

SCIENCE



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# contours

FACULTY OF SCIENCE ALUMNI MAGAZINE

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**A peek**  
*inside the*  
**Universe's  
Core**

CERN's Large Hadron Collider ready  
to unlock mysteries of the universe



L to R: Gregory Taylor, Kari Byron, Jane Taylor and Grant Imahara

Ellis Brothers Photography

On July 1, I accepted another five year term as Dean of Science. However, this year I took a leave from academic matters and have been focusing my efforts on areas like external relations and CCIS.

I continue to have plenty of opportunities to connect with alumni and students, and Homecoming 2008 was an opportunity to connect with new and familiar faces. This year we kicked off the festivities with a Faculty of Science wine and cheese, which drew record numbers. Graduands from as far back as the 1940's joined as we highlighted the accomplishments of science alumni, faculty, staff and students over the years. The following evening the festivities continued as we celebrated the university's centenary at the gala.

We were thrilled to co-host, along with the Science Alberta Foundation and the Faculty of Engineering, the incredibly popular Mythbusters. Tickets for the Discovery Channel's hit series were a hot commodity with our students, who were entertained by Kari Byron and Grant Imahara.

Listening to the MythBusters, who take everyday myths and use modern-day science to show what is real and what is fiction, it came to me that we in science are the ones creating that modern-day science. From discovering the cause behind algae blooms, which can poison lakes and kill fish; to confirming the ongoing, massive shrinking and drastic thinning of the Arctic's sea ice; to solving the mystery of global mass extinction some 252 million years ago; to designing, building and installing components for the largest detector at the Large Hadron Collider at CERN; and, in this case, busting everyday myths...science is at the heart of them all.

In the following pages you will find students, alumni and faculty who are making a difference around the world. Enjoy.

Gregory Taylor  
Dean of Science



Science Contours is published twice a year by the Faculty of Science Office to provide current information on the many activities of the Faculty. The newsletter is distributed to alumni and friends of the Faculty.

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5



6



9



16



18

## science bases

### 4 Recognizing our Best

A great faculty has, among other things, great researchers, recognized by their peers: a highlight of recent award winners and accomplishments.

### 5 Science in the News

From the NY Times to the BBC to National Geographic, Faculty of Science researchers have been making headlines around the world.

### 18 What a Party!

The university's centenary culminates with Homecoming 2008, featuring alumni awards, gala celebrations, and a convocation in Hong Kong.

## features

### 6 Joining Two Worlds

Cheryl Bartlett is creating a new approach to science education and research in higher education that is bringing together Indigenous and Western scientific knowledge.

### 8 Science 100

The Faculty of Science has introduced a new first year science course.

### 9 Unlocking Mercury Mystery

An alumnae's curiosity for physics has taken her from her home in Bogotá, Columbia to working on a NASA supported mission to Mercury.

### 12 Riding the Wave of Climate Change

Lawrence Mysak has devoted his career to understanding one of the world's most serious issues: climate change.

### 14 Back to the Classroom

Two companies throw their support behind educating future generations of scientists.

### 16 Remembered Forever

Families remember their loved ones by establishing memorial scholarships to honor them.

## cover story

### 10 A Peek Inside the Universe's Core

CERN's Large Hadron Collider ready to unlock mysteries of the universe.



# Awards and Accolades

iCORE **Chair** announced

**Dr. Gane Ka-Shu Wong** was awarded a \$4M iCORE Chair in Biosystems Informatics. The relentless improvement in our ability to acquire molecular data at lower costs is a unifying theme behind Wong's research. Working with collaborators in the medical school at the University of Alberta, he is developing methods to help identify pathogens in idiopathic inflammatory diseases. Wong also maintains strong ties with the Beijing Genomics Institute in China, which is a prominent member of an international consortium that is now sequencing 1000 human genomes to identify all but the most rare polymorphisms in a global human population.



international consortium that is now sequencing 1000 human genomes to identify all but the most rare polymorphisms in a global human population.

Most **Powerful** Woman

**Dr. Margaret Ann Armour** was named by the Women's Executive Network as one of Canada's Most Powerful Women: Top 100 in the category of Champions. This category acknowledges women who have made a distinct and describable difference to the advancement of women in the Canadian workplace by either helping to achieve greater opportunities for women in traditional careers or acting as an 'agent of change' on a national level.



ASTech recognizes **outstanding science**

**Dr. Hong Zhang** won the 2008 Syncrude/ASTech Innovation in Oilsands Research award for his close work with industry to develop advanced image processing software, which gives equipment operators an effective means to measure ore particles; and **Dr. James Hoover** and long-time collaborator **Antony Olekshy**, won the AVAC/iCORE/ASTech Outstanding Achievement in Information and Communications Technology and Innovation award for their work developing Avra Software Lab Inc., a U of A spinoff company that provides software development services and acts as an industrial test bed for research.



**C**ongratulations to all the Faculty of Science award winners who routinely receive prestigious international, national, provincial and university awards that recognize their excellence in research and teaching.

## International

**Mike Belosevic** (Biological Sciences/School of Public Health), *American Society of Parasitologists' Clark P. Read Mentor Award*;

**George Pemberton** (Earth and Atmospheric Sciences), *Grover E. Murray Memorial Distinguished Educator Award, American Association of Petroleum Geologists*.

## National

**Margaret-Ann Armour** (Dean's Office), *Canada's Most Powerful Women: Top 100*; **Mike Belosevic** (Biological Sciences), *Fellow of the Royal Society of Canada*; **Robert Creaser** (Earth and Atmospheric Sciences), *Fellow of the Royal Society of*

*Canada*; **Wolfgang Jäger** (Chemistry), *Fellow of the Royal Society of Canada*;

**Suneeta Vardarajan** (Mathematical and Statistical Sciences), *NSERC University Faculty Award*.

## Provincial

**James Hoover** (Computing Science), *AVAC/iCORE/ASTech Outstanding Achievement in Information and Communications Technology and Innovation*; **Gane Ka-Shu Wong** (Biological Sciences/Department of Medicine), *iCORE Chair in Biosystems Informatics*; **Hong Zhang** (Computing Science), *Syncrude/ASTech Innovation in Oil Sands Research*.

## University

**David Bundle** (Chemistry), *Killam Annual Professorship*; **Mike Belosevic** (Biological Sciences/School of Public Health), *University Professor*; **Greg Goss** (Biological Sciences), *Killam Annual Professorship*; **Dennis Hall** (Chemistry), *University Professor*; **George Pemberton** (Earth and Atmospheric Sciences), *University Professor*; **Jonathan Schaeffer** (Computing Science), *University Professor*.

### Reducing roads could boost bear population

Alberta's scant grizzly bear population could grow by up to five per cent a year if fewer logging roads are built in the animals' habitat, according to University of Alberta researchers. A study conducted by biologists Scott Nielsen and Mark Boyce showed that, regardless of any ecologically friendly harvesting practices adopted by industry, if road density is not reduced in logging areas, the grizzly population may continue to decline. It is estimated that there are currently less than 500 grizzly bears in Alberta.

### Arctic sea ice vanishing

While the summer of 2007 saw record low sea-ice coverage of the Arctic Ocean, a six year study of the Arctic's sea ice has confirmed its ongoing, massive shrinking and drastic thinning. Ice expert Christian Haas, professor in the Department of Earth and Atmospheric Sciences and Alberta Ingenuity Scholar, has gathered a unique data set showing that the sea ice in the region of the North Pole has thinned up to 53 per cent between 2001 and 2007.



