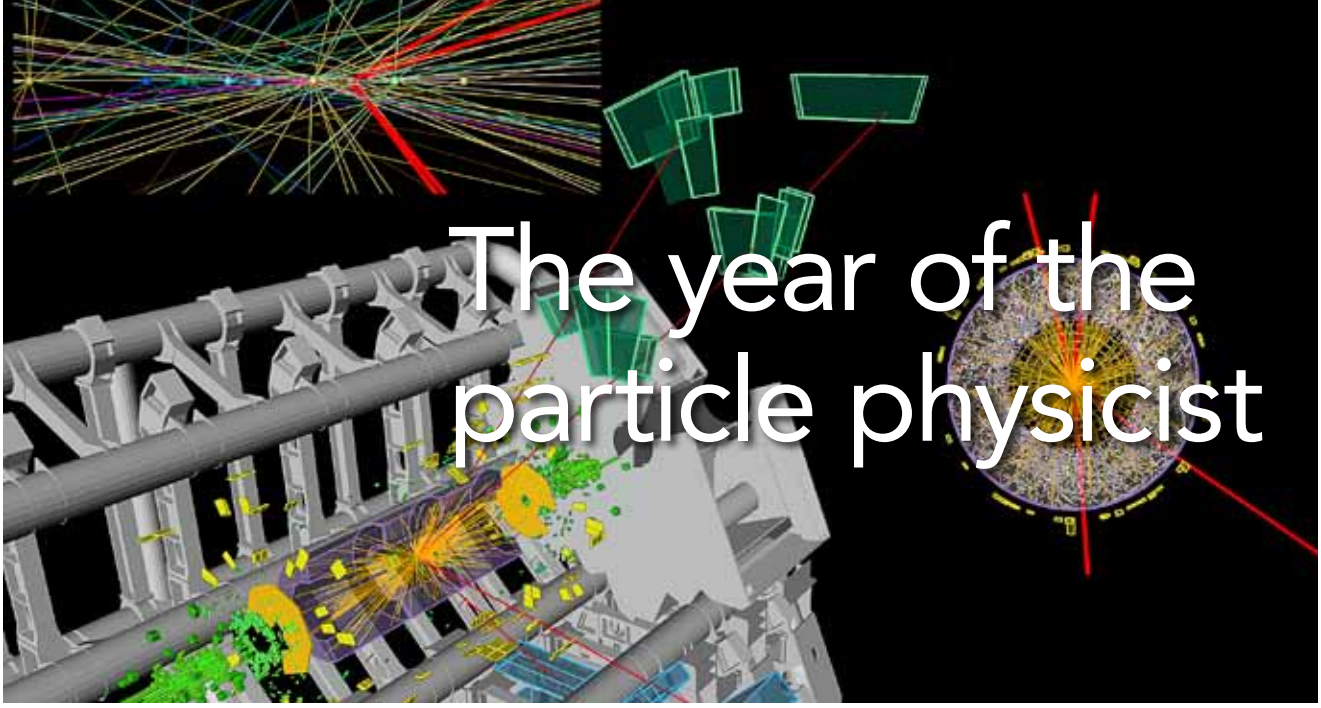


The year of the particle physicist

By Susan Hickman

This is the year of the particle physicist – the year scientists who have been looking for the missing Higgs boson particle have been waiting for. They knew before the year was out they would have either confirmed or refuted the existence of the hypothetical particle that is credited with providing the mechanism by which particles acquire mass. And sure enough, on July 4, the world learned that there was significant evidence of a new particle and that some of the particle's properties were consistent with the Standard Model predictions of a Higgs boson particle.

The July 4 announcement has been decades in the making and there are physicists, such as Carleton's physics professor Gerald Oakham, who have been anticipating this year's discovery their entire careers. What it means is a revolution in physicists' understanding of the smallest objects that make up matter, an extension of the Standard Model with something yet unknown that could explain mass, gravity and other phenomena.

The Standard Model, a quantum theory of all known elementary particles and interactions, is incomplete. We don't know why particles have mass, and we're not certain if quarks and leptons have further substructure, or what constitutes dark matter.

Peter Higgs, a British theoretical physicist and emeritus professor at the University of Edinburgh, now in his 80s, is credited with discovering a mechanism some 50 years ago that would give mass to particles. According to this model, elementary particles gain mass by interacting with an invisible, omnipresent field. The more they interact with the Higgs field, the more mass they will have.

In fact, physicists in search of this Higgs boson particle are not able to actually "see" it. When high energy particle beams are smashed together, what they see are the particles emitted by the decaying Higgs. This summer's discovery is still not "definite," but according to Oakham, the findings are consistent with the Higgs boson.

