



DEPARTMENT OF PHYSICS

Newsletter 2010/2011

Message from the Chair

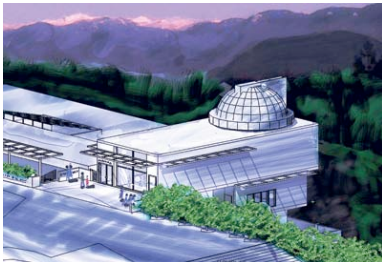
We hope you enjoy this update on the past year's activities in the Department of Physics. It has been a busy year of events, awards and other happenings. The main news from my office is that I am in the last few months of my term as chair and that my successor, Simon Watkins, will move into the Chair's office this August. Best wishes to all!

– Barbara Frisken

Articles from SFU News

SFU Approves Astronomical Observatory

www.sfu.ca/archive-sfunews/news/sfu-approves-astronomical-observatory.shtml



New SFU observatory \$8,000 closer

www.sfu.ca/archive-sfunews/news/new-sfu-observatory-8000-closer.shtml



Fire up the antimatter generator, Scotty

www.sfu.ca/archive-sfunews/news/fire-up-the-antimatter-generator-scotty.shtml



Physicist's focus less-than-zero

www.sfu.ca/archive-sfunews/news/physicists-focus-less-than-zero.shtml



Gwen Eadie, BSc Physics, Convocation Speaker 2010

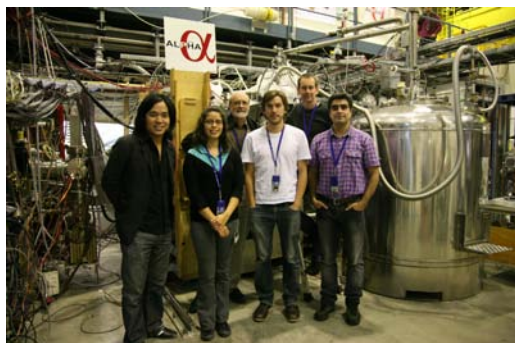
www.sfu.ca/archive-sfunews/news/2010-convocation-student-speakers.shtml



Research Highlights

Antihydrogen – trapped

PhD Student Mohammad Dehghani Ashkezari and his supervisor Professor Mike Hayden are part of the ALPHA collaboration, an international team of physicists working at CERN to create and trap anti-hydrogen. The group reported its first success trapping 38 antihydrogen atoms for 170 ms in November 2010 and this story went on to be chosen one of the top 10 Physics breakthroughs of 2010 by Physics World. Recently the group has shown how their "magnetic bottle" can trap antihydrogen for up to 15 minutes. For more information on the ALPHA experiment, check [here](#).



Mike Hayden and Mohammad Ashkezari were two of thirteen researchers from Canada involved in the discovery of antihydrogen. This photo shows, from left to right, Makoto Fujiwara from TRIUMF; Andrea Guitierrez and Walter Hardy from the University of British Columbia; Tim Friesen from the University of Calgary with Mike and Mohammad and their experimental setup at the CERN Laboratory near Geneva. (ALPHA)

Highly Enriched ^{28}Si – from the kilogram to quantum computing

Mike Thewalt's group has been studying the remarkable properties of highly isotopically enriched ^{28}Si – a purified form of the same material used to build today's computer chips, and in fact most of modern electronics. This began with their discovery that optical transitions in this material are much narrower than in ordinary silicon, or in any other semiconductor, for that matter. For an overview of their research click [here](#).

The material was originally produced in an effort to redefine our standard of mass, the kilogram, by the [Avogadro Project](#). Others are interested in ^{28}Si for investigating the possibility of a silicon-based quantum computer, which offers the prospect of solving certain types of problems which are essentially intractable using ordinary computers. Thewalt's discoveries have opened new avenues to optically measure and control the electronic and nuclear spins of impurity atoms in ^{28}Si , which would be the quantum bits, or qubits, used in quantum

computation. The group collaborates with the international leaders in this area, and this collaboration has recently resulted in a [publication](#) in the journal Nature. This was the first demonstration of quantum entanglement in silicon – an important step on the way to the realization of a quantum computer.

For a CBC news article related to this publication click [here](#).