Alberta researchers solve mystery of massive global extinction event 252 million years ago

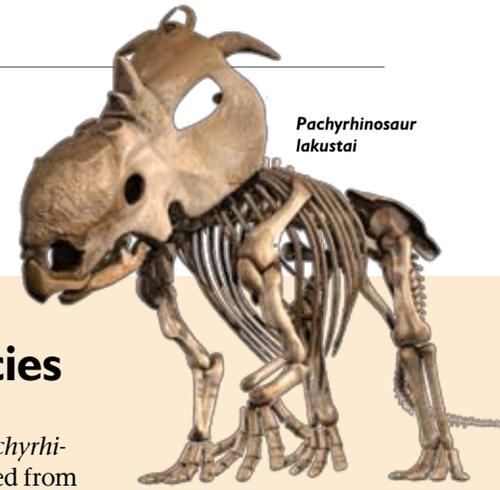
Alberta scientists have solved part of the mystery of where marine organisms that recovered from the biggest extinction on earth were housed. Published in the October edition of *Geology*, lead-author and graduate student Tyler Beatty (University of Calgary), earth science professor J-P Zonneveld (University of Alberta) and Charles Henderson, (U of C), discovered that the shorelines of ancient Canada provided a refuge for marine organisms that escaped annihilation during the Permian-Triassic extinction event.

J-P Zonneveld

Right-bottom, *Cruziana* isp., top left, *Protovirgularia* isp., crossed over by a small *Cruziana* isp

### Researcher uncovers treatment for E.coli

Chemistry professor David Bundle and his colleagues-Pavel Kitov and Glen Armstrong-have created a drug that lashes the E.coli bacteria to a naturally-occurring protein molecule, preventing the E.coli from making contact with kidney cells. The drug that acts like a lasso is called Polybait. "Think of Polybait as piece of sticky string that wraps around the interface between the protein and the toxin," he said. "The surface of the toxin that kills kidney cells is drawn tightly against the surface of the protein and neutralizes it." The molecules are held together long enough to be transported to the liver and eventually eliminated from the body. Testing is in the early stages but so far the drug looks promising.

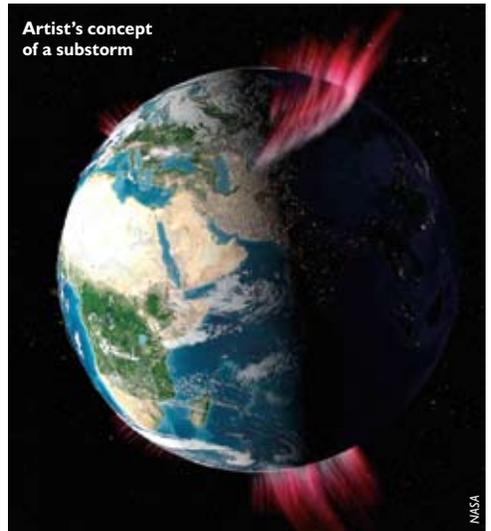


Pachyrhinosaurus lakustai

### A new dinosaur species unveiled

A new dinosaur species, *Pachyrhinosaurus lakustai*, was unveiled from Pipestone Creek, about 30 kilometres southwest of Grande Prairie, Alberta. The fossils revealed a herd of dinosaurs that perished in a catastrophic event 72.5 million years ago. Dr. Philip Currie, renowned paleontologist and Canada Research Chair of Dinosaur Paleobiology, describes the animal as having a bony frill on the back of the skull ornamented with smaller horns. They also had large bony structures above their nose and eyes which lends them their name: Pachyrhinosaurus (thick-nosed lizard). These structures probably supported horns of keratin.

Pipestone Creek Dinosaur Project



### NASA satellites discover what powers Northern Lights

Dr. Ian Mann from the Department of Physics is one of a group of researchers who, using a fleet of five NASA satellites, have discovered that an explosion of magnetic energy a third of the way to the moon powers the Northern Lights. The mission, called THEMIS (Time History of Events and Macroscale Interactions during Substorms), used five satellites and a network of 20 ground observatories located throughout Canada and Alaska to observe the event.

Dr. Cheryl Bartlett and  
Elder Murdena Marshall



# Joining two worlds

Cape Breton University

According to the 2006 Census, of the 2.9 million students who graduated with a Bachelor's degree from a post-secondary institution across Canada, less than 2% were Aboriginal students. If Dr. Cheryl Bartlett ('77 BSc) has her way, that number will change, for the better.

A trained wildlife parasitologist, Bartlett began her academic career at the University of Guelph. After a move to Cape Breton University, a small, undergraduate institution in Sydney, NS, she continued similar research in combination with teaching biology courses at both the introductory and fourth year levels in the BSc degree program.

"I quickly came to realize that although there were many, many Mi'kmaq First Nation students at the university there were very few if any in the sciences," Bartlett says. "Being a scientist, I found myself asking 'Why?'"

For many Aboriginals, there is a cultural mismatch in the way science is viewed. Bartlett explains that for the Mi'kmaq thinker, whose mind is conditioned by traditional Aboriginal knowledge, science has a close kinship with Mother Earth.

"For example, a Mi'kmaq thinker would try to keep her or his understandings of Mother Earth together as a whole, rather than fragmenting them into disciplines called biology, geology, physics, etc. As a result, mainstream science education can feel very alien to them."

A collective effort by a small group of dedicated people within the Mi'kmaq community, including Murdena Marshall (of Eskasoni First Nation), a faculty member in Mi'kmaq Studies, and Sister Dorothy Moore (of Membertou First Nation), the Mi'kmaq student advisor, and individuals at Cape Breton University led to a radical innovation in science education. A new program, called Integrative Science, was created, and is part of the university's four year BSc Community Studies degree.

The idea behind Integrative Science is science inclusive of the knowledges and ways of knowing of Aboriginal peoples and Indigenous sciences, alongside those

of the mainstream.

Elder Albert Marshall of Eskasoni First Nation in Nova Scotia offered to Integrative Science the guiding principle of "Two-Eyed Seeing". In his words, "Two-Eyed Seeing is learning to see from our one eye with the strengths of Indigenous knowledges and ways of knowing, and from our other eye with the strengths of Western (Eurocentric or mainstream) knowledges and ways of knowing ... and learning to use both these eyes together, for the benefit of all."

The program brings together Indigenous and Western scientific knowledge's and ways of knowing for the purposes of science education, science research, and science applications, plus science outreach to Aboriginal youth and communities.

The result? Cape Breton University has seen a dramatic increase in the numbers of Aboriginal students who enter university science degree programs, stay in university science degree programs, and graduate with university science degrees - a complete opposite of the situation at the university a little over a decade ago. The first cohort of students entered Integrative Science in Fall 1999 and Spring 2003 saw the first two graduates. By Spring 2008, ten Mi'kmaq students graduated from the Integrative Science program, with another dozen or so who started or had a formal association with the program graduating from other science or science-related programs.

In addition to advising on the educational component of the program, Bartlett also maintains an active research program. With a Canada Research Chair in Integrative Science, funding from NSERC and SSERC, she works with other university-based researchers, Aboriginal post-secondary science or graduate students, and key individuals in community organizations who are involved in education, cultural preservation and healing, human and wildlife health research, science promotion, youth outreach, Aboriginal language revitalization, environmental planning, and ecosystem sustainability research.

The innovative approach has led to the creation of training manuals and knowledge posters, highlighting the

relationships among ecological understandings and the lifestyles and practices of the Mi'kmaq people. Images depict Elders' stories, as lived and remembered by them.

