

CONCORDIA PHYSICS

CONCORDIA PHYSICS NEWSLETTER, Vol. 1, No. 1

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Foreword

Truong Vo-Van, Chair, Department of Physics

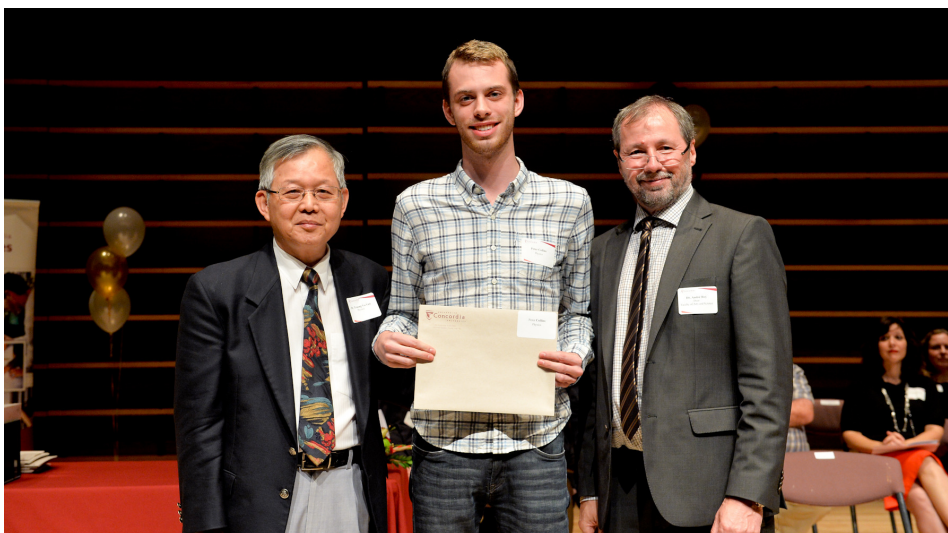
This newsletter is the first one published by the Department of Physics at Concordia University. Its purpose is to provide information on departmental activities to students, members of the department as well as the public at large. It responds to the need for more communication within our community while giving the public a glimpse at the growing importance of physics at Concordia. As the department progresses, we need to report on our accomplishments and our plan for better serving our students, our discipline, science and the community.

Students should be at the center of our preoccupations and this is why we inaugurate this newsletter by highlighting the accomplishments of some of our students (Student Scholar Award, High Altitude Ballooning Project) and our relationship with colleges that are forming the future university students and the next generation of scientists and physicists.

The Department of Physics is committed to excellence in research and teaching and this commitment can be seen in the various activities of its members. While research is conducted in different areas that span from high energy physics to physics education, our main research orientations lie in bio/medical physics and nanophysics. Consolidating and expanding these two latter areas will be our priority in the coming years.

With our best wishes for the Holiday Season!

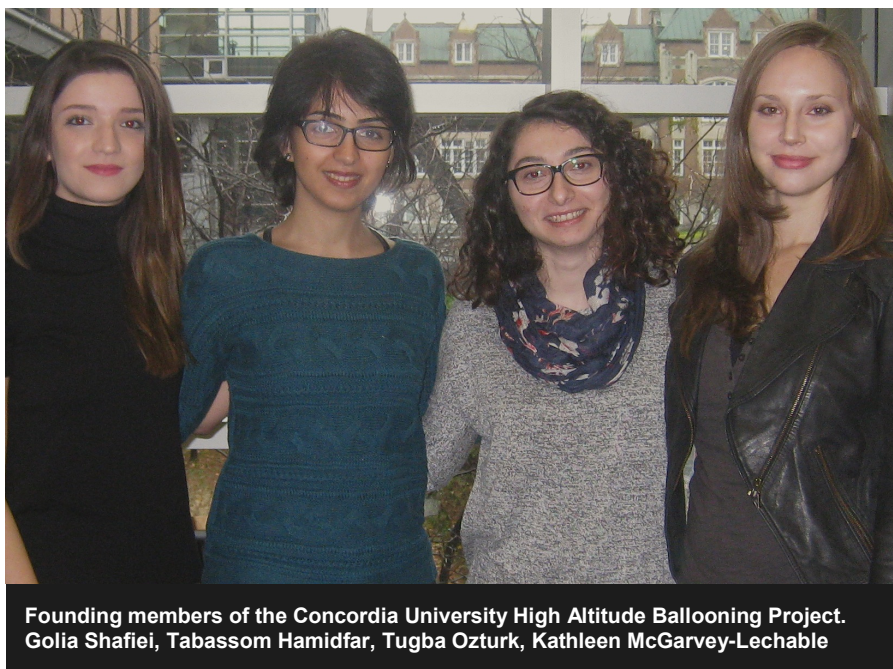
“Choosing to study physics is embracing a challenging but also very gratifying field of activity and work, for physics can be seen as the most fundamental science, the foundation of scientific disciplines, and the basis of the greatest scientific discoveries spanning the whole history of humanity”