Carleton's physics department is a major contributor to this fascinating world of experimental physics and its cutting-edge research in the decades-long search for the Higgs puts a well-deserved feather in its cap. Oakham leads a group of three other faculty members (Manuella Vincter, Thomas Koffas and Alain Bellerive), three research associates and seven graduate students in the ATLAS particle physics experiment being conducted at one of four large detectors at the Large Hadron Collider (LHC) particle accelerator in the underground European Organization for Nuclear Research (CERN) laboratory in Geneva, Switzerland. The Carleton team is among hundreds of teams of scientists from more than three dozen countries who are studying the basic forces that shape our universe, and probing unknown processes and particles that might unveil such mysteries as extra dimensions of space, microscopic black holes and string theory. Carleton's team is the only Canadian group searching for the Higgs in the two channels believed most likely to prove the existence of the elusive particle. They are also responsible for developing, constructing and testing detector modules for the forward calorimeters of the LHC.

Oakham, who is also a research scientist at TRIUMF (Canada's National Laboratory for Particle and Nuclear Physics), has been developing detectors for particle physics experiments since he was a PhD student at Carleton in the early 1980s. He has been fascinated with the work at CERN since he was in high school and began working in the field of particle physics during his graduate studies.

"The fundamental nature of the research is interesting," says Oakham. "Since 1975, our understanding of the constituents of matter have come very far. We didn't know what made up neutrons or protons and the idea of a quark was a mathematical construct. We couldn't see the patterns and the relationships between the particles then."

Oakham and his team first considered joining the international collaborative ATLAS particle experiment in 2000, but it was "a complicated game" of decision-making and searching for funds, Oakham explains.

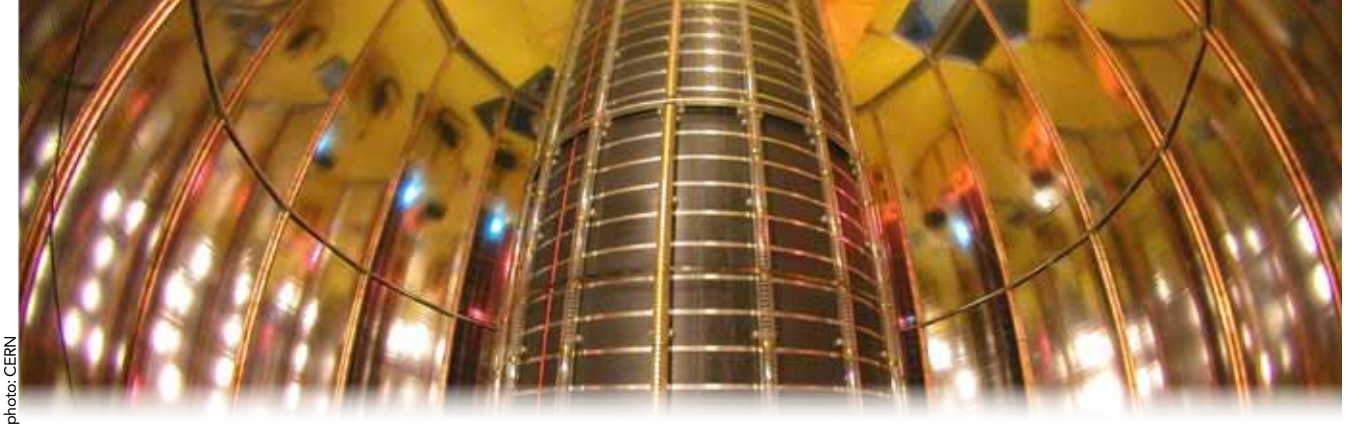


photo: CERN

"Carleton changed its focus. We were looking at a tracking detector, then we ended up working on the forward calorimeter, which is close to the beam line and measures the energy of streaming particles. It is exposed to some of the highest radiation rates in the detector, so how we built it was significant."

Parts were shipped from all over the world and, as Oakham points out, "This is truly an international collaboration that transcends most of the traditional boundaries."

Carleton contributed two of these detectors, starting with a prototype and followed by years of testing. Oakham points to the advantage of having access to Carleton's unique Science Technology Centre, highly experienced faculty and grants from TRIUMF, for example, that allow engineers and technicians to work on the construction projects.

A newer member of Carleton's ATLAS team is Thomas Koffas, who came to Ottawa in July 2011 after working as a staff research physicist at CERN for seven years.

Having been "at the heart of things" for several years before joining the Carleton team, Koffas admits the ATLAS experiment was the more appealing.

"The ATLAS detector is well placed and designed to search for new physics at the LHC," says Koffas, who was at CERN when the first collision event took place in 2008, and when the Higgs boson discovery was made in July.

What happens in the LHC is the acceleration of protons in opposite directions. When the protons collide, in effect re-creating the Big Bang in miniature and the immediate after-affects, scientists scramble to unravel the resulting chaos. They analyze each of these "events" and record any significant data.

