Canadian Institute of Nuclear Physics
Institut canadien de physique nucléaire

May 2018 Newsletter

The Canadian Institute of Nuclear Physics (CINP) is a formal organization of the Canadian nuclear physics research community to promote excellence in nuclear research and education, and to advocate the interests and goals of the community both domestically and abroad.

1. CINP Sessions at the CAP 2018 Congress

As is now customary, the CINP and IPP are hosting a joint session at the CAP Congress at Dalhousie University in Halifax, NS. There have been some significant changes to the CAP Congress timetable, and as a result, the CINP sessions will now be near the end of the Congress, instead of our usual time on Monday. Please plan your travel accordingly.

Time	Event
Thursday, June 14, 2018	
7:00	**CINP Breakfast Board Meeting** (by invitation only)
10:45	**CAP-TRIUMF Vogt Medal talk**
	CINP+IPP Joint Session (with lunch)
11:15	NSERC SAPES Report – Jeff Martin (30+5)
11:50	CFI Report – Olivier Gagnon (20+5)
12:15	TRIUMF Report – Jonathan Bagger (30+5)
12:50	SNOLab Report – Nigel Smith (20+5)
13:15	**CINP Annual General Meeting**

2. NSERC Support for CINP

The CINP gratefully acknowledges support from NSERC in the form of a Subatomic Physics Major Resources Support (SAP-MRS) grant. This grant supports the CINP's external conference support program, the undergraduate research scholarship program, expenses for the Long Range Plan, and other initiatives. The CINP MRS grant was renewed for 5 years in the 2015 competition, and the installment for 2018-19 is $46,000.

NSERC CRSNG

3. Consultations with External Agencies

The CINP is an advocate and representative of the Canadian nuclear physics community and is asked to attend various meetings or make presentations on its behalf. Some recent and forthcoming activities include:

- As was reported in the last newsletter, the CINP was very active in making the case for the federal government to accept in full the recommendations of the *Fundamental Science Review*. The recent federal budget included a lot of very good news for science, with the overwhelming acceptance of the recommendations of this report. In addition to the Institute's efforts, those of the membership were also vital, and we would like to thank those who contacted their federal MP or other government representative to ask for the implementation of the report.

- The CINP made a 15 minute in-camera presentation to the NSERC Subatomic Physics Evaluation Section (SAPES) at Large Projects Day, on Monday, January 29, 2018 at NSERC headquarters in Ottawa. In addition to a status report on CINP activities, GH provided information on the breadth of Canadian nuclear physics research and important current and future priorities. The response from the membership in providing highlights and updates for this section of the presentation was excellent, and GH would like to thank all of those who provided material for the presentation.

- After the presentation, the CINP and IPP Executive Directors (GH and Mike Roney) took the opportunity while in Ottawa to meet with the senior leadership of NSERC and CFI, as well as the new Assistant Deputy Minister, Science and Research Sector, at Innovation, Science and Economic Development Canada (ISED), and the new Chief Science Advisor. The meetings discussed the status of the Fundamental Science Review recommendations, support for Major Science Infrastructure, and the High Luminosity LHC Upgrade. The officials were very attentive and asked excellent questions. We particularly thank Mona Nemer for fitting us into her schedule at very short notice.

- The CINP provides input to NSERC on a periodic basis, including suggestions for members of the Subatomic Physics Evaluation Section (SAPES), to replace the specific nuclear physics expertise of outgoing members. If you have any suggestions for domestic or international SAPES members please let Garth Huber know (contact info at the end of the newsletter). When making suggestions, please keep in mind that committee members cannot be applicants in that competition and they are required to recluse themselves from any applications in which there is a real or perceived conflict of interest.