Peter Collins, 2014 Physics Scholar, with Truong Vo-Van, Chair and André Roy, Dean, FAS

In This Issue

- High Altitude Ballooning Project
- A College Student Experience in Physics at Concordia
- Faculty Activities
- Student Research Opportunities & More



Founding members of the Concordia University High Altitude Ballooning Project. Golia Shafiei, Tabassom Hamidfar, Tugba Ozturk, Kathleen McGarvey-Lechable

Careers in physics

« Life can seem uncertain for those graduating with an academic degree in physics, especially if yours is not a graduate level degree. However, there is hope for you when you realize that your physics education has taught you more than just physics. Hidden in your training, if you tried hard to grasp the material, are skills you probably never knew you had. Use these powers wisely »

Dr. Ian D'Souza, COMDEV International, Concordia Physics Alumnus

Consider the multiple possibilities by accessing the link to the power-point presentation last September 15 by Dr. D'Souza on our career webpage:

<http://www.concordia.ca/artsci/physics/student-life/career-options.html>

High Altitude Ballooning Project

The High Altitude Ballooning Program was recently created by physics graduate students with the purpose of increasing talent acquisition and retention of female undergraduate students in Concordia University's Department of Physics. In pursuance of this goal, the program has established three main objectives. In order to increase students' confidence in working in an applied research setting, the students will design and execute a high altitude balloon payload capable of reaching the near-space environment (~35,000 m). They will also be offered a network of mentors consisting of female graduate students and faculty members in the greater Montreal area. Finally, the undergraduates will be given an opportunity to serve as mentors by conceptualizing and conducting a two-day physics workshop offered to local CEGEP students. The program plans on a tethered balloon in June 2015, with plans on expanding to a full, unmanned balloon launch in 2016. The High Altitude Ballooning Program is actively recruiting undergraduate students to participate in the program; any interested students are encouraged to contact the group at haballon.conu@gmail.com.

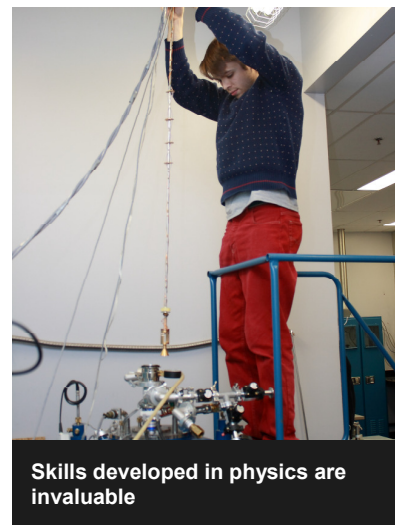
The High Altitude Ballooning Project is supported by the Department of Physics. It also gratefully acknowledges the financial contribution of the Office of the Vice-Provost, Teaching and Learning.

Opportunities for undergraduate student internships and summer works

1. Research opportunities in particle and nuclear physics offered by **TRIUMF** to undergraduate students : <http://www.triumf.ca/undergraduate-student-program>.