The initial collision trials in the 27-kilometre underground accelerator took place at a total energy of 0.9 TeV, compared to the event collisions that are taking place this year at an energy of 8 TeV and next year's expected increase to 14 TeV.

As the collisions intensify, scientists must upgrade equipment and seek new technologies. "We have to start thinking how our accelerators are going to run in the future," says Oakham. "Within the next decade, we are planning to run the accelerator at six times the luminosity it runs at now."

CERN first announced in December 2011 that it had made significant progress in the search for the Higgs boson and suggested the experiments had seen "tantalizing hints" that the elusive particle was likely to have a mass at the 124 to 126 billion electron volts (GeV) range. At that time, however, the measurements were not strong enough to claim a discovery. The July 4 announcement narrows the finding down to around 126 GeV. This particle, at the level of 5 sigma, is reported to be the heaviest boson ever found.

Now, scientists will take more precise measurements to clarify whether the new particle is, in fact, the Higgs boson, or part of a larger family of particles or something else entirely. Beyond that, physicists will examine the many theories about the behavior of the Higgs and they expect to find more exotic versions of the particle. In the meantime, scientists at Carleton continue to work on upgrading detector equipment, and investigate new technologies that will allow the calorimeter to survive ever higher luminosities.

For more on Carleton's ATLAS group, visit **www.physics.carleton.ca/atlas**. Also check out the ATLAS website at **www.atlas.ch**, and **CERN at http://public.web.cern.ch/public/**.

On October 11, attend a public lecture at Carleton entitled "Discovery of the Higgs Boson: Mystery of Mass Revealed". Details available at **www.carleton.ca/science**.

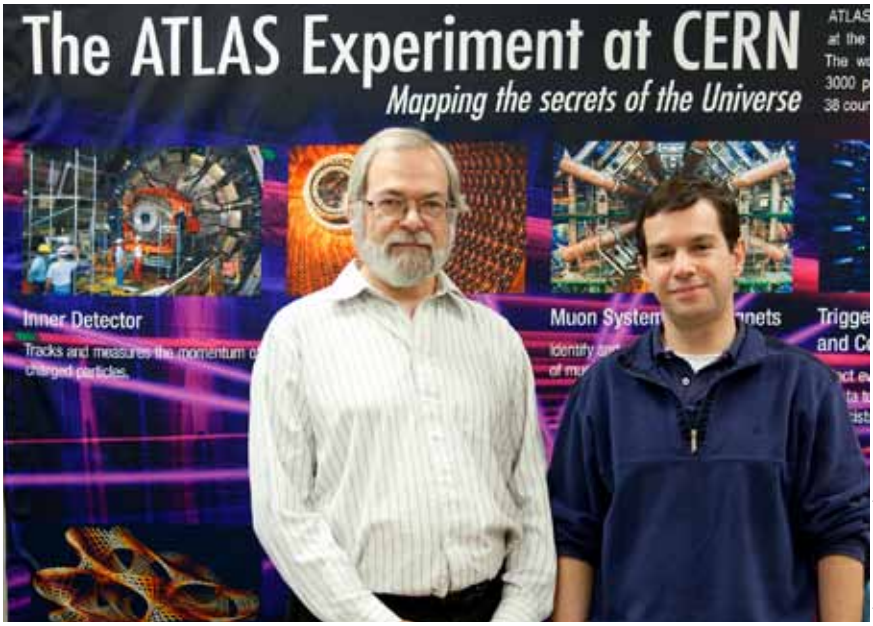
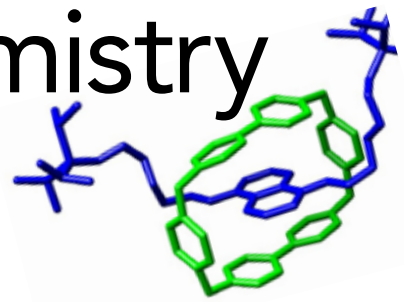


photo: James Park

As members of the ATLAS particle physics experiment at the Large Hadron Collider at CERN, Physics professors Gerald Oakham (left) and Thomas Koffas divide their time between their Carleton labs and CERN's underground facilities in Switzerland.

Collaborative Chemistry in the Lab



Nano-scale research envisions big things

By Susan Hickman

Put a handful of students from different academic departments in the same laboratory and interesting chemistry can happen.

At least that's what Sean Barry, an associate professor in Carleton's Department of Chemistry, anticipates as two of his students and a student from Carleton's Electronics Department deposit atomic layers of copper or gold on fibre-optic filaments, study the passage of light through the filaments and then analyze the data.

Collaboration between departments can only lead to better things, according to Barry.

"Put these kids in the same room and let their natural ability shine through. If each student knows what they are doing, they can interact and teach each other," says Barry. "Then we can improve their expertise and make them into better scientists, which is the goal."