Most recently, the Integrative Science program is participating with Canada's professional and amateur astronomy communities as they plan celebratory activities for the United Nations-designated International Year of Astronomy 2009.

"Integrative Science research associate Sana Kavanagh has worked intimately with Mi'kmaq Elder Lillian Marshall and Elder Murdena Marshall to create an animated audio-visual presentation for the Mi'kmaq legend of Muin and the Seven Bird Hunters, a story that teaches about seasonal star patterns in the night sky as reflections of ecosystem patterns on earth," relates Bartlett.

The presentation will be publicly released in January 2009, as part of the first activities within Canada's celebrations for International Year of Astronomy.

Bartlett admits to having a better understanding and appreciation for what it means to be Aboriginal in Canada today. "Many Mi'kmaq students have come into the university while lacking the normal high school science background that universities expect. Through determination and commitment plus the nurturing environment of Integrative Science and the other support venues for Aboriginal students at Cape Breton University, some of these students have excelled and graduated, or are en route to graduation," she proudly notes.

She also adds her gratitude to the Elders and others in Aboriginal communities, who have given so much to create this new path of science education for their youth.

With interest in the program coming in from Australia, New Zealand, United States, Ghana, and Peru, Bartlett is optimistic the world is open to a new science paradigm, one that is inclusive of multiple perspectives and cultures, and one that is respectfully and meaningfully engaged with its communities.

For more information on the Integrative Science program at Cape Breton University, visit [www.integrativescience.ca](http://www.integrativescience.ca).



# Science 100:

*A new way of learning*

2008 Science  
100 class

For most new students, the first week of university is dedicated to memorizing class schedules and locations, developing routines, and perhaps, attending parties and campus events. But imagine starting your first year of university on a field trip to Jasper National Park.

Students in the Faculty of Science's Science 100 class at the University of Alberta did just that. Twenty-six students in the new program, designed to provide a broad, interdisciplinary introduction to science, participated in a three-day exploratory trip that set the pace for their learning for the coming school year.

For Jenna Motkoski, the trip was a great opportunity to get to know the people she will be working so closely with this year.

"It's the opportunity to get involved doing fieldwork. It certainly was different from what most first year students were doing in their second week of university," said Motkoski, a Science 100 student from Edmonton.

But the field trip was no simple walk in the park. Armed with laptop computers, digital cameras and various scientific measuring instruments, the trip was first and foremost about science.

"One of the goals of the trip was to get them thinking," said Dave Lawrie, program co-ordinator for Science 100. "They conducted a number of experiments that could not be duplicated in a lab setting. They had the chance to explore how the disciplines connect in nature and interconnect with each other."

"Among the activities planned were experiments on Newton's laws of motion and statistics, data gathering for earth and atmospheric science and an observation hike that challenged students to look at nature from a broad scientific mindset, including observing varying biases and perceptions within the group."

That is the concept behind Science 100. Tackle an issue or problem not from a single perspective, but from a

collective one. Focused on discovery learning, students discuss issues like global warming by looking through the lens of a chemist, physicist and a geologist to understand the multiple factors influencing the issue and to explore connections between the different disciplines. The goal is to get them to ask questions and seek answers from all angles.

While similar programs exist at other universities across Canada, Science 100's scope includes components of all seven disciplines: biology, chemistry, computing science, earth and atmospheric sciences, math and statistics, physics and psychology. Fully integrated, students do not take any other separate courses other than Exploring Writing, and days are divided between lectures, labs and group projects.

The curriculum also includes an independent research project aimed at giving students a taste of the scientific research process while allowing them to explore a topic of personal interest.

# Unlocking the Mercury mystery

**T**he first time Natalie Gomez Perez ('07 PhD) held a compass, she was intrigued. How was it that such a tiny needle was able to find its way north? While most of us might look it up and move on, Gomez Perez discovered a curiosity for physics that would take her from her home in Bogotá, Columbia to working on a NASA supported mission to Mercury.

Gomez Perez came to the University of Alberta in 2002 to begin a PhD in geophysics. She looked at various programs in Canada, the US and Australia, before deciding on the U of A because of its strength in geodynamics and planetary physics.

"The U of A taught me all I know in planetary physics and planetary dynamics," she says from her current home in Washington, DC. "The interaction between the space physics and geodynamics groups started when Dr. Konstantin Kabin proposed to Dr. Moritz Heimpel, my supervisor then, to work on Mercury. It was then I became interested in the interior of the planet."

Mercury could be called the planet of extremes. It is the smallest, the densest, has the oldest surface, and the largest daily variations in surface temperature, which fluctuate by as much as 600 degrees Celsius. It is also the least explored. Until now.

In April of this year, a spacecraft named MESSENGER (Mercury surface, space environment, geochemistry and ranging), made its first flyby of Mercury, recording never-before-seen images of the mysterious planet.

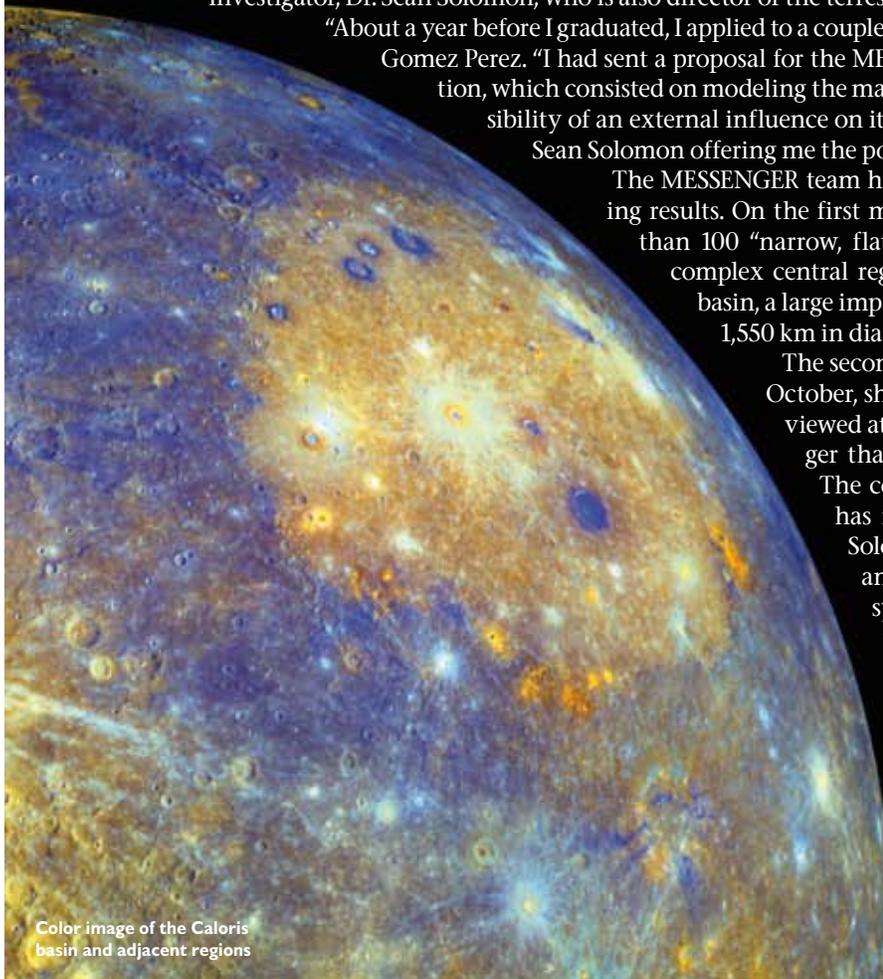
As a postdoctoral fellow in the Department of Terrestrial Magnetism at the Carnegie Institution of Washington, Gomez Perez is now working on the mission under the leadership of MESSENGER Principle Investigator, Dr. Sean Solomon, who is also director of the terrestrial magnetism department.

