

Newsletter 2009/2010

June 15, 2010

## 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 with lots of progress on all fronts. Dr. Erol Girt has joined as an Associate Professor and Tier 2 CRC; undergrads and grad students are winning awards for presentations at conferences and for theses, and have been winning NSERC fellowships in record numbers; our outreach program has been very, very busy; and we have launched an exciting campaign for funding for a new Teaching Observatory and Science Outreach Centre. Read all about it!

– Barbara Frisken

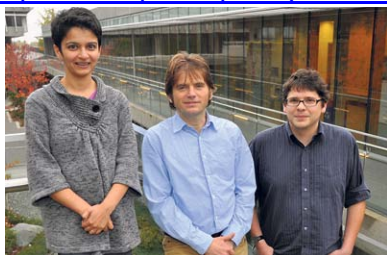
## Comings and Goings



Erol Girt joined the Department as a Tier 2 Canada Research Chair in Novel Magnetic Materials in August 2009. Dr. Girt completed his B.Sc. and M.Sc. in Bosnia and Herzegovina in 1987 and 1991, respectively, and his doctorate at McGill University in 1998. His doctoral thesis focused on the magnetic behavior of rare earth – iron compounds. He was awarded a FCAR Postdoctoral Fellowship from the province of Quebec, which he held in the Department of Material Science in the Lawrence Berkeley National Laboratory and the University of California at Berkeley, USA. Following his postdoctoral fellowship, he joined Seagate Technology to work on magnetic microstructures for magnetic memory materials. He left Seagate in 2007 to take up a position as Head of Research at a small startup company, Applied Quantum Technology, which is focused on design and implementation of nanostructured solar cells. His broad experience will be of great benefit both to the Department and to the materials science efforts of the University.

## Articles from SFU News

**Three new, four renewed Canada Research Chairs**  
[www.sfu.ca/sfunews/news/story\\_11050922.shtml](http://www.sfu.ca/sfunews/news/story_11050922.shtml)

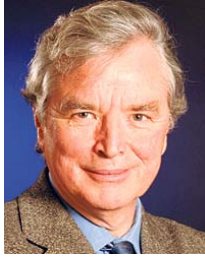


**Halloween Science Spooktacular**  
[www.sfu.ca/sfunews/news/story\\_10220901.shtml](http://www.sfu.ca/sfunews/news/story_10220901.shtml)



### Robert Turner, Outstanding Alumnus

[www.sfu.ca/sfunews/print/news/story\\_12030916.html](http://www.sfu.ca/sfunews/print/news/story_12030916.html)



### Atom-smashing record thrills physicists

[www.sfu.ca/sfunews/news/story\\_01061001.shtml](http://www.sfu.ca/sfunews/news/story_01061001.shtml)



### Starry Nights delight star-mad kids of all ages

[www.sfu.ca/sfunews/news/story\\_02051008.shtml](http://www.sfu.ca/sfunews/news/story_02051008.shtml)



### Prof receives phone messages from space

[www.sfu.ca/sfunews/news/story\\_02051013.shtml](http://www.sfu.ca/sfunews/news/story_02051013.shtml)



### Laser Jello Shots Thrill Kids and Laser Blazers

[www.sfu.ca/sfunews/news/beaming-in-on-lasers.shtml](http://www.sfu.ca/sfunews/news/beaming-in-on-lasers.shtml)