As chemistry students David Mandia and Matthew Griffiths and electronics student Wenjun Zhou perfect their collaborative and scientific skills, Barry is contemplating a new acronym for the nanoscience surface and sensor interfaces facility that will be constructed in the engineering building with new government and industry funding.

"The vision we have," says Barry, "is to further our research using atomic layer deposition for non-traditional applications."

Barry is counting on his laboratory developing a unique reputation for being able to deposit extremely fine layers of metals, including gold and silver, oxides and nitrides on metal surfaces, ceramic, silicon wafers, natural fabrics such as cotton and, well, just about anything, using this atomic layer deposition process.

photo: David Irvine

Students and professors from both the Faculty of Science and the Faculty of Engineering and Design work together in Chemistry professor Sean Barry's lab. Barry (right) is seen here with Chemistry graduate student Jason Coyle.

Barry's groundbreaking research in this area is benefiting the semiconductor industry, and has potential biomedical and environmental applications.

Last year, the chemistry professor's team created a copper precursor that could well meet performance needs of semiconductor foundries around the world. A further breakthrough occurred when the group repeated the process using gold – a global first.

The non-reactive and longer-wearing properties of gold have significant and economical benefits for coating medical devices and implants and micro-electrical mechanical systems.

Barry is also working with Carleton's electronics professor Jacques Albert, Canada Research Chair in Advanced Photonic Components, who is addressing medical and environmental issues under a nearly $600,000 grant from the Natural Sciences and Engineering Research Council of Canada (NSERC).

Professor Albert's MOSAIC project (Multimodal Optical Sensor Applications, Interfaces, and Controls) is a fibre optic sensing technology combined with nanoscience in chemistry to develop higher quality sensors that can be used in biomedical and environmental research.

"We share an interest in nano-scale structures," notes Barry, who explains the MOSAIC project will operate out of the new facility once it's completed. A "clean room" in the facility will also benefit many industry partners, who will provide academic as well as financial support to the work.

For more information about "The Barry Lab," visit **http://http-server.carleton.ca/~sbarry/**.

Faculty News

SUSAN AITKEN

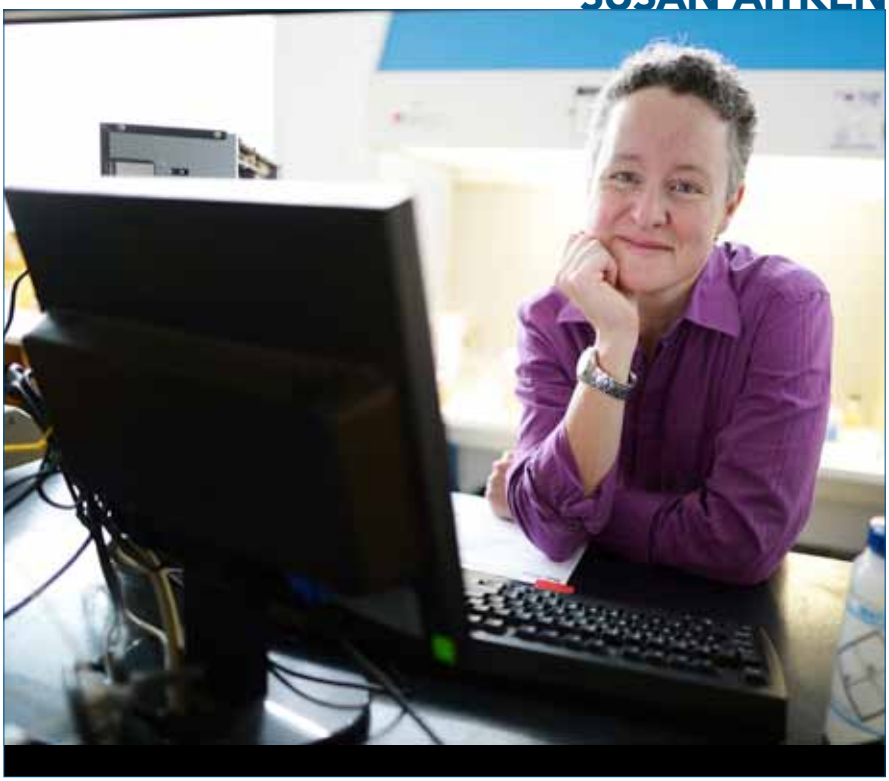


photo: James Park

Biology and Biochemistry professor Susan Aitken has been named the director of the new Institute of Health: Science, Technology and Policy, which was established to oversee the new graduate program in Health: Science, Technology, Policy.

The new program brings students from different academic backgrounds together to address issues in the areas of health research and policy, and is the first graduate program at Carleton to involve all five academic faculties. "The critical assessment of research and policy information, and the ability to integrate information from diverse sources and to effectively communicate with disciplinary experts are key components of the program," says Aitken. For details about the program, visit **institute-health.carleton.ca**.