"About a year before I graduated, I applied to a couple of postdoctoral positions," explains Gomez Perez. "I had sent a proposal for the MESSENGER postdoctoral fellow position, which consisted on modeling the magnetic field of Mercury and the possibility of an external influence on its dynamo. I received a call from Dr. Sean Solomon offering me the position, which I accepted gladly."

The MESSENGER team has already discovered some intriguing results. On the first mission flyby, images revealed more than 100 "narrow, flat-floored troughs radiating from a complex central region," in the middle of the Caloris basin, a large impact crater measuring approximately 1,550 km in diameter.

The second flyby, which just occurred in late October, showed a region of Mercury's surface viewed at close range for the first time is bigger than the land area of South America. The combined data from the two flybys has revealed about 95% of the planet. Solomon added "We have completed an initial reconnaissance of the solar system's innermost planet, enabling us to gain a global view of Mercury's geological history and internal magnetic field geometry for the first time."

For Gomez Perez, the opportunity to participate in discussions with the members of the MESSENGER Science Team has advanced her knowledge in many different areas of science.



Color image of the Caloris basin and adjacent regions

Image produced by NASA/Johns Hopkins University Applied Physics Laboratory/Arizona State University/Carnegie Institution of Washington. Image reproduced courtesy of Science/AAAS.



# Peeking inside the Universe's Core

**T**he world was watching on September 10th 2008 when the first beam in the Large Hadron Collider (LHC) at CERN was successfully guided around the total 27 kilometres of the world's most powerful particle accelerator. After two decades of preparation, experiments conducted at LHC promise to give us a peek inside the universe's core.

Standing at the centre of it all in the CERN Control Centre was Engineer-in-Charge for LHC Operations, Dr. Alick Macpherson ('91 MSc, '96 PhD).

"As one of the people responsible for the daily operation of the LHC accelerator, I am in charge of ensuring the efficient running and the safe operation of the LHC, and the safety of all personnel involved during LHC operation," explains Macpherson from his current residence in Geneva.

The LHC is a gigantic scientific instrument near Geneva, where it spans the border between Switzerland and France about 100 m underground. It is a particle accelerator used by physicists to study the smallest known particles - the fundamental building blocks of all things.

Two beams of subatomic particles called 'hadrons' - either protons or lead ions - will travel in opposite directions inside the circular accelerator, gaining energy with every lap. Physicists will use the LHC to recreate the conditions just after the Big Bang, by colliding the

two beams head-on at very high energy. Teams of physicists from around the world will analyze the particles created in the collisions using special detectors in a number of experiments dedicated to the LHC.

Macpherson is no stranger to CERN. Originally from Ashburton, New Zealand, Macpherson completed his MSc in general relativity at the U of A in 1991 under renowned physicist Werner Israel, followed by a PhD in particle physics phenomenology. During a post-



Alick Macpherson  
(in glasses) monitors  
LHC operations.

doctoral appointment with the U of A's Dr. James Pinfold and the Experimental Physics Group, Macpherson worked on the construction and installation of a time of flight detector for the OPAL experiment that was installed at CERN's LEP accelerator.

"My task was to cut, polish and glue optical fibres into plastic scintillator plates. At that stage I was still considered a theoretical physicist, but my group argued that since I used to work in a sheep shearing gang in New Zealand, I should

not be that hopeless, and was sent to CERN," jokes Macpherson.

He went back to CERN in 1998 to operate and commission/upgrade the time of flight system he helped build and install. Since then, he has been a CERN Scientific Associate in the Experimental Physics Division; a CERN Project Associate with the Paul Scherrer Institut in Villigen, Switzerland; a CERN Project Associate with Rutgers University, New Jersey; a Visiting Scientist at ETH Zurich; and now Engineer-in-Charge for LHC Operations at CERN.

For Macpherson, the sheer challenge controlling and steering two counter rotating beams of high-energy protons so they collide at designated points around the 27 km circumference of the LHC is a highlight of his current post.

"You have to remember that a nominal LHC beam has the energy equivalent of a 400 ton train traveling at 150km/h, but with a transverse size at the collision points of only 16 microns (about 1 one third the diameter of a human hair). Given that the LHC beam is an unforgiving, high intensity beam, LHC operation is all about synchronized control of these beams using a very large accelerator, and for me that is what I really enjoy."

Macpherson is also struck by the physics reach of the LHC. A lot has been said about the search for the Higgs bosons. Observation of the Higgs boson would help explain why some particles are very heavy while others have no



Inside the LHC tunnel

CERN PhotoLab, Maximilien Brice

mass at all. The search is associated with the mechanism by which particles acquire mass.

“The thing that I find fascinating and potentially very satisfying, is that through collisions at the LHC, the experiments may be the first to directly observe dark matter,” says Macpherson. “Here I am hoping that dark matter comes in the form of neutral supersymmetric particles and that their decays are observed by the LHC experiments soon after the LHC enters regular operation.”

Cosmological and astrophysical observations have shown that all of the visible matter accounts for only 4% of the Universe. The 96% that is unaccounted for is dark matter (23%) and dark energy (73%), and the search is on for particles or phenomena responsible for both.

Macpherson is aware of some of the controversy surrounding the LHC.

“At the moment, the biggest misconception that we have to deal with is the notion that when we start producing particle collisions in the LHC, a microscopic black hole could be created that would then proceed to devour the earth. For me this is really the stuff of science fantasy that was picked up by the popular press and has now grown to a rather popular misconception.”

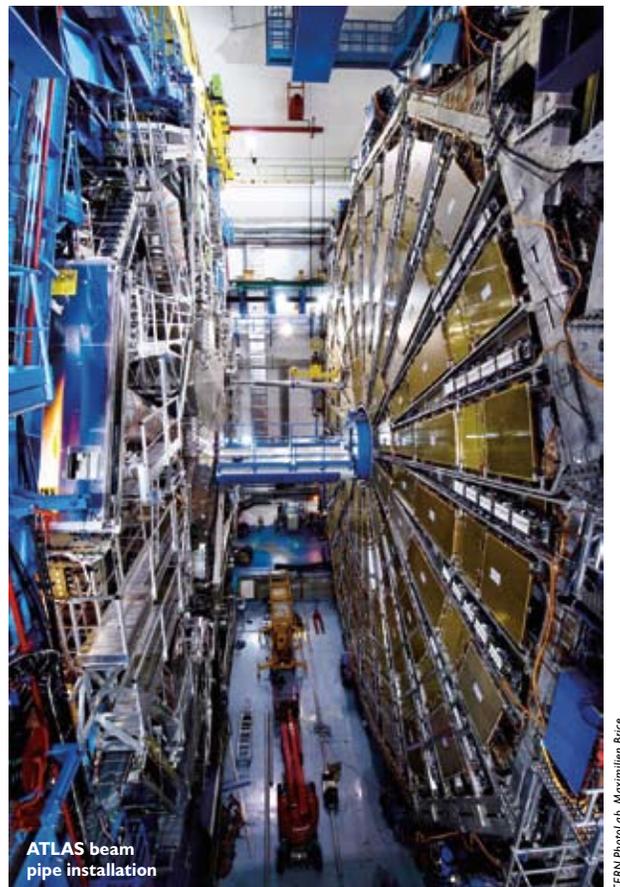
According to Macpherson, there is no reason to believe that LHC could produce harmful black holes of any flavour. He explains there are a flux of cosmic rays that have been hitting the

Earth over its lifetime. When keeping in mind that the range of cosmic ray energies exceeds LHC energies, the fact our Earth is still here gives a simple and direct reassurance that collisions produced by the LHC are safe.