## Research Highlights

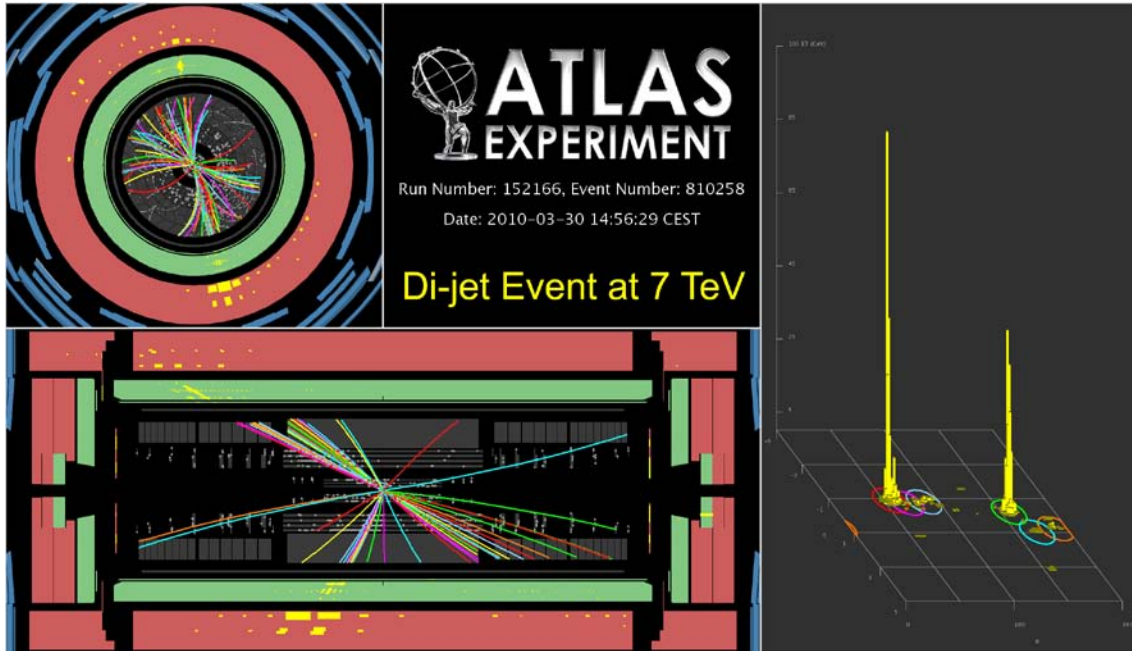
### ***Using optical tweezers as tools to grab and stretch single proteins and DNA molecules***

Optical tweezers (also known as laser tweezers) work by focusing laser light very tightly through a microscope objective lens. At the focus, microscopic particles can be "trapped" (held stably in solution) and the forces acting on them probed. By using these particles as handles, Nancy Forde's group is stretching single molecules. Her research strives to relate the sequence of proteins to their mechanical function, which may provide insight into the mechanisms of connective tissue diseases. In related work, her group has been leading the world in demonstrating the suitability of the technique of holographic optical tweezers as a precision measurement tool, showing that this instrument, which works by modifying the phase of a laser beam to create and steer optical traps, can position traps with nanometre precision and can exert calibrated forces in excess of 65 picoNewtons. Her group plans to apply these techniques to stretch protein-based biomaterials, characterizing their response and helping to design new materials with different mechanical function. Contact: Nancy Forde, [nforde@sfu.ca](mailto:nforde@sfu.ca)

### ***The ATLAS experiment at CERN***

After well over a decade of preparation, the ATLAS experiment at CERN in Geneva has started taking data on proton-proton collisions at the highest energies ever achieved in the laboratory. ATLAS is a general-purpose