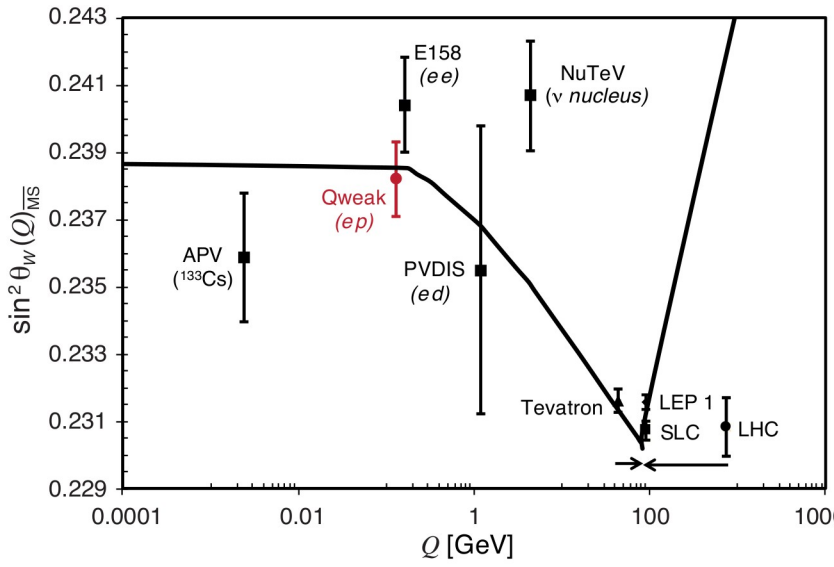
- The Advisory Committee on TRIUMF (ACOT) is a panel of international experts panel that meets and reports to the NRC twice a year. Garth Huber represents the CINP as a “community observer”, providing feedback on TRIUMF's planning and operations. If you have specific information that would be useful to the CINP's input, please let us know.

4. The Weak Charge of the Proton – Final Results from the Q_{weak} Experiment
(submitted by Shelley Page)

Canadian researchers played a major role in an international collaboration that has gained new insight into the most elusive of the four fundamental forces in nature, the weak force. The Q_{weak} experiment has revealed the strength of the weak force's grip on the proton, by measuring the proton's weak charge to high precision. The research was carried out using the high quality polarized electron beam available at Jefferson Lab. The result, published in the May 10 issue of Nature, significantly narrows the search for new particles that could influence the behavior of matter at sub-nuclear distance scales.

The proton's weak charge is analogous to its more familiar electric charge, a measure of the influence the proton experiences from the electromagnetic force. The proton's weak charge can be predicted very precisely in the Standard Model, and a precise measurement then can be used to look for hints of new physics, via deviations from the Standard Model prediction.

To measure the proton's weak charge, an intense beam of electrons was directed onto a target containing cold liquid hydrogen, and the electrons scattered from this target were detected in a precise, custom-built measuring apparatus. The key to the Q_{weak} experiment is that the electrons in the beam were highly polarized. With the direction of polarization rapidly reversed in a controlled manner, the experimenters were able to latch onto the weak interaction's unique property of parity violation, in order to isolate its tiny effects to high precision: a different scattering rate by about 2 parts in 10 million was measured for the two beam polarization states.



The proton's weak charge was found to be $Q_w^p = 0.0719 \pm 0.0045$, which turned out to be in excellent agreement with predictions of the Standard Model, taking into account all known subatomic particles and the forces that act on them. "Our new Q_{weak} result constrains predictions of hitherto unobserved heavy particles, that could play a role in weak interactions, such as those that may be produced by the LHC or at future high energy accelerators", said Dr. Michael Gericke (University of Manitoba). "For example, Q_{weak} has set limits on the possible existence of leptoquarks -- hypothetical particles that can reverse the identities of two broad classes of very different fundamental particles – turn quarks into leptons and vice versa."

"The Q_{weak} experiment, initiated in 2001, represents the sustained effort of a large, international team of about 100 scientists from 25 institutions over nearly two decades", said Dr. Shelley Page, a co-spokesperson and NSERC PI for the experiment. "The Canadian group was a founding member and represents approximately 15% of the Q_{weak} collaboration; it was a leading contributor to the equipment design and construction, data production, and analysis efforts".

More than $3M of support has been provided through NSERC subatomic physics project grants to scientists from the Universities of Manitoba, Northern BC, Winnipeg, and TRIUMF. These funds were used to build equipment and to support student and postdoctoral researchers' salaries and travel to carry out the measurements at Jefferson Lab. Vital technical and engineering support was provided by TRIUMF, and detector development was carried out in CFI-funded laboratories at the Universities of Manitoba and Winnipeg. The Canadian group's primary contributions include the design, fabrication, and field mapping of the large spectrometer magnet, the design and construction of the main electron detector package, development of a novel diamond microstrip detector used for precise Compton electron beam polarimetry, design and construction of low noise detector readout electronics, extensive systematic error simulations and data analysis.

The successful completion of the Q_{weak} experiment is an important milestone in parity violating electroweak physics and sets the stage for a new measurement of the weak charge of the electron, at even higher precision – the MOLLER experiment – which is currently under development and in which a Canadian subatomic physics group from the University of Manitoba has again a strong position of leadership.

5. CINP Individual Membership

CINP membership numbers are nearly unchanged last year. There was an increase of 5 in the number of faculty members, but this was offset by a decrease in associate members as several retired scientists decided to not renew their membership and as several junior members left the field.