After a successful startup, activities are on hold at LHC because of a large helium leak in the LHC tunnel. The likely cause of the incident was a faulty electrical connection between two of the accelerator’s magnets. The sector where the incident occurred now has to be brought to room temperature and the magnets involved opened up for inspection, a process that could take three to four weeks. The time necessary for the investigation and repairs prevents a restart before CERN’s obligatory winter maintenance period, bringing the date for restart of the accelerator complex to early spring 2009.

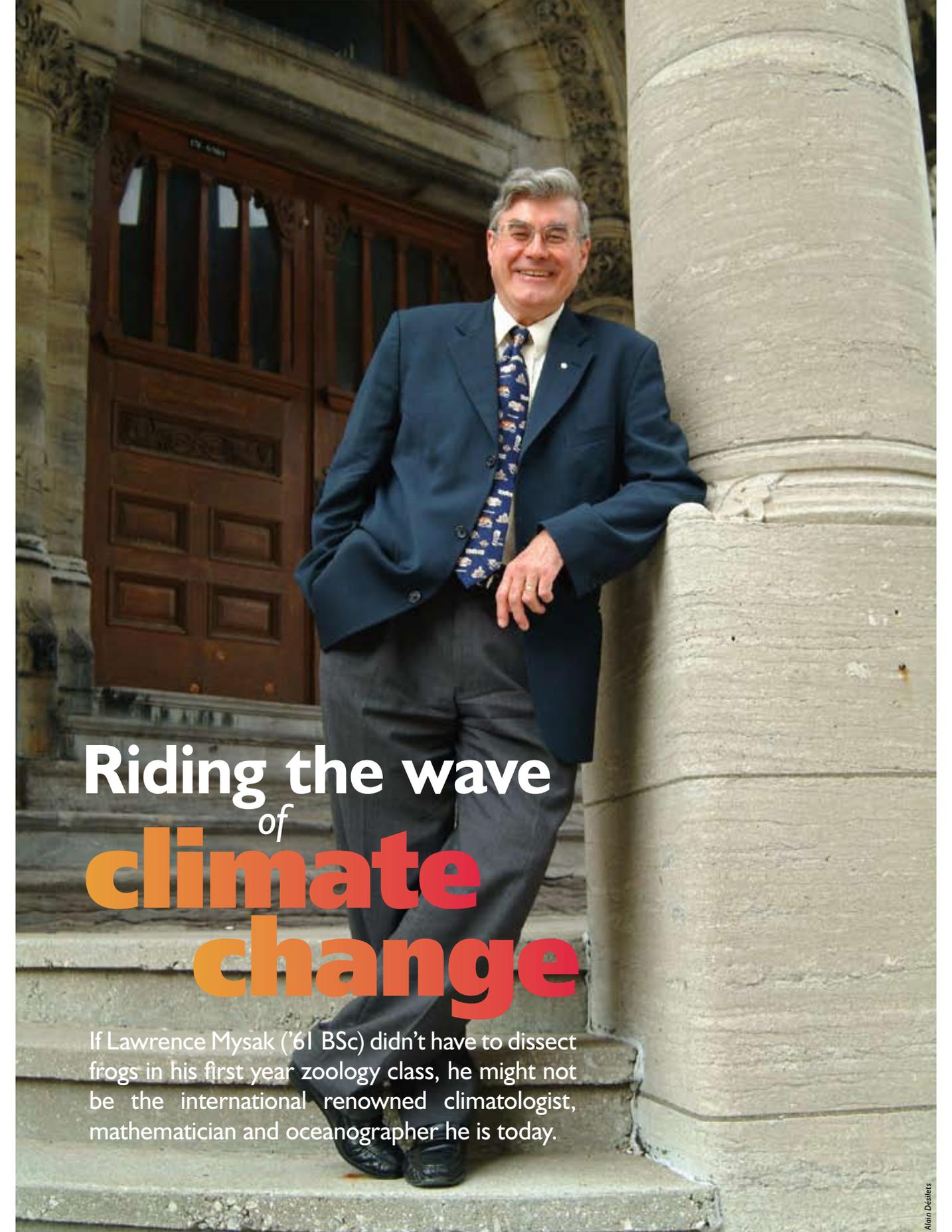
While Macpherson is kept extremely busy in the CERN Control Centre, he hasn’t forgotten his time at the U of A. Having benefited from his international experience gained

while doing graduate work, he hopes the university doesn’t lose sight of the value of world-wide collaborations, such as the one with CERN.



ATLAS beam pipe installation

CERN PhotoLab, Maximilien Brice



# Riding the wave *of* **climate change**

If Lawrence Mysak ('61 BSc) didn't have to dissect frogs in his first year zoology class, he might not be the international renowned climatologist, mathematician and oceanographer he is today.

Alain Desjardis

“I decided that dentistry was the career for me since then I could use my handicraft and model-making hobby skills,” explains Mysak. “However, in my first year of the ‘pre-dent’ program I had to dissect frogs in a Zoology lab. The spurting blood and nervous twitches of the supposedly dead frogs were most off-putting.”

So, under encouragement from Reginald Jacka, his calculus teacher at the time, Mysak continued his studies in the honors applied mathematics program at the U of A. After graduating, he worked at the Pacific Naval Laboratory in Victoria conducting research into fluid mechanics, proving there were real-world applications of his mathematics degree. He went on to complete an MSc from the University of Adelaide, Australia followed by a PhD in Applied Mathematics from Harvard University, where he did one of the first theses on continental shelf waves.

After a 10-month postdoc at Harvard, Mysak was torn between a tenure track position at UBC in the mathematics department or a faculty position at Johns Hopkins University in Baltimore, MD. A desire to return to Canada landed him at UBC, where he was a professor of mathematics and oceanography, and was a founding member of the Institute of Applied Mathematics and Statistics.

During a sabbatical in Zurich in 1982, Mysak had a few revelations.

“I remember seeing firsthand the global warming trends I had been studying for years,” he recalls. “We went on a ski trip to the Alps only to find poor ski conditions due to warm temperatures. We then visited Israel, and the desert was blooming with flowers that hadn’t been seen in years. Finally, Germany was experiencing El Niño, which was having an impact both in winter and spring.”

These events had a lasting impression on Mysak, and upon returning from Europe he began researching fisheries in the N.E. Pacific and its relationship with El Niño.

The year in Zurich was also when Mysak decided it was time to move on.

“I began thinking about my time at UBC, and realized this was another turning point in my career,” he explains. “I knew it was time for a change, and needed to decide between moving south to Hobart, Australia to head a CSIRO physical oceanographic group, or to move east to Montreal, to start a new climate research program at McGill University.”

Montreal it was, and Mysak soon took a position as an NSERC Professor of Climate Research in the Department of Atmospheric and Oceanic Sciences at McGill, and it took him no time to make his mark.

In 1989 he became the Canada Steamship Lines Professor of Meteorology. The next year he was a founding member and director of the Institute of Applied Mathematics and Statistics and an associate member of the then Institute of Oceanography.