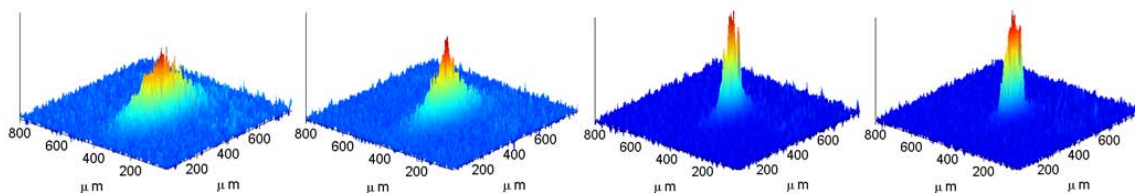
experiment that will look for a wide variety of phenomena. The main goal of the experiment is the discovery of the Higgs particle that is central to the current model of how subatomic particles attain mass. ATLAS will also look for physics beyond the Standard Model of particle physics such as supersymmetry and extra dimensions. SFU physicists are involved in many aspects of ATLAS, ranging from high-performance computing and real-time monitoring of the data, to physics analysis. Examples of the latter include deriving from raw data properties of the particles resulting from the collisions, studying the properties of the top quark (heaviest fundamental matter particle), and searching for resonances (new particles). For more information, see <http://atlas.ch/>. Contact: Mike Vetterli, [vetterli@sfu.ca](mailto:vetterli@sfu.ca)



The figure above shows a visualization of one of the more remarkable events collected in the initial data-taking period, remarkable because of the violence of the collision. The upper-left panel is a view along the axis of the cylindrical ATLAS detector and shows the tracks left in the inner detector by the particles emerging from the collision point in the centre. The yellow blobs in the green and salmon coloured outer rings represent energy deposits in calorimeters, which measure the total energy of the particles. The lower left-hand panel is a side view of the same collision. Finally, the right panel is an unfolded view of the calorimeters, which clearly shows the presence of two prominent "jets" of particles. Jets are manifestations of quarks emerging from the collision point. Much of the physics activity at SFU is related to jets.

### ***The coldest matter in BC***

When bosons become cold enough and dense enough, they undergo a phase transition and all squeeze into a single quantum state. This state, known as a Bose-Einstein condensate (BEC), has been created in the McGuirok lab and, at a temperature of around 50 nK, it is the coldest object in BC and amongst the coldest matter in the universe. In order to produce BECs, the McGuirok group evaporatively cools clouds of Rubidium atoms, in much the same way a cup of coffee cools by losing the most energetic particles.



The above images are false color images of a confined atomic gas. As the gas is cooled from 250 nK to 50 nK (left to right), the presence of the condensate is seen by the emergence of a sharply peaked bump in the

middle of the Gaussian-distributed uncondensed gas. The McGuirk group plans to study the behavior of BECs, in particular how interactions within the condensate as well as with matter outside of the condensate influence the dynamics of the system. Contact: Jeff McGuirk, [jmcguirk@sfu.ca](mailto:jmcguirk@sfu.ca)

## Events

### ***Department Poster Competition – Friday February 5, 2010***

34 posters were presented from 24 research groups at this year's competition! The 2009-2010 poster prize winners were Michel Trottier-MacDonald (\$1000 travel grant), Azadeh Akhtari Zavareh (\$1000 travel grant) and Jixin Liang (\$100 cash).

### ***International Year of Astronomy 2009***

SFU joined the world to celebrate the 2009 International Year of Astronomy, marking the 400th anniversary of the year in which Galileo first turned a telescope on the cosmos. Led by Howard Trottier, and in partnership



with Science in Action, IYA activities were focused on an ambitious program of school visits. By the end of 2009, the IYA team had hosted over 2,150 grade-school students at daytime astronomy workshops, from about 70 schools and community groups, accompanied by over 300 parents, guardians and teachers. Students were introduced to observational astronomy and taught how to use a simple telescope. Donations from members of the department and external sponsors were used to purchase 150 telescopes to distribute to each classroom that visited. We also hosted more than 1,000 guests at evening star parties and related events. More than 80 volunteers assisted in the various activities.

### ***Science Spooktacular 2009 – Saturday October 31, 2009***

The Departments of Physics and Chemistry hosted a free Halloween-themed science show for families, which included the famous Suicide Pendulum and Multi-colour Glowing Pumpkins. Before the show, there were hands-on science activities and displays on the South Concourse of the Academic Quadrangle, including Dr. Inferno's glassmaking demonstration and liquid-nitrogen ice cream tastings.