2. Summer research work with **NSERC-USRA** (Undergraduate Student Research Award)
 (Link to information: <http://faao.concordia.ca/main/awardprograms/nserc.shtml>)
 (Link to USRA program: http://www.nserc-crsng.gc.ca/Students-Etudiants/UG-PC/USRA-BRPC_eng.asp) (Link to How to Apply Instructions: <http://www.nserc-crsng.gc.ca/OnlineServices-ServicesEnLigne/instructions/202/e.asp#appinfo>)

3. Other opportunities will be announced during the year.



Skills developed in physics are invaluable



Phonemac working on thin films in Dr. Vo-Van's laboratory

A College Student Experience in Physics at Concordia

Thanavady Phonemac

Dare to do things out of your comfort zone. I keep on repeating this to my friends because I've lived wonderful experiences out of this. Two springs ago, I was at Ahuntsic College and saw an advertisement about a stage cooperation with Concordia University. I said to myself: "why not?" I kind of knew what I wanted to do with my life but was not too sure about it. So I applied for an internship at Concordia. It was the best decision I made at that time. I got an interview and worked in nanotechnology in the physics department that summer and the following one. Not only has this stage given me the opportunity to work in a research lab, it also helped me confirming my decision on becoming a researcher. In addition, I have got the chance to have a first paper published as a co-author. I even had the opportunity to present results of this work at the ACFAS Annual Congress in 2014. Moreover, I made new friends from different background, ethnicity and of all ages. I lived this amazing experience just because I said to myself "why not?" Thanks to the great team at Concordia for this opportunity! Truong, Simona, Mohammed, Youssef, Stephen, Afaf, Wentworth, Annie and the wonderful staff I have met, you will always be in my heart. I am now studying in my second year in bio-informatics and will aim at becoming a neurological science researcher. So, fellow college students, let's see what positive experience you can get when you're out of your comfort zone!

Visit by Vanier College Students and Teachers

« On Friday, October 31, 2014, twelve Vanier students accompanied by teachers, Stephen Newbigging and Gabriel Bulgarea, visited the Physics Department of Concordia University to learn about interdisciplinary research areas that can be explored at the university level and to see what common projects might be worked on by Vanier and Concordia students.

The visit allowed Vanier students to learn about advanced equipment and expertise not available at Vanier and consider how some of the projects they undertake at Vanier might be expanded and continued at the university level. »

From the Vanier College—Intercom—November 2014 Issue

Collaborative Project between Collège Ahuntsic, École polytechnique de Montréal & Concordia: A Frank Success!

Thanks to a grant from the Québec Ministry of Education, Leisure and Sport, a collaborative project between Concordia, Collège Ahuntsic and École Polytechnique was started in 2013. Among other objectives, the 3-year project aims at initiating college students to research in nanotechnology and biophysics through an internship program in the Department of Physics at Concordia.

So far more than 30 college students have benefited from this internship program. The host laboratories were the research groups of Drs. Laszlo Kalman, Valter Zazubovits, Pablo Bianucci and Truong Vo-Van. Dr. Simona Badilescu was the project coordinator at Concordia while Dr. Lucie Brouillette and Dr. Gilles Picard coordinated the work at Collège Ahuntsic.



Working in Dr. Kalman's lab

New Faculty Members in Medical Physics Imaging

The Department of Physics is happy to announce that two new members, Dr. Christophe Grova and Dr. Claudine Gauthier, have joined our faculty rank respectively in July and September 2014. They were recruited in collaboration with the PERFORM Centre, a new, state-of-the-art imaging centre at Concordia dedicated to cutting-edge lifestyle preventative health research.

Dr. Grova's expertise lies in the developing and validating of methodologies for multimodal neuroimaging data integration and fusion. He can work with several imaging modalities that include SPECT, PET, MRI/fMRI, EEG and Near Infra-Red Spectroscopy.