Today, Mysak is immersed in teaching and research on oceans, climate change, and earth system science, which involves the interactions between the atmosphere and oceans, as well as exchanges between the land surface, the cryosphere, and the biosphere.

More recently he has started to develop a climate model of intermediate complexity for better understanding climatic variations at the thousands of years time scale, looking in particular for the whole climate system response to the astronomical forcing over the last glacial-interglacial cycles. His book *Waves in the Ocean* is often referenced and many of his ~150 papers are widely cited.

For his outstanding scholarly achievements, Mysak has been recognized often. He is a member of the Order of Canada, which recognizes a lifetime of outstanding achievement, dedication to the community and service to the nation. He is a fellow in the Royal Society of Canada (and past president of their Academy of Sciences), has received the Queen’s Golden Jubilee Medal, and is a fellow of the

American Geophysical Union and of the American Meteorological Society.

Perhaps the two accolades he is most proud of are the prestigious Alfred Wegener Medal and Honorary Membership of the European Geosciences Union and the Prix Marie-Victorin (natural sciences), one of 11 Prix du Quebec awards given annually in all areas of culture and the sciences.

“The Wegener Medal was a complete surprise,” reflects Mysak. “This is a huge European association, and they only give out 3 top medals in atmospheric, hydrological or ocean sciences. To be chosen is an incredible honor.”

The first Canadian to receive the honor (the most prestigious award made by the Union reserved for scientists who have achieved exceptional international standing for their merit and their scientific achievements), Mysak was recognized for his leadership in oceanography and his fundamental contributions in ocean dynamics, sea-ice and climate research. He has been very active lecturing, touring and returning to Europe for sabbaticals and international scientific committee work.

Currently he is the President of the International Association for the Physical Sciences of the Oceans, and ex-officio of SCOR (Scientific Committee on Oceanic Research), a leading international non-governmental organization for the promotion and coordination of international oceanographic activities.

While Mysak is leading cutting edge research programs, he is also teaching generations of future scientific leaders. He has attracted many top graduate and postdoctoral students to his lab, supervising 40 MSc and PhD theses, 30 postdoctoral fellows. He currently has a crop of six graduate students.

“To see so many of my former students in a variety of positions around the world today is most gratifying. Having a continuous flow of new students over the past 38 years has certainly kept me on my toes.”

# Back to the Classroom



Roger Dootson,  
PCL Construction  
Management Inc.

**L**ong time University of Alberta supporter PCL announced a gift of \$500,000 to the university, \$200,000 of which will support the PCL Construction Management Inc. Lounge in the Centennial Centre for Interdisciplinary Science.

"The University of Alberta is a significant institution in the city," commented Roger Dootson, PCL Vice President and District Manager. "It's part of our culture to give back to the city in which we work and live."

Dean of Science Gregory Taylor recognized PCL's gift as a true gift to the students. "We can make great strides in providing world-class teaching through partnerships with industry."

PCL has been in Edmonton since 1922, when founder Ernest Poole opened an office in Edmonton and began its first project in the city: the Edmonton Public Library on Jasper Avenue. Since then, PCL has grown into the largest general contracting organization in Canada and the eighth largest in the United States, with an annual volume of over \$5 billion.

The company has been a major player in

many of the recent building projects on campus. With the Engineering Building and the Health Research Innovation Facility complete, CCIS underway, and construction on the massive Edmonton Clinic soon to begin, PCL is getting quite comfortable on campus.

"By February 2009, PCL will have a total of 10 cranes on campus, making it one of our top clients in Alberta," added Dootson.

Taylor added that he considers PCL an "honorary" science department.

Located in the east wing of the Centennial Centre for Interdisciplinary Science, the PCL Construction Management Inc. Lounge sits outside what will be the university's two largest lecture halls. With up to 18 different courses scheduled in each of the lecture halls each term, students from earth sciences to fine arts will have an opportunity to enjoy the stunning views over the North Saskatchewan River as they relax, study and mingle before and after classes.

The remaining of the PCL gift will go to the Faculty of Medicine and Dentistry and the Faculty of Engineering.

One of the world's largest biopharmaceutical companies is helping ensure the University of Alberta's scientist feeder system continues its long tradition of excellence.

Gilead Sciences announced a gift of \$250,000 over a five-year period to the Faculty of Science that will support the Gilead Sciences Lecture Theatre in the Centennial Centre for Interdisciplinary Science, currently under construction.

"Having the best people with the appropriate knowledge and skills is critical to Gilead's ability to deliver medications to patients around the world," said Robin Nicol, general manager. "We have been associated with the University of Alberta for more than 40 years through hiring graduates and the Industrial Internship Program, and we have seen firsthand the quality of the U of A's staff and students. Gilead is delighted to take this opportunity to support the education of future scientists."

Gilead Sciences works to discover, develop and commercialize therapeutics

that advance the care of patients suffering from life-threatening diseases in areas of unmet medical need. Headquartered in Foster City, Calif., Gilead has operations in North America, Europe and Australia. Gilead Sciences acquired Raylo Chemicals, a company founded by U of A alumnus and the pioneer of carbohydrate chemistry Raymond Lemieux, in 2006.

Gregory Taylor, Dean of Science, explained the Gilead Sciences Lecture Theatre will be a pioneer in its own right, providing a 190-seat, state-of-the-art collaborative learning experience complete with enhanced multimedia capabilities.

"In this, our 100th year, it is rewarding to see an investment in the education of tomorrow's science leaders, like the one made by Gilead," said Taylor. "Our students will be positioned to learn in an environment that will equip them to work in an increasingly global and interdisciplinary economy."

Designed to encourage collaboration, the tiered lecture theatre will feature fixed counters and independently mobile

seating to allow students to work in teams either side by side or front to back. The enhanced learning environment will be outfitted with an AV central control station accessed from motorized lecture podium, electrical outlets in each row, whiteboards, and universal access student stations at the front and rear of room with audio assistance. A fixed demonstration table with an overhead projection camera to televise experiments to projection screens will encourage hands on learning.

Slated to open in 2010, the Centennial Centre for Interdisciplinary Science will equip the Faculty of Science with a facility unlike almost any other in the world.

"It will provide over 1,500 more undergraduate and graduate students with an opportunity to pursue the education in science that they desire," said Taylor. "The increased capacity in lecture halls and teaching labs will provide an unprecedented learning experience for students campus wide."



Robin Nicol,  
Gilead Sciences

# Remembered Forever

Families remember loved ones by establishing memorial scholarships in their name.



Donald Scobie

**D**onald Scobie could be described as a creator. From woodworking to music, science experiments to paintings, Donald added his personal touch to everything he set out to do.

“When he was 14 or 15, he was always conducting scientific experiments in his room in our basement,” remembers his father, Jeff Scobie. “The walls of his room were plastered with scientific posters, the periodic table and chemical reactions, and he turned our work room into a laboratory. He had a lot of equipment and would do research on the internet.”

With his self built laboratory, Donald built a six foot tall rocket, along with many smaller ones from scratch, buying only the engines, as well as his own computer from the most basic parts, which he either bought or rounded up

from discarded equipment.

Donald traveled the world with his family and school groups. While his home base was in Calgary, he lived in the State of Qatar for six years, completed two years of high school at Brentwood College in Mill Bay, BC, and spent time at the family cottage in Ontario.

A sports enthusiast, Donald excelled at squash, white-water kayaking, downhill skiing and water skiing. He was also an avid artist, playing the guitar and composing some of his own pieces.