Photos (from left to right): Levon Pogosian, Becky Goyan and Sophie Lavieri cook with LN<sub>2</sub>; Leigh Palmer enthralles the crowds with the superconducting train; we packed B9200! (Photos courtesy of Aaron Springfold)

## ***Girls Explore Physics***

This year we held a day-long workshop at SFU Burnaby for girls in Grades 9-10. The workshop consisted of a presentation about current research topics in physics and hands-on activities in two areas that SFU women faculty specialize in, Biophysics and Condensed Matter Physics. It concluded with a discussion of career opportunities available to students who study physics at the university level. During lunch, participants had a chance to play with physics demonstrations and interact informally with women physics faculty and students from SFU. This project was supported by the Jade Project of the BC/Yukon NSERC Women in Science and Engineering Chair.



## ***Lasers in Action***



Thanks to a \$7300USD grant from the SPIE as part of the world-wide LaserFest celebrations in 2010, SFU is hosting "Lasers in Action" workshops to introduce students to lasers. These workshops, organized by the Department of Physics in conjunction with Science in Action, are bringing grade 8 students to campus to broaden their optics lessons from school with hands-on laser-based demonstrations and activities such as solving laser obstacle courses and uncovering secret messages. Over 600 students attended workshops during the spring semester of 2010.

## ***Frontiers in Biophysics 2010***

Held at SFU in March, Frontiers in Biophysics 2010 was a multidisciplinary event that highlighted current research in the Vancouver area biophysics and quantitative biology communities. This, the fifth annual Frontiers in Biophysics event, drew over 100 participants from a wide range of scientific backgrounds and all stages in their research careers. We were pleased to welcome Dr. Jennifer Ross from the University of Massachusetts – Amherst who gave a keynote presentation about her work with microtubules and associated motor proteins as “Building Complexity in Cytoskeletal Architecture”. The event also featured a series of talks by graduate students from SFU and UBC. It closed with a well attended poster session with thirty posters from students (graduate and undergraduate) and postdoctoral researchers. The poster session provided an excellent opportunity for discussion and socializing for members of the diverse biophysical community.

Frontiers in Biophysics 2010 was organized by graduate students in SFU’s Physics department. It was sponsored by NSERC (via SFU’s Office of the Vice-President, Research), MITACS and the MITACS Student Advisory Committee.

## Plans for the Coming Year

### ***SFU Observatory and Science Outreach Centre***

Simon Fraser University has approved an exciting project to build a Teaching Observatory and Science Outreach Centre! After careful study, the university has designated a wonderful site for the facility, on the North end of campus, adjacent to the Diamond Alumni Centre. A detailed cost study has been produced, and the university has just released a new and very evocative concept drawing for the Centre. Please check the Starry Nights website [www.sfu.ca/starrynights](http://www.sfu.ca/starrynights) for further details.

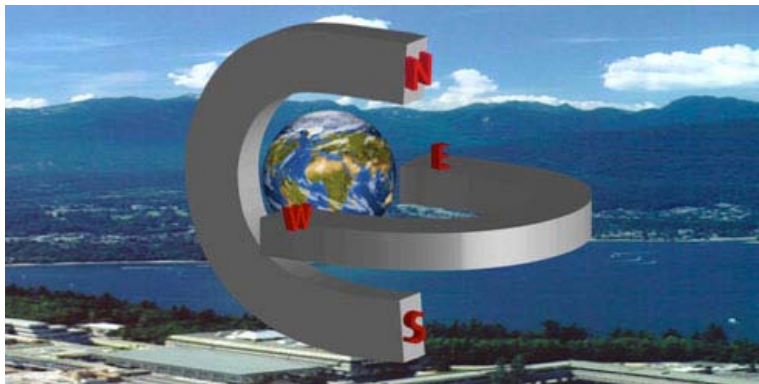
A private donor has already come forward with \$2M in support of the total project cost of approximately \$4M. However, we still need to raise the other half ...