Please encourage your grad students and PDFs to join and contribute to the activities of the Scientific Working Groups (SWGs). "Associate class" memberships are typically renewed every three years, to ensure that continued membership is appropriate, and that our records remain up to date. An associate membership may be renewed if the individual is no longer a Canadian resident, provided he/she intends to permanently return to Canada within the next 5 years.

The membership form and introduction letter are posted at:
http://cinp.phys.uregina.ca/node/19
or contact Garth Huber for further information.

CINP Individual Membership – May 1, 2018			
Total Membership	114	Nuclear Astrophysics SWG	39
Faculty-class Members	72	Nuclear Structure SWG	48
Associate Members	42	Fundamental Symmetries SWG	45
Experimentalists	85	Hadrons/QCD SWG	38
Theorists	28	Education & Training SWG	39

6. Junior Scientist Travel Support Program (JSci)

The goal of the CINP Junior Scientist Travel Support Program is to allow graduate students and PDFs to broaden their research horizon and become more mature scientists. Initially, the program supports two types of expenditures:

1) Allow graduate students and PDFs to attend specialized workshops and schools not directly related to their research project, and hence not normally funded from their supervisor's NSERC grant. Examples include workshops or training opportunities on the practical applications of subatomic physics detector techniques (e.g. muon tomography in archaeology, medical imaging, etc.), new computer or digitization technologies, advanced computation techniques, or technology transfer training (e.g. patent law, venture capital, etc.).

2) Funding to enable PDFs to present their work at conferences or workshops, so they may receive external recognition for their work, improve their communication skills, and better position them for successful careers in subatomic physics. Conferences and workshops already receiving funds from CINP will not be eligible. Preference will be given to international meetings held either in Canada or abroad.

How to Apply

The total program funds available for 2018-19 is $7500. We anticipate the typical award to be: $1500-2500 for application type 1, $500-$1000 for application type 2. The applicant is encouraged (but not required) to use the CINP support to leverage additional sources of funding.

Applications are accepted on a continuing basis, and must be submitted to the CINP Executive Director at huberg@cinp.ca at least 2 months (preferably even earlier) before the expected date of travel. A standing committee consisting of: CINP Executive Director, Chair of the Education & Training SWG, and one representative of the CINP Board will evaluate applications as they are submitted and provide prompt feedback or decision to the applicant (typically within 2 weeks).

The application form can be obtained from the CINP website at:
http://www.cinp.ca/node/565

The applicant is expected to make their case for funding according to the training or scientific opportunity that will be enabled by the travel, the quality of the applicant, and the need for funds.

7. CINP Conference Support

The CINP extends partial funding to workshops, meetings and conferences of broad relevance to nuclear physics in Canada. Requests are appraised against the mission and goals of the CINP, and funding is contingent upon satisfactorily showing that the event will further the aims of the CINP and be of benefit to its members.

Application forms for external conference support are available from http://cinp.phys.uregina.ca/node/22 and should be returned to the CINP Executive Director, Garth Huber. Once it is confirmed the necessary information is received, the Chair of the Scientific Working Group most closely related to the conference topic will be consulted, and a recommendation forwarded to the CINP Board for final approval.

We hope you will be able to attend one of the following CINP-sponsored conferences:

The 1st APCTP-TRIUMF Joint Workshop "Understanding Nuclei from Different Theoretical Approaches"
September 14 (Fri), 2018 ~ September 19 (Wed), 2018

This workshop on low energy nuclear physics will be held at the Asia Pacific Center for Theoretical Physics (APCTP) in Pohang, Korea, 14-19 September 2018. The idea is to bring together practitioners of the various theoretical methods to discuss possible overlaps and cross fertilizations between the Asian and the Canadian theory communities. We envisage involving description of theorists working on ab initio calculations, the Skyrme model, and nuclear phenomenological the subject of models, allowing to explore the whole known nuclear chart, and, most importantly, the conference expanding beyond the known nuclei, which has implications in the astrophysical theatre.
Website: https://www.apctp.org/plan.php/apctp-triumf-2018

Fundamental Neutron Physics Summer School 2018

The fifth in a series of summer schools will be held at North Carolina State University, Raleigh, NC, July 16-20, 2018. The school designed to introduce graduate students and new post doctoral fellows to the study of nuclear, particle, and astrophysics with low energy neutrons. The school will consist of a program of lectures by leading researchers in the field on topics such as neutron electric dipole moment, neutron beta decay, parity and time reversal interactions, neutron gravitational interaction, and the subject of neutron interferometry. The school will