“A bench he carved out of a massive log still looks out over the ocean at Brentwood,” adds Scobie, “and a large painting he made hangs in our house.”

Donald had applied for admission in the Faculty of Science at the University of Alberta for the fall of '08. His plan was to become a surgeon. However he passed away suddenly in the winter of 2007

while the family was on a ski trip. He was 17.

“We set up the Donald T. Scobie Memorial Fund because we very much wanted to establish some worthy memorial, to keep Donald’s memory alive,” comments Scobie. “We wanted it to somehow be related to science, which was his passion, and we also realize how difficult it is now for students to finance their post-secondary education, so we thought this would help.”

Asked about what message he would give 17 year olds today, Scobie says students should take in the whole experience and reserve time to have fun, without putting too much pressure on themselves to achieve perfect grades.

“I would also say, ‘work hard, and play hard’. That’s exactly what Donald did every day.”

**A**s a young boy, Afzal Khan was a whiz at math. His father, a Captain in the British Indian Army, caught on to his young son's enthusiasm and hired a private teacher to challenge the curious boy. Years later, Khan turned his passion of mathematics into a career in engineering, a career that would take him around the world.

At the age of 17, Khan left his home in Pakistan to join the Royal Naval College in Dartmouth, England as a naval officer. It was in England where he studied to be an electrical engineer, graduating from Faraday House College. After an internship in Berlin, where he learned to speak German, he took a position with Siemens Company in Lausanne, Switzerland as an engineer. His move to Canada came in 1965, when he was recruited to Glace Bay, Nova Scotia and then Montreal, before finally settling in Edmonton as a project engineer for Enbridge Company.

Khan's thirst for knowledge was transferred to his children.

"His passion was to engage us in meaningful learning experiences enriched by his prior travels and knowledge of history, geography, mathematics, and politics," says his family, which includes wife Rabia, daughters Sophia, Samia, Nadia, and son Waleed. "He took delight in teaching us math at home at the dinner table, heightening our understanding of the principles and pragmatics of math in a way that went beyond the textbook."

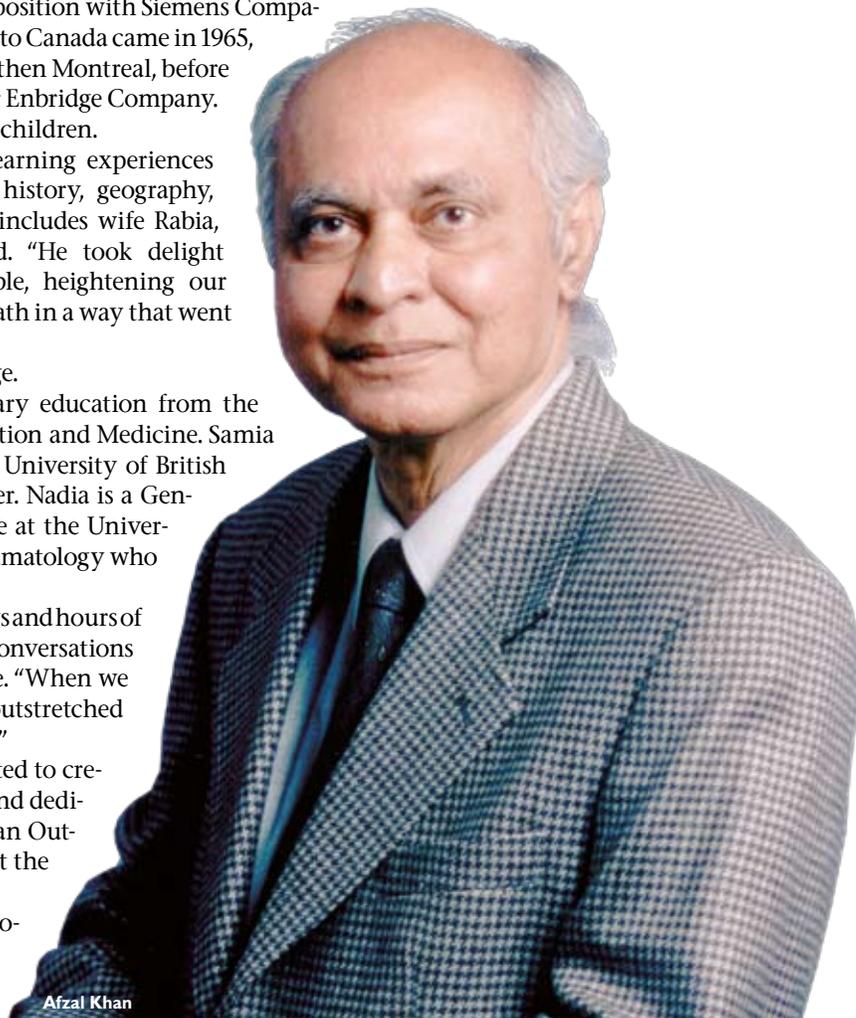
Like their father, the children took to the challenge.

All four of his children completed post-secondary education from the University of Alberta in Engineering, Science, Education and Medicine. Samia is a tenured Associate Professor of Education at the University of British Columbia. Waleed is an Aerospace Software Engineer. Nadia is a General Internist and an Assistant Professor of Medicine at the University of British Columbia. Sophia is a specialist in Rheumatology who opened her own medical clinic in Edmonton.

The family's fondest memories include his teachings and hours of laughter with him at the dinner table. "Dinner table conversations were lively and spanned every topic," they reminisce. "When we once asked him what family meant, he showed us his outstretched palm and fingers, symbolizing the oneness of family."

Khan passed away in 2001. The Khan family wanted to create a legacy that would reflect his passion for math and dedication to education, and established the Afzal A. Khan Outstanding Achievement in Mathematics Scholarship at the University of Alberta.

If Khan were sitting around a dinner table with today's students, he would advise them to "work hard and live your life with integrity and honesty". These are the principles he stood for and lived by.

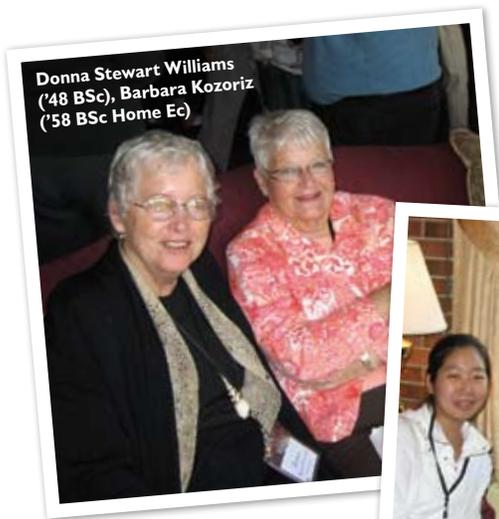


Afzal Khan

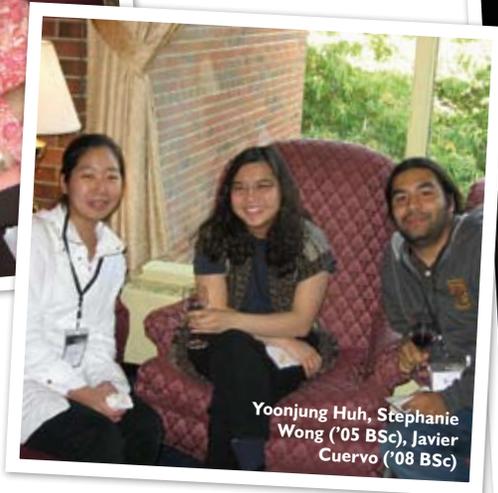
*Memorial scholarships are one way to create a living memory of loved ones. They can be established in any department, and can be directed to any undergraduate or graduate year. Annual memorial scholarships can be established for as little as \$500 per year, and require a five year commitment. Endowed scholarships, meaning they are given in perpetuity, need a commitment of \$12,000 for undergraduate students and \$24,000 for graduate students. If you would like more information, please contact Claudia Wood, Assistant Dean (External Relations), 780-492-6662 or [claudia.wood@ualberta.ca](mailto:claudia.wood@ualberta.ca).*