Please contact Howard Trottier ([trottier@sfu.ca](mailto:trottier@sfu.ca)) or Anna du Bois ([ada52@sfu.ca](mailto:ada52@sfu.ca)), Science Advancement Officer, for further information about this project.



### ***Spin and Charge at the Nanoscale - 45 Years of Magnetism at SFU***

The Physics department will be hosting a conference this summer to mark 45 years of magnetism research at Simon Fraser University. This program was pioneered by Professors John Cochran, Tony Arrott, Bret Heinrich



and grew to be internationally recognized and formed the basis of the condensed matter group in the department, one of the largest and strongest condensed matter physics groups in Canada. This research continues to the present day and includes new directions in correlated electron materials and magnetic resonance. In honour of this effort, and to cement ongoing collaborations in this area, we are holding a special international meeting:

***Spin and Charge at the Nanoscale, 2010:  
45 Years of Magnetism at Simon Fraser University  
August 1 to 4, 2010, SFU Burnaby Campus***

### ***Physics at Surrey – Move to Podium 2***

Funding through the federal Knowledge Infrastructure Project has enabled the university to embark on an extensive renovation of 50,000 sq ft in the Podium 2 area of the SFU Surrey campus. Much of this space will be dedicated to Science classrooms and labs, and the Physics Studio, home of our successful studio physics versions of first year physics, will relocate to this space. Move in date is estimated to be September, 2011.

## Ongoing

### *View the cosmos through a telescope!*

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!

For more information please visit our web site [www.sfu.ca/starrynights](http://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](mailto:trottier@sfu.ca) Phone: 778-782-4465).

## Theses for 2009/2010

### *Undergraduate Honors Theses*

<b>Author</b>	<b>Semester</b>	<b>Title</b>	<b>Advisor</b>
Mr. Yiu Chung Lau	1094	<i>Electrodynamics of CeColn<sub>5</sub></i>	D. Broun
Mr. Ryan Thomas	1101	<i>Characterization of an Apparatus for the Creation of a Bose-Einstein Condensate in Rubidium Vapour</i>	J. McGuirk
Ms. Clara Chan	1101	<i>Electron Microscopical Approach to Probing Collagen Morphology</i>	N. Forde
Ms. Gwen Eadie	1101	<i>A PAndAS Project: Measuring Structural Parameters of Globular Cluster in M31</i>	H. Richer, UBC

### *Graduate Theses*

<b>Author</b>	<b>Degree</b>	<b>Title</b>	<b>Advisor</b>
Mr. Sebastian Cogswell	MSc	<i>An Experimental Model for MRI-detected Measurements of Oxygen Uptake in the Lungs</i>	M. Hayden
Mr. Benjamin Patrick Black Downing	MSc	<i>Probing the Mechanical Properties of Short Molecules with Optical Tweezers</i>	N. Forde
Mr. Graham Lea	MSc	<i>Metallic Scattering Lifetime Measurements with Terahertz Time-Domain Spectroscopy</i>	J.S. Dodge
Mr. David Lee	MSc	<i>Structural Investigation of Carbopol ETD2050 By Light Scattering</i>	B. Frisken
Ms. Roja Zakariaee	MSc	<i>The Effect of Cholesterol on the Partitioning of 1-Octanol into POPC Vesicles</i>	B. Frisken
Dr. Dag Gilberg	PhD	<i>Discovery of Single Top Quark Production</i>	D. O'Neil
Dr. Wenjie Li	PhD	<i>Hot Electron Transport Through Molecular Diodes</i>	K. Kavanagh
Dr. Zhiyi Liu	PhD	<i>Measurement of Single Top Quark Production in Tau + jets Channel Using BDT at D0</i>	D. O'Neil
Dr. Xiaoqing Zhou	PhD	<i>Microwave Flux-flow Impedance Measurements of Type-II Superconductors</i>	D. Broun