Events

Convocation Hat Trick – June 16, 2010

Not only did we have a number of great students graduate in the June 2010 convocation, but we also celebrated a convocation hat trick as three of our students received particular honours. Ryan Thomas (BSc Hon Physics 2010) received the Governor General's Silver Medal, awarded to the top undergraduate student. Dag Gillberg (PhD Physics 2010) received the Dean of Graduate Studies Convocation Medal for the top graduate student in Science, and Gwen Eadie (BSc Maj Physics 2010) was selected to present the Graduated Address. Ryan is currently a graduate student at the University of Calgary, Gwen is a graduate student at Queen's, and Dag is doing postdoctoral work at Carleton.

Physics Summer Poster/BBQ/Softball Event – August 6, 2010

Our annual summer event features posters presented by our summer undergraduate researchers, a softball game between faculty/staff and students, and a barbeque in the courtyard.



This year, the poster winners were:
First Prize: Carolyn Kierans/Kathy Nelson (Hayden group) – “Magnetic Particle Imaging”
Second Prize: Joel Klassen (Girt group) – “Measuring Quantum Efficiency”
Third Prize: Lydia Zajiczek (McGuirk group) – “Optical Excitation of Non-Linear Spin Waves in Ultracold 87Rb”

As usual, the faculty/staff team won the softball game.

Starry Nights @ SFU Forever! – September 18, 2010

"Starry Nights @ SFU Forever!" was an open house held to raise awareness of our project to build a SFU Teaching Observatory and Science Outreach Centre. Over 1,000 people signed the guest book for the afternoon and evening program of events, which ran from 2-9PM. This turned into an extraordinary volunteer effort with participation by departments from across the university and by many community organizations. The Vancouver Centre of the Royal Astronomical Society of Canada (RASC) provided a key initial impetus for the event by agreeing to host its annual "Astronomy Day" public outreach event at SFU. Notable



attendees included SFU President Andrew Petter, Acting Mayor of Burnaby Sav Dhaliwal, and Burnaby Councilor Pietro Calendino, all three of whom gave welcoming remarks at the start of the RASC lecture in Images Theatre. For more info, www.sfu.ca/starrynights/observatory.html

Physics Career Night – Tuesday, October 5, 2010

Every other year, the Department and Science Coop sponsors a Career Night. Guests are invited to speak to students about their careers and provide useful tips about job finding, interviews, opportunities for physicists etc. This year's panelists were Derek Cheng, Ballard Power Systems (BSC Applied Physics SFU 1999), John Lidner, SJ Geophysics (BSC Physics & Astronomy UVic 2003) and Donna Hohertz, SFU Physics PhD student (BSC Chemical Physics SFU 2003).

Poster Competition 2010-2011 – Friday, February 11, 2011

41 posters were presented from 25 research groups at this year's poster competition. The 2010-2011 poster prize winners were Sonia Milbradt – \$1000 travel award (Broun group), Lydia Zajiczek – \$100 cash prize (McGuirk group) and Mohammad Dehgani Ashkezari – \$1000 travel award (Hayden group).

Undergraduate Pacific Physics and Astronomy Conference (UPPAC) – March 2011

The Simon Fraser University Physics Student Association was very excited to host the fourth annual Undergraduate Pacific Physics and Astronomy Conference, UPPAC 2011, from March 4th to March 6th. Participants presented 12-minute talks describing their research. In addition to student presentations, the conference included lab tours, a keynote lecture, and an optional pub night. Keynote speakers for UPPAC 2011 include Dr Jeffrey McGuirk and Dr. Dugan O'Neil from SFU and Dr. Gary Hinshaw, an Astrophysicist who recently joined the University of British Columbia from NASA. Best Talk: Carolyn Kierans (1st), Lydia Zajiczek (2nd).

Surrey Podium 2 opening – May 28, 2011

SFU has opened new space at Surrey in Podium 2. This includes extensive space for science including lab space for BISC, CHEM and BPK. The space also includes the third version of our Physics Studio.

Convocation – June 15, 2011

Congratulations to all our graduands at this year's convocation and best wishes for a successful life. Two graduands have received special recognition: Michel Trottier-McDonald has been awarded the Dean of Graduate Studies Convocation Medal for top graduate student in Science and Wendell Huttema has been awarded the Diane Filer / Quirks & Quarks Graduate Award for the best PhD thesis in Science.

Physics Outreach – Ongoing

Department members continue to be very engaged in presenting science to the public. In collaboration with other science departments, we ran a second, very successful Science



Spooktacular on Saturday, October 30, 2010. We presented two shows to audiences of 300+ each time and had many hands on activities for children in between shows. Here's a link to a video a volunteer made of this year's event: www.youtube.com/watch?v=fmdFbqqpocw.