Dr. Gauthier, for her part, is conducting research on cerebral metabolic and vascular imaging, the impact of aging and lifestyle on the brain, functional MRI BOLD signal modeling, and quantitative imaging of plasticity. She is presently a guest researcher at the Max Planck Institute for Human Cognitive and Brain Sciences in Leipzig.



Seminar by Dr. Christophe Grova

Faculty Activities & News

Dr. **Christophe Grova** was an **invited speaker** for the following events: **2014 Dec 1st**: The Feindel Brain Imaging Lecture Series, McConnell Brain Imaging Center, Montreal Neurological Institute, *Principles of Near-Infrared Spectroscopy (NIRS)* <http://www.mcgill.ca/bic/training-events/bic-feindel-lectures>; **2014 Oct 1st**: First PERFORM Colloquium: Exploring brain activity through multiple modalities. Insights from electrophysiology (EEG, MEG) and from hemodynamic processes (fMRI, NIRS), <http://www.concordia.ca/cuevents/main/2014/10/01/perform-colloquiumexploringbrainactivitythroughmultiplemodalities.html>; **2014 August 24th**: International conference BIOMAG 2014, Halifax, Canada, Satellite Meeting: Biomagnetic signal processing: Denoising, source localization and connectivity analysis organized by K. Sekihara and S Nagarajan, *Properties of the MEM inverse operator*, <http://www.biomag2014.org/satellites.shtml>.

The following **talks** were also given: **2014 March 12th** Whistler-Blackcomb, B.C., Canada The 2nd Whistler Scientific Workshop on Brain Functional Organization, Connectivity and Behavior. **Christophe Grova**, Christian L Dansereau, Pierre Bellec, Kangjoo Lee, Francesca Pittau, Jean Gotman, *Detection of Abnormal Resting-State Networks in Individuals (DANI): Application in Epilepsy* <http://mrrc.yale.edu/home/seminars/workshop/index.aspx>; **2014 June 2nd** Open Methods Meetups Series: MEM Brainstorm Plug-In for EEG/MEG Source Localization. McConnell Brain Imaging Center, Montreal Neurological Institute, **Christophe Grova** and Jean-Marc Lina <http://www.mcgill.ca/bic/training-events/bic-feindel-lectures>.

Dr. **Grova** participated in the following **workshop/conference organization**, **Oct 10-12 2014**: Committee member for the Organization of the 3rd functional Near Infra-Red Spectroscopy (fNIRS) international conference in Montreal 2014. <http://fnirs2014.org>; **Oct 9th 2014**: Organization at Concordia (Loyola Campus) and with PERFORM of the 1-day fNIRS educational session, just before the fNIRS conference (Oct 9th 2014) (C. Grova and L. Bherer) : <http://fnirs2014.org/wordpress/course/>

Dr. **Claudine Gauthier** was a **keynote speaker** for: ASL at 7 Tesla: the Leipzig experience (September 25, 2014) EU COST Action ASL in dementia, Dubrovnik, Croatia. She was also an **invited speaker** for the following events: Cerebrovascular health and metabolism in healthy aging (November 26, 2014) Cerebral Imaging Center, Douglas Hospital, Montreal; Imaging cerebral oxidative metabolism using calibrated fMRI at 3 and 7 Tesla (September 19, 2014) DCRM, Copenhagen, Denmark; How to measure brain plasticity: Approaches, pitfalls, perspectives (September 1, 2014) Neurology Seminar, Max Planck Institute, Leipzig, Germany.

Faculty Activities & News

Dr. **Claudine Gauthier** was the **main organizer** of an **international 2-day symposium**: 2nd international symposium on Imaging Cerebral Physiology: Manipulating Magnetic Resonance contrast through respiratory challenges, December 4-5th in Leipzig, Germany. The post-doc co-supervised by Dr. Gauthier, **Audrey Fan**, presented her work entitled « Comparison of absolute brain oxygenation in visual cortex by QUantitative O₂ imaging (QUO₂) and susceptibility MRI » at this symposium. Dr. **Gauthier** gave a talk entitled « Age-related changes in grey and white matter changes in cerebrovascular reactivity and the impact of cardiorespiratory fitness » at the ISMRM workshop on Functional MRI: Emerging Techniques & New Interpretations in June 2014. A supervised student, **Steffen von Smuda**, presented his work on Cerebral arterial and venous blood T1 during hyperoxia and hypercapnia at the International Society for Magnetic Resonance in Medicine conference in Milan in May 2014.