PAT MORIN

photo: Ainslie Coghill

Among Computer Science Professor Pat Morin's list of publications are two entries identified as 'A freely-available open content textbook.' Yes, Professor Morin has written a textbook for his second year computer science class that he makes available to anyone, absolutely free. Professor Morin's open source textbook is considered part of a trend of posting textbooks online where they can be viewed for free and easily updated by the author and other contributors.

By making the material available online, it not only means that students get a financial break on the cost of textbooks but also means that Morin's book has gotten a wider audience. Morin reports that he's received content feedback from professors from as far afield as Brazil and says "having such a large audience means there is more rigorous editing because all my colleagues can access it and suggest changes." For all of Pat Morin's publications, visit **cg.scs.carleton.ca/~morin/publications/resume.pdf**

MIKLOS CSORGO

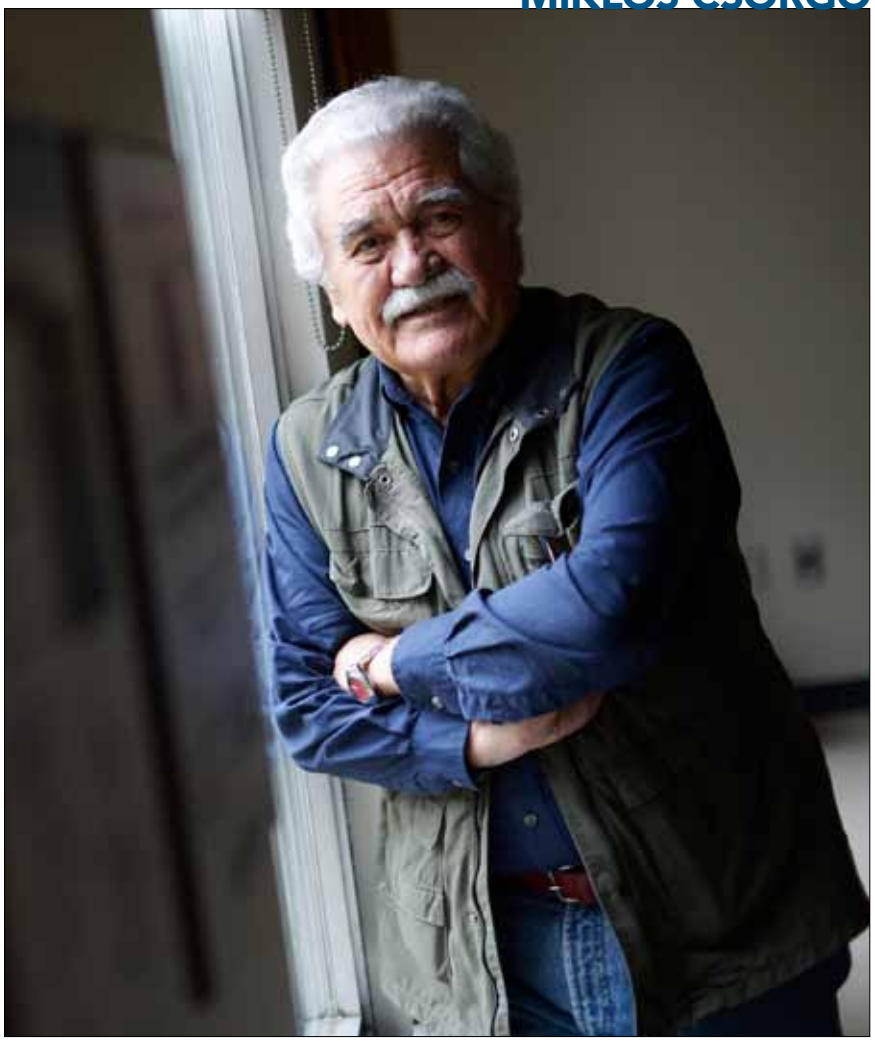


photo: James Park

Early in July 2012, Carleton hosted the Fields Institute International Symposium on Asymptotic Methods in Stochastics, which honoured the work of Carleton's Distinguished Research Professor Miklós Csörgő, as well as celebrated his 80th birthday. Professor Csörgő graduated from the School of Economics in Budapest in 1955, before moving to Canada to study at McGill University, where he obtained his PhD in Mathematics in 1963. In 1972, he joined the faculty of Carleton's School of Mathematics and Statistics.

Throughout his career, he has been actively involved in his field of stochastics (probability and statistics), as an active researcher, a prolific writer for scholarly publications, an invited speaker at annual meetings and conferences, a member of editorial boards and research-proposal review panels, and as an inspiring teacher and mentor. He's been the recipient of numerous academic honours, including being named a member of the International Statistical Institute, a Fellow of the Royal Society of Canada, and an External Member of the Hungarian Academy of Sciences, to name a few. His influence was obvious as witnessed by the distinguished scholars and guests attending the conference, and the visit by the Hungarian ambassador to the conference opening.