## Homecoming 2008

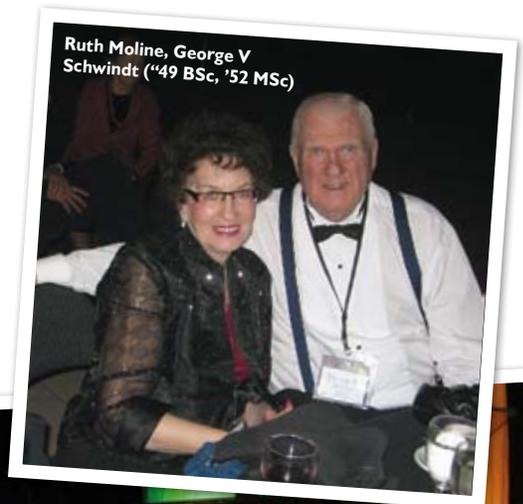
Reunion weekend is always greeted with excitement and anticipation, but this year it promised to be the biggest bash ever. The Faculty of Science kicked things off with a wine and cheese social on Friday night, to which record crowds attended. The Dean hosted science alum at the sold out marquee event, the gala dinner at the Shaw Conference Centre, which featured a concert by folk legend Ian Tyson.



Donna Stewart Williams ('48 BSc), Barbara Kozoriz ('58 BSc Home Ec)



Yoonjung Huh, Stephanie Wong ('05 BSc), Javier Cuervo ('08 BSc)



Ruth Moline, George V Schwindt ('49 BSc, '52 MSc)



Marie Rutter, Laurence Hoye ('55 BSc, '56 MS), Nat Rutter ('65 PhD)

### Hong Kong Convocation celebrates U of A ties to Asia

The U of A's relationship with Asia goes back at least as far the 1920s, when Japanese education student Yuichi Kurimoto became our first international student to graduate.

Kurimoto returned to his home country to found three schools, including a university. Since then some 4,000 students from China, Malaysia, Singapore, Japan and Korea have graduated from the U of A, comprising the university's largest concentration of alumni outside of North America.

To celebrate those deep-rooted ties, along with the Centenary, the U of A held a special convocation ceremony in at the Grand Hyatt Hotel in Hong Kong Nov. 1, the only Centenary event outside of Canada.

"The University of Alberta is proud of its international reputation and our alumni from all over the world who represent us as ambassadors," said President Indira Samarasekera. "I have been looking forward to

meeting with alumni during the special convocation and gala banquet dinner."

More than 200 alumni received special Centenary certificates at convocation and later that day some 500 alumni and members of the region's business community convened for a sold-out gala.

Attending the convocation, the first such event in Hong Kong since 1998, were University of Alberta President Indira Samarasekera, Chancellor Eric Newell, Alberta Minister of Advanced Education and Technology Doug Horner and several university deans and senior administrators.



Dean Gregory Taylor (in red robe), congratulates alumni convocating in Hong Kong

## Science alumni *rise to the top*

Each year, the University of Alberta hands out awards to exceptional alumni during Reunion Weekend. Here are this year's science winners.

### The **Award of Excellence**

recognizes specific, recent accomplishments of University of Alberta graduates.

**David H. Evans**, '78 BSc, '82 PhD, is an internationally recognized poxvirus researcher and a member of the smallpox scientific advisory panel of the World Health Organization. A faculty member at the University of Guelph for 15 years, he returned to Edmonton as chair of the Department of Medical Microbiology and Immunology in 2003. His team from Edmonton and Calgary was recently awarded \$24.9 million from the Canadian Foundation for Innovation and the Province of Alberta to create the Alberta Institute for Viral Immunology. In 2007, he was appointed director of this new institute. His work concerning poxvirus replication has been funded for more than 20 years by the MRC and CIHR.

**Malcolm Whiteway**, '83 PhD, is an expert in yeast signal transduction and genetics. He is a principal research officer and leader of the Genetics Group at the National Research Council's Biotechnology Research Institute and an adjunct professor at McGill University. His research focuses on understanding the biology of the yeasts *Saccharomyces cerevisiae* and *Candida albicans*. He has published more than 100 scientific papers, and two first-author articles in Cell and Science provided seminal insight into the yeast mating pathway. In 2008, he was elected as a Fellow of the American Academic of Microbiology for his outstanding scientific achievements and original contributions to the advancement of microbiology.

### The **Alumni Honour Award**

recognizes the significant contributions made over a number of years by University of Alberta alumni in their local communities and beyond.

**Tako Koning**, '71 BSc, has been described as "an Angolan Angel" for his humanitarian work in that country. A geologist for more than 30 years working worldwide in the oil industry, he organized major donations of textbooks and journals for universities in Nigeria and Angola, countries where he has lived and worked for the past 16 years. Since his retirement he has worked with a humanitarian organization that provides clean drinking water to rural populations in northern Angola, and he chairs the Mosquito Nets Project, supplying nets that prevent malaria. For his work he was honored with the Regional Services Award presented by the Society of Petroleum Engineers International.

### The **Alumni Horizon Award**

recognizes the outstanding achievements of University of Alberta alumni early in their careers.

**Irene Cheng**, '96 BSc, '99 MSc, '05 PhD, is an award-winning, innovative computer scientist making a tremendous impact on multimedia research internationally. She is the scientific director of the University's NSERC/iCORE Multimedia Research Centre, and an adjunct professor in the computing science department. As a leader in interdisciplinary collaborations, she has established partnerships with other U of A faculties—including a joint curriculum with the art and design department—and

with universities around the world. She invented a new educational framework, Online Multimedia Innovative Item Types, which helps bring high quality education to students through adaptive learning and evaluation.

**Daniel McKennitt**, '06 BSc, is an emerging leader in Aboriginal health research and awareness. A member of the Sandy Bay Ojibway First Nation, he founded the University of Alberta Aboriginal Health Group, and in 2008 organized the University's first-ever Aboriginal Health Awareness Week. His contributions to campus—and beyond—have earned this U of A medical student numerous honours. In 2006 he was one of 12 selected to receive the National Aboriginal Role Model Award. In 2008 he received an Alberta Aboriginal Youth Achievement Award and a \$10,000 National Award for Excellence in Youth Leadership from the Kaiser Foundation.

**Erik J. Saude**, '00 BSc (Augustana), '07 PhD, is a stellar young researcher making groundbreaking strides by applying Nuclear Magnetic Resonance spectroscopy in the field of medicine to help diagnose patients quickly and tailor treatments to their specific disease. A direct result of his work with the University's National High Field Nuclear Magnetic Resonance Centre was the formation of the Magnetic Resonance Diagnostic Centre, a collaboration of several U of A faculties and departments. A strong supporter of his alma mater, he volunteers his time with the Office of the Registrar during student recruitment and participated in the University's Centenary Road Trip. In September 2007, this Camrose-raised, Augustana grad started medical school at the University of Calgary.

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