Dr. **Gauthier** was also active in **media activities**. She attended the 64th Lindau Nobel Laureate Meeting on Physiology and Medicine in August 2014 and was interviewed by **Nature** about aging (The long goodbye: <http://www.nature.com/lindau/2014/index.html>). She was also interviewed by **Le Soleil** about her latest Neurobiology of Aging paper: <http://www.lapresse.ca/le-soleil/actualites/sante/201408/25/01-4794504-lexercice-physique-un-remede-aux-pertes-de-memoire.php>

Dr. **Valter Zazubovits** was the **Conference Chair** of the 31st Eastern Regional Photosynthesis Conference. April 4-6, 2014; Marine Biological Laboratory, Woods Hole, MA, U.S.A, http://physics.concordia.ca/~valter/ERPC2014/ERPC%202014_files/home.htm.

Dr. **Laszlo Kalman** was an **invited plenary speaker** at the 40th Midwest/Southeast Photosynthesis Conference, October 24-26, 2014, Turkey Run State Park, Marshall, IA, U.S.A, <http://www.phy-astr.gsu.edu/hastings/semwpm40/speakers.html>. **Alexandru Ivanescu**, MSc student in Dr. Kalman's group, gave an oral presentation at the 31st Eastern Regional Photosynthesis Conference. April 4-6, 2014; Marine Biological Laboratory, Woods Hole, MA, U.S.A. **Charles Protheroe**, also a MSc student, had a poster presentation at the same Photosynthesis Conference as well as at the 40th Midwest/Southeast Photosynthesis Conference last October.

Dr. **Mariana Frank** was on sabbatical in 2013-14. She was invited to visit the Harish Chandra Research Institute in Allahabad (January 2014), and the Indian Institute for the Advancement of Science in Kolkata (February 2014), and Institute for Theoretical Physics in Helsinki (May 2014). She presented a talk "Chargino and neutralino decays in U(1)' and LRSUSY". She was also an **invited speaker** at the CAP Annual Congress 2014, Sudbury (June 2014), Canada where she gave a review talk "Supersymmetry after the LHC data", and at the "Searches for New Phenomena at the Upgraded LHC" workshop in Vancouver, Canada (September 2014) where she gave a talk on "Charginos and Neutralinos beyond MSSM".

Other activities in the High Energy Physics Group: **Nima Pourtolami** was selected to participate in the TASI 2014 workshop (July 2014) in Boulder Colorado. A paper co-authored by **Sahar Bahrami** and **Mariana Frank** was selected for display on the Physical Review D journal web site as part of "Kaleidoscope" (August 2014). **Jack Yakup Araz** was selected to attend the DESY workshop in LHC phenomenology and presented the report "Search for Multilepton Final States at 14 TeV" (July-September 2014). **Ashley Arsenault** was a speaker at the American Mathematical Society fall Eastern sectional meeting at Dalhousie University (October 2014) where he presented an invited talk on "Using supersymmetric quantum mechanics to generate families of solvable potentials". **Ushoshi Maitra** visited the High Energy Group from HRI, India (November 1-14, 2014).