Led by Sarah Johnson and with funding from WWEST Partners, we offered our second Girls Exploring Physics workshop. More than 40 girls in grades 9 and 10 attended. Girls learn about different physics careers as well as attend hands-on workshops. You can find links to two videos about this event on the Girls Exploring Physics website: www.physics.sfu.ca/about/outreach/gep.

The HEP group hosted 20+ highschool students for an "International Physics Masterclass" day on March 18, 2011. This involved some lectures, some ATLAS data analysis and a video conference with other sites around the world to share analysis results. The group plans to repeat this at least twice per school year in the future. Details and photos are here: hep.phys.sfu.ca/Masterclasses/2011/March18/.



As part of Science in Action (www.sfu.ca/~siasfu), Physics has developed three workshops for class visits that are based on prescribed learning outcomes but can be tailored for individual classes. The first workshop was the Astronomy workshop, the second was Lasers in Action, and we are currently piloting a third workshop entitled Exploring Energy. This year, over 500 students attended the Astronomy workshops and over 1000 students attended 24 Lasers in Action workshops.

Plans for the Coming Year

HEP Group to host Physics in Collision Symposium Aug 28 – Sept 1 2011



This prestigious annual conference will be held in Canada for the first time, hosted by SFU's High Energy Physics group. The Symposium on Physics in Collision has a 30-year history and typically draws about 100 particle physicists from around the world. The program of the conference is composed of invited plenary talks and contributions in poster session. Invited speaker's are nominated by the World's leading international particle physics experiments and review key topics and new results in elementary particle physics. The conference aims to encourage informal discussions on new experimental results and their implications. Topics cover a wide range of subjects from experimental and theoretical collider physics to astroparticle and neutrino physics. Specifically discussed are electroweak phenomena, quantum

chromodynamics, neutrino physics, heavy flavour physics, Higgs and beyond the standard model physics. For more information, check the website: hep.phys.sfu.ca/pic2011.

SFU bids to host the 14th Annual NW-APS meeting in 2012



Dr. K.S. Viswanathan and Dr. Andrew DeBenedictis are in the process of preparing a bid for the 2012 Northwest Section APS meeting, to be held at SFU Vancouver.

The Northwest Section of the APS was officially founded in 1998 and numbers over 1100 members. Its purpose is to facilitate the exchange of physics information and discussion among members living in the rather large area of the Pacific Northwest (primarily Alberta, British Columbia, Idaho, Montana, Oregon, Washington, and Wyoming & Alaska). The Section places emphasis on including students and physicists who work in education, research and in industry. For more info: www.aps.org/units/nws/index.cfm.

View the cosmos through a telescope! – Ongoing

The physics department hosts "Starry Nights @ SFU", free events that are open to the public. On these nights you can view a variety of celestial objects through our telescope, including planets, the Moon, star clusters, nebulae, and galaxies. We also take astronomical images with a CCD camera, which are then made publicly available for download. You are also welcome to bring your own binoculars or portable telescope: the more gear we have on hand, the merrier!

Check out a Starry Nights video here: www.youtube.com/watch?v=QABOVnaDCsE. For more information please visit our web site www.sfu.ca/starrynights. To receive up to date information on our public events please subscribe to the Starry Nights @ SFU mailing list by contacting Howard Trottier (Email: trottier@sfu.ca Phone: 778-782-4465).

Comings and Goings

Ayako Nagasawa joined the Department September 23, 2010 as our Office Assistant, replacing Bianca Beaulieu who moved to Ontario.

Simin Bagheri Najmi joined the Department October 1, 2010 as a half-time Undergraduate Advisor.

Rose Evans joined the Department March 23, 2011 as our Graduate Secretary, replacing Amy Lau who accepted a position in the Faculty of Education at SFU.

Contact us! Barbara Frisken, Chair – frisken@sfu.ca

Dagni Lund, Secretary to the Chair – lund@sfu.ca

Departmental Website – physics.sfu.ca

Theses for 2010/2011

Undergraduate Honors Theses

Author	Semester	Title	Advisor
Joel Klassen	1111	<i>On the Feasibility of Genetic Algorithms in the Design of Thin Film Magnetic Materials for Nuclear Magnetic Resonance Devices</i>	E. Girt and A. Frolov
Emilio Miralles	1111	<i>Stochastic Simulation of Bbacterial Plasmid Motion in a Type I Partitioning System</i>	E. Emberly
Eric Thewalt	1111	<i>Design and Construction of Cavity Perturbation Apparatus for Microwave Surface Impedance Measurements at Millikelvin Temperature in Applied Magnetic Field</i>	D. Broun
Carolyn Kierans	1111	<i>The Design and Construction of a Magnetic Particle Imaging System</i>	M. Hayden
Mehrad Alavipour	1111	<i>Quantum Interferences and Weak Localization in Layered Metals at Strong Magnetic Fields</i>	M. Kennett

Graduate Theses

Author	Degree	Title	Advisor
Mr. Michel Trottier-McDonald	MSc	<i>Identifying Tau Lepton Hadronic Decays using Calorimeter Topological Clusters at ATLAS</i>	D. O'Neil
Mr. Nuri Yazdani	MSc	<i>Hybrid Monte Carlo scheme for interacting double-exchange systems</i>	M. Kennett
Ms. Sara Ejtemaee	MSc	<i>A Fluorescence Study of Single Trapped Ytterbium Ions for Quantum Information Applications</i>	P. Haljan
Ms. Iris Gutowski	MSc	<i>The Effects of pH and Concentration on the Rheology of Carbopol Gels</i>	B. Frisken
Ms. Hasmik Hayrapetyan	MSc	<i>Principal Component Approach to Structure Formation with Massive Neutrinos</i>	L. Pogosian
Ms. Zenan Jiang	MSc	<i>Deep Level Transient Spectroscopy Measurements of GaAsBi/GaAs</i>	P. Mooney
Mr. Omid Salehzadeh Einabad	MSc	<i>Carbon doping of GaAs Nanowires</i>	S. Watkins
Mr. Wendell Alexander Huttema	PhD	<i>Superconducting Electrodynamics of Underdoped Yttrium Barium Cuprate</i>	D. Broun
Mr. Amirmohamad Keyvanloo	PhD	<i>Investigating Phase Behavior and Nanodomain Characteristics of Sphingomyelin/Cholesterol Membranes, Using 2H NMR</i>	J. Thewalt
Mr. Albion Yang	PhD	<i>Optical Hyperpolarization and Detection of Electron and</i>	M. Thewalt

Awards for 2010/2011

Undergraduate Awards

Name		Title of Award
Howard	Hao	Highest scoring SFU student on the 2011 CAP Undergraduate Prize Exam
Ian	Anderson	VPR USRA 2011
Renat	Kamalov	VPR USRA 2011
Tin	Ma	VPR USRA 2011
Laleh	Mohtashemi	VPR USRA 2011
Bradley	Noakes	VPR USRA 2011
Carmen	Tang	VPR USRA 2011
Darrell	Tse	VPR USRA 2011
Jonathan	Williams	VPR USRA 2011
Brian	Koote	TRIUMF USRA
Karol	Krizka	TRIUMF USRA
Rakinder	Gill	NSERC USRA 2011
Gabriel	Scholz	NSERC USRA 2011
Starla	Talbot	NSERC USRA 2011 - Dalhousie
Thomas	Wintschel	NSERC USRA 2011
David	Deepwell	RISE Scholarship
Karol	Krizka	Rudi Haering Award in Physics 2011
Eric	Thewalt	Physics Charter Faculty Prize 2011
Eric	Thewalt	NSERC CGSM (2011-2012)
Carolyn	Kierans	NSERC CGSM (2011-2012)

Graduate Awards

Name		Title of Award
Koos	Van Nieuwkoop	Faculty of Science Graduate Entrance Scholarship 2010
Sonia	Milbradt	Pacific Century Graduate Scholarship 2011
Jamie	Horton	NSERC CGSM (2011-2012)
Sonia	Milbradt	NSERC CGSM (2011-2012)
Natalie	Murphy	NSERC CGSM (2011-2012)
Ian	Bushfield	NSERC IPGS (2010-2012)
Derek	Sahota	NSERC CGSD3 (2011-2013)
David	Lackner	2011 Billy Jones Memorial Graduate Scholarship
Michael	Steger	2011 Borden Ladner Gervais Graduate Scholarship
Michel	Trottier-McDonald	2011 Dean of Graduate Studies Convocation Medal
Wendell	Huttema	2011 Diane Filer/Quirks & Quarks Graduate Award for the Best PhD Thesis