ILDI MUNRO

After teaching at Carleton for almost 40 years, Professor Ildi Munro officially retired in June 2012. Cross-appointed to the Department of Earth Sciences and the Institutes of Environmental Science and Integrated Science, Professor Munro developed and taught a variety of courses over the years.

But her influence on students went far beyond what was discussed in the classroom or in the lab. Throughout her time here, Munro devoted countless hours to mentoring students, helping them choose courses or tailor their program to match their interests. It is for this gift of her time and advice that many of her former students will be forever grateful.

"Still sitting in the Sudbury airport. Trying to get to Timmins and on to a plane to Attawapiskat…"

So reads Beth McLarty Halfkenny's Facebook status on Tuesday, January 24, 2012. Halfkenny, Carleton's Department of Earth Sciences Outreach Co-ordinator, was invited by the Aboriginal Education Manager at Prospectors and Developers Association of Canada (PDAC) Mining Matters to join her and two other educators traveling to Attawapiskat, a First Nations community located on the northwestern shore of James Bay, to deliver a series of hands-on workshops on rocks, minerals and mining to students and teachers, as well as to make a presentation to the wider community. DeBeers, which operates the Victor Diamond Mine 90 km to the west of the community, sponsored the trip. What follows is excerpted from Halfkenny's Facebook entries and daily journal.

Tuesday morning:

Was supposed to be there yesterday afternoon. Looks like I won't get there until tomorrow. Freezing rain in Sudbury delayed our flight out of Ottawa yesterday. When we finally took off, we only got as far as North Bay. After several hours there, the airline put us in a cab to Sudbury. Missed my connection. The others in the group were coming from Toronto and seemed to have found the only weather window and got into Attawapiskat as scheduled. I hope I'm not going to miss the Grade 1 classes tomorrow.

Tuesday afternoon:

Sat on the Sudbury tarmac for a while this morning. Sunny day here now, apparently not in Timmins. Have missed my connection north again. They now want to fly us to Kapuskasing and send us by cab back south to Timmins. If we can land that is. And if not, back to Sudbury. Sounds like a bad idea. Am now going to take the four-hour bus ride this evening to Timmins and get on the flight to Attawapiskat tomorrow.

Tuesday night, late:

I am now in a little motel in Timmins! The bus had plugs to charge my phone and iPad. Sat with a woman on the bus who works for the local school district and was trying to get to Moosonee. Had a great chat. I'm scheduled to take a 14-seat turbo-prop at 10:50 am tomorrow. Almost there! Sent a text to the others to go outside and look for the Northern Lights for me. There were sunspots on the weekend and tonight there is supposed to be the most activity. Wish I was there. Asked them to take photos!

Wednesday mid-morning:

I'm in the plane!

Wednesday evening, late:

Arrived in Attawapiskat finally at 1:30 this afternoon! I had a crazy grin on my face the whole trip! Immediately taken into the afternoon Grade 1 class. It was the first time looking in the bins I'd brought. No prep time. We had fun though with the blow-up Earth ball, sandpaper and rocks! Community supper tonight. There were lots of tables with a variety of activities and lots of folks waiting for dinner – chicken and spaghetti. Set myself up with the mineral identification stuff and played with streak plates, magnets and conductivity testers. Kids were intrigued: nothing like a noisemaker to get their attention! Kids brought their moms over to show them what they had been doing. Very cool!

Thursday evening:

Had 42 Grade 2 kids in the morning with five activity stations and lots of crazy fun! They loved the product matching puzzles: match the everyday object with the minerals that help to make it. Testing properties of minerals and rocks with sandpaper and water – does it float or does it sink? Pulling hidden paperclips out of sand with magnets, separating different-sized materials with sieves. Had the Grade 1 class I missed yesterday morning this afternoon. Great kids. Enthusiastic teachers. With each class in a different portable moving stuff is challenging, but had some Grade 2 boys helping today – really sweet! Held a two-hour elementary-school teacher workshop in the Community Centre afterwards. Teachers seemed to be engaged, especially with some of the activities from the kits we have brought for them. Gave them lots of materials and lesson plans and ideas. Tired but happy! Grade 3 kids tomorrow and secondary school teacher workshop afterwards. Only have Internet in the motel, and so trying to keep family updated when I get to bed at the end of the day!

Friday evening:

One of our team members is very sick. Apparently the flu is going around town! She had to stay in bed so we went with the flow today. She was scheduled to lead the secondary school teacher workshop this afternoon so we scrambled to put something together. I ran over when I was finished in the elementary school in the afternoon. We were told not to expect many kids this morning as there is a wedding happening tonight. I had two Grade 3 classes today; morning one only had eight kids. A lovely teacher who had

her own rock collection: great coral and brachiopod fossils in claystone. AND magnetite bearing iron formation! Checked it with the magnets. Kids were excited to learn the magnets are made of this rock found in their community. The afternoon Grade 3 class had 17 kids (some kids had gone home at lunch and told friends who were absent in the morning to come!). Got a huge thank you card delivered from the Grade 1 class. Rushed to the secondary school teachers' workshop with the whole Grade 3 class carrying my four huge bins to the high school. We had one teacher ask us if we thought the Cree had gotten a "raw deal" from DeBeers in their negotiations and also wanted to know about the reclamation plan. We really couldn't speak to the negotiations as we didn't know much about them, but we did get into a good conversation about the mining industry in general which we knew more about. With all the media attention the town has received, suspicion among the townsfolk of outsiders does sometimes run high. We did a grocery store run and I was amazed at the prices: milk is $17 for 3Litres, $15 for a bag of onions, $5 for one red pepper. Took in a hockey game at the local rink.

Saturday, mid-morning:

A couple of us took a walk this morning around the community with our cameras. Glad to say that mine did not freeze and stop like others' did! Took lots of photos. Interesting light with the variety of shades of white and the overcast sky. Bitter cold and biting wind. Had to "tack" around the streets to ensure we were not facing the wind for too long. No one else was walking; all driving and looking at us as if we were nuts. Back at the motel kitchen, we met Band Manager Wayne Turner. Really interesting guy. Seemed very wary of us at the start but warmed up as we told him what we were up to, and what we had heard in the news back home. He talked to us about the community and ended up having breakfast with us. We spoke to a couple of policemen who had come in from Timmins the night before and they told us a bit about their experiences. It really is a challenging and complex place to live.

Sunday afternoon:

Waiting in Attawapiskat airport for our flight. Whirlwind day of packing materials, touring the flea market – picked up some tiny moose hide mittens like the kids were wearing. None my size for sale! Fingers crossed for an uneventful trip!

Sunday early evening:

In Timmins airport waiting for the Air Canada desk to open so we can get on our connecting flight to Toronto. Then on to Ottawa for me. Can't believe our adventure is almost over.

Sunday later in the evening:

Just landed in Sudbury. Medical emergency. Not serious, thank goodness!

Sunday even later:

Thanks to everyone for your positive energy! I've just made it into Toronto and am sitting on my connecting flight to Ottawa!

Sunday much later:

So much for my hope of a speedy flight. We are apparently missing a signature in a maintenance logbook and will be delayed leaving Toronto. Apparently it is a particular maintenance guy who has to sign the logbook. He seems to have gone home. We are delayed another 25 minutes. People are giving me dirty looks because I now have the giggles.

Monday afternoon:

I am home again. Got into Ottawa at 2:45 am and was home by 3:30 am. Just got up!

Wednesday afternoon:

Still a bit dazed and confused to be back in Ottawa. Still jazzed about the visit to Attawapiskat. What a great opportunity to visit this community, meet new friends and discuss rocks. I have the best job!

photo: Spencer Wynne, *Toronto Star*

Beth Halfkenny (back row) poses with some of the Grade 3 students she met on her visit to Attawapiskat. All are wearing their Mining Matters T-shirts that Beth handed out.

Summer Dream Job

By Susan Hickman

When Joey Carter applied to the Dean of Science's Summer Research Internship (DSRI), he didn't know how rewarding and enlightening it would be to conduct cutting-edge research into the effect of climate change on biodiversity.

One of 103 first-year science students with a GPA higher than 10.0 invited to apply to the program and one of 15 chosen to spend the summer gaining hands-on experience in a research laboratory on campus, the 19-year-old biology and physics major worked with biology professor Root Gorelick's climate change team.

"It's lovely watching a first-year student see what biological research entails," says Gorelick. "Joey has turned out to be an extraordinary, hard-working, amazingly pleasant, and remarkably curious and interested student. We couldn't have asked for better!"

"The DSRIs connect promising students to research at a very early stage," says chemistry department chair Robert Burk, who sits on the committee that reviews and rates internship applications. "This program increases the number of students doing research," he adds, "which is important, because research awards are increasingly difficult to come by. Students are selected primarily for their enthusiasm for their chosen field, the clarity of their ideas and their level of professionalism," finishes Burk.

Top achievers are invited at the start of their second semester to apply for the $4,620, 12-week internship. This year, the Dean's Office was able to offer 15 internships, up from 10 the year before, due to additional funds from Alumni donations.

"The student has to do a bit of homework," explains Sue Bertram, an Associate Professor in Biology. "They have to write in 100 words or less why they want to join a lab and what is exciting about the lab's research."

First-year student Joey Carter received a Dean's Summer Research Internship and spent two weeks in New York City this past summer, conducting research at the American Museum of Natural History.

Once accepted to the program, the student must then ask a professor to take them on in the lab. In taking on the student, the professor then has to contribute $1,000 to the internship.

Professor Bertram hired Kathryn Dufour to work in her evolutionary biology laboratory this summer. Dufour studied how carbohydrates and proteins in the diet influence growth, development and obesity, using insect models.

"She was so excited to be putting to use what she learned in her classes. She was bubbling over with enthusiasm," Bertram says of Dufour.

Motivation and a desire to learn are the most important attributes for the interns, Bertram says. "In the first year it's mostly training. But by the end of their third year, they are often doing publication-quality work. All four students who worked in my lab four years ago have been accepted to their first-pick graduate research program or medical school."

This is Gorelick's first time employing a DSRI student.

"Day-to-day supervision [of Carter] is in the able hands of Danielle Fraser, my extraordinary doctoral candidate and Fulbright fellow in the biology department," Gorelick explains. "Joey is helping Dani collect and analyze data on teeth of fossil hoofed mammals."

The data will be used to study the evolution of the animals' size.

"The objective of this research is to ascertain what the landscape looked like four to eight million years ago," explains Gorelick, "especially what fossil mammal teeth can tell us about the effects of climate change."

Carter credits his "inherent sense of wonder and curiosity in the natural world" for leading him into Carleton's combined Honours in biology and physics program and into the DSRI program.

"I can easily picture myself becoming a researcher, committed to understanding more about nature and the universe in which we live," says Carter, adding his thanks to the Faculty of Science for providing "naive, unlearned first-year students" the opportunity to be part of scientific research at Carleton.

Outward Bound

Biology PhD student Danielle Fraser has made several trips to New York City to access the vast fossil collection housed at the American Museum of Natural History. What she is particularly interested in is tracking climate change through the fossil remains of Northern mammals in order to predict what may happen in the future. Her work in isotope analysis earned her a prestigious Fulbright scholarship and this fall she headed off to spend a year at the University of Wyoming to continue her paleontological studies.

In the summer of 2011, Maureen McKeague, a Carleton PhD student in Chemistry at the time, presented a paper at a conference at California's prestigious Stanford University. Now a little more than a year later, she heads back to "the most beautiful campus in the world" [her words] to take up a one-year postdoctoral fellowship there. During her undergraduate and graduate studies at Carleton, McKeague worked closely with professors Sean Barry and Maria DeRosa, an experience that solidified her dream of one day becoming a professor herself.

Snapshots from Convocation day – June 5, 2012

On a sunny June morning, students graduating from programs in science, computer science, and mathematics walked across the stage in Carleton's Fieldhouse to receive their diplomas. This year's graduating class included (clockwise, from top left): Integrated Science student Christopher Seguin who is off to McMaster University to pursue a Master's degree and is seen here with his 4th year thesis supervisor Professor Sue Bertram; Heather Bocz who is also heading to McMaster to attend the university's medical school; basketball star and academic standout Elliot Thomson plans to work for a year before attending graduate school; Samy Majdalany is headed to the Caribbean, the first Carleton graduate to attend the University of Medicine and Health Sciences in St. Kitts under a newly signed joint agreement between the two universities.

Well-known science writer and broadcaster Jay Ingram delivered the Faculty of Science's 2012 Discovery Lecture, entitled "Truth, an inconvenience". Ingram served as host of Discovery Channel Canada's science show Daily Planet from its first episode in January 1995 to June 2011. Before his move to television, Ingram hosted CBC radio's national science show, Quirks and Quarks, from 1979 to 1992.

If you are in the Ottawa area, come and join us at one of our upcoming events

During the academic year, the Faculty of Science hosts a series of **Science Cafés** at the Wild Oat Café near the university campus. Free and open to the public, the Cafés run every other Wednesday from 6:30 to 7:30 p.m. and are a wonderful opportunity to hear about the latest research news from our faculty members. An open question and answer period follows every talk. Check out this year's schedule and the list of topics to be discussed at **sciencecafe.carleton.ca**.

The Faculty also hosts two large public lectures every year. The **Discovery Lecture**, usually held in the spring, is designed to showcase and promote excellence in science journalism. The **Herzberg Lecture**, traditionally held in November, dates back to 1975 when it was established to honour Gerhard Herzberg, a former visiting professor in physics, Carleton's 4th Chancellor and the recipient of the 1971 Nobel Prize in Chemistry. The lecture topic aims to address an aspect of science that has a pronounced impact on our daily lives. Check our website at **carleton.ca/science** for all our events listings.

Want to connect with your fellow alumni? Visit the alumni website at **carleton.ca/alumni** to find out about all our **alumni events** in town and out. While there, don't forget to update your contact information so you can continue to get news, special offers and invitations from your faculty.

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Giving to Carleton

The generous support of donors has helped to make experiences such as the Dean's Summer Research Internship available to more students than ever before. To explore how a gift from you can make a difference to science students, visit **carleton.ca/science** or **carleton.ca/giving**.

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