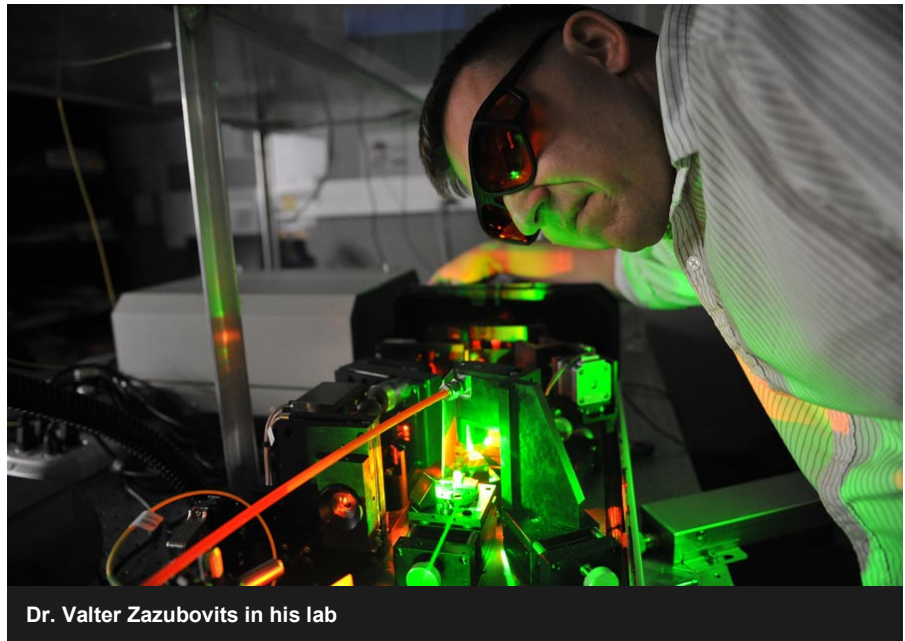
Dr. **Calvin Kalman** coedited the special issue of Physics in Canada on Physics Education–2014. He has been an **invited speaker** at the Malinson Institute and the Physics Department, Western Michigan University in November 2014. Prof. **Kalman** will also be an **invited speaker** at the American Association of Physics Teachers (AAPT) winter meeting in San Diego (Jan 2015) as well as at the Inter American Conference on Physics Education, in a plenary session (June 2015). In the edited series "Science & Engineering Education Sources" his **new book** "Rethinking Science Education: Philosophical Perspectives" has just been released. Dr. **Kalman** is presently the chair of the **Division of Physics Education** at the Canadian Association of Physicists.

Dr. **Sushil Misra** has been offered the George Weston Visiting Professorship at Weizmann Institute of Science, Rehovot, Israel. He will start his 6-month sabbatical leave in January 2015. Professor **S. Andronenko** from St. Petersburg, Russia is participating in Electron Paramagnetic Resonance (EPR) research at Concordia as a Visiting Scholar for 8 months as of October 25, 2014. **Adam Michaels**, an undergraduate physics working with Dr. Misra in 2013, is a co-author in a paper on EPR that will be published shortly in the Journal of Magnetism and Magnetic Materials.

Interested in doing projects for PHYS 497 (Specialization Research Project), PHYS 496 (Honours Research Project), or simply curious about our research?

Please visit our department website to know better about faculty research interests and programs, and contact them for a lab visit or a discussion (in case of theoretical work).

The department can also organize a group visit at a date and time convenient for the parties involved. If you are interested in a group visit in our research labs, please give your name to Ms. Marie-Anne Cheong Youne at the Physics Office (SP 365.02).



Dr. Valter Zazubovits in his lab

Faculty Activities & News

Dr. **Pablo Bianucci** presented a **Café Scientifique** talk at the Department of Physics, Engineering Physics, and Optics at Laval University on October 21st, 2014. He also gave a **seminar** at INRS-EMT on November 6th. Prof. **Bianucci** has also been accepted as a regular member of the Centre d'Optique, Photonique et Laser (**COPL**), one of Quebec's strategic research clusters.

Prof. **P. Vasilopoulos** will be soon visiting the dynamic group of his longstanding collaborator, Prof. F. M. Peeters, Department of Physics, University of Antwerp, Belgium. The visit, in December 2014, is scheduled for research on electronic transport in the "hot" materials, MoS₂, silicene, and black phosphorus two-dimensional electron gas.

Dr. **Alexandre Champagne** was invited to give a **seminar** for the Centre for the Physics of Materials at McGill University on October 30th. The title of his presentation was "Experimental Quantum Electronics in 10-nm Scale Carbon Systems". Prof. **Champagne** will be on sabbatical leave conducting research in collaboration with the group of Prof. Bertrand Reulet (U. de Sherbrooke) from January 1st to July 1st 2015 to explore high-frequency quantum transport in nano-electromechanical systems.

Dr. **Truong Vo-Van** has just received a new **NSERC-Engage grant** (\$25,000) to conduct research on nanocellulose-based smart papers in collaboration with Ventix, a Montreal company specializing in nanocellulose R & D and production. Prof. **Vo-Van** is also continuing his research with Nanomed, equally a Quebec company, working on carbon nanopearls and their applications (project funded by MITACS). Dr. **Babacar Diop**, PhD in Prof. Vo-Van's group, gave a talk on the continuous production of carbon nanopearls at the ACFAS 2014 Congress, as well as Dr. **Simona Badilescu** on the optical properties of gold nanostars and **T. Phonemac** on porous gold-doped electrochromic tungsten oxide films. Dr. **Mohammed Alsawafta** gave a presentation on the effect of symmetry breaking on the optical properties of supported silver nanoparticles in different surrounding media at the Photonics North Conference in May 2014.

Concordia Physics Student Awards (2014-2015)

One award of \$1,500 (Physics First-Year Award) to a student having completed 9 - 15 credits in Physics program courses in the current Fall session (minimum required GPA of 3) and who will take at least 9 credits of physics courses in the coming Winter session. The winner will be the candidate with the highest GPA.

One award of \$1,500 (Physics Second-Year Award) to a student having completed 27 - 45 credits in Physics program courses in the current Fall session (minimum required GPA of 3) and who will take at least 9 credits of physics courses in the coming Winter session. The winner will be the candidate with the highest GPA.

One award of \$1,500 (Physics Third-Year Award) to a student in his/her last semester before graduation (minimum required GPA of 3.0). The student will take at least 6 credits of physics courses in the coming Winter session. The winner will be the candidate with the highest GPA.

Students wishing to be considered for these awards are requested to submit their names to the Department Office (c/o Marie-Anne Cheong Youne) before January 15, 2015. They also need to list the physics courses to be taken in the Winter session. There is no need to submit academic transcripts. Awards will be remitted to the award winners in a reception organized in February.

These awards are made possible thanks to the generous contributions from faculty and staff members in the Department of Physics.

The Lorraine Gosselin Scholarship

We are happy to announce the creation of the **Lorraine Gosselin Scholarship in Physics**, effective in 2015. Ms. Gosselin has confirmed her pledge of \$5,000/year for 5 years for this scholarship aimed at supporting a new graduate student in the Department of Physics, with a preference given to female students.

We are very grateful to Ms. Gosselin for her passion in physics and her commitment to promote studies in this field.

Physics Co-op News

This year we are happy to welcome **Anastasia, Shon, and Israel** to the Co-op program! If you are interested in the program, please contact Dr. **Pablo Bianucci** (pablo.bianucci@concordia.ca), our Co-op Program Director, for more information.

First Mukerji & Upreti Award Recipient

Thanks to an endowment created by the Mukerji's family and friends, an undergraduate physics award of \$1,000 named after the late Drs. Nishith Mukerji and Gyan Upreti is now available for a student starting his/her studies in Physics at Concordia. The first recipient of this award was **Matias Rittatore**. Congratulations, Matias!

Peter Collins: 2014 Physics Scholar

For his high academic achievements, **Peter Collins**, undergraduate student in Physics, has been named Physics Scholar in a ceremony held on October 15, 2014 to honor undergraduate students of the Faculty of Arts and Sciences with consistent high GPAs during the previous year (please see picture on the front page of this newsletter). Congratulations, Peter!

Contact Us

Give us a call for more information on physics at Concordia!

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