## **Awards for 2009/2010**

### ***Undergraduate Students – Awards, Prizes and Honours for 2009/2010***

<b>Name</b>		<b>Title of Award</b>
Clara	Chan	VPR USRA
Senny	Foo	VPR USRA
Kevin	Morse	VPR USRA
Gabe	Scholz	VPR USRA
Lydia	Zajiczek	VPR USRA
Carolyn	Kierens	NSERC USRA
Starla	Talbot	NSERC USRA
Eric	Thewalt	NSERC USRA
Gwen	Eadie	CUPC 2009 – Best Talk
Carolyn	Kierens	CUPC 2009 – Honourable Mention - Poster
Eric	Thewalt	CUPC 2009 - Best Talk
Ryan	Thomas	Rudi Haering Award in Physics (2009)
Eric	Thewalt	Rudi Haering Award in Physics (2010)
Braden	Brinkman	Physics Charter Faculty Prize (2009)
Ryan	Thomas	Physics Charter Faculty Prize (2010)
Gwen	Eadie	Brendan Midgley and Joseph Stryjak Celebration of Life Award
Carolyn	Kierens	London Drugs 60 <sup>th</sup> Anniversary Student Service Award
Gwen	Eadie	Graduand Address – Convocation June 2010
Ryan	Thomas	Governor General’s Silver Medal 2009-2010
Alex	Loosley	NSERC CGSM (2009)
Andra	St Quintin	NSERC CGSM (2010)
Ryan	Thomas	NSERC CGSM (2010)

### ***Graduate Students – Awards, Prizes and Honours for 2009/2010***

<b>Name</b>		<b>Title of Award</b>
Laleh	Samii	Poster Prize, International Society for Math Biology Conference
Michel	Trottier-McDonald	FQRNT (Quebec) (2009)
Colin	Truncik	NSERC CGSM (2009)
Mark	Gooyers	NSERC CGSM (2010)
E. Noel	Dawe	NSERC PGSD2 (2010-2012)
Payam	Mousavi	NSERC PGSD2 (2010-2012)
Teresa	Cheung	NSERC PGSD3 (2010-2013)
Colin	Truncik	NSERC PGSD3 (2010-2013)
Sherry	Leung	NSERC CGSD3 (2009-2012)
Scott	Yang	NSERC CGSD3 (2009-2012)
Michel	Trottier-McDonald	NSERC CGSD3 (2010-2013)
Douglas	Schouten	Billy Jones Memorial Graduate Scholarship 2009
Dag	Gillberg	Dean of Graduate Studies Convocation Medal 2009-2010
Dag	Gillberg	Thesis accepted for publication in the Springer Theses Series



### ***Alumni – Awards, Prizes and Honours for 2009/2010***

<b>Name</b>		<b>Title of Award</b>
Marija	Nikolic-Jaric	PhD, 2008 Hildred Blewett Scholarship, American Physical Society
Robert	Turner	PhD, 1973 SFU Outstanding Alumni Award, Professional Achievement

### ***Staff – Awards and Recognition for 2009/2010***

<b>Name</b>		<b>Title of Award/Honour</b>
Misty	Jorgenson	Graduate Diploma in Urban Studies
Mehrdad	Rastan	Master of Financial Risk Management
Sukhy	Sidhu	Master of Public Policy

### ***Faculty – Awards and Recognition for 2009/2010***

<b>Name</b>		<b>Title of Award</b>
John	Bechhoefer	Elected Fellow of the American Physical Society
Erol	Girt	Canada Research Chair, Tier 2 (2009-2014)
Leigh	Palmer	Lifetime Achievement Award, British Columbia Association of Physics Teachers
Mike	Wortis	Outstanding Referee, American Physical Society

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#### **Contact and/or Further Information:**

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This newsletter will be posted with the 2008/2009 newsletter on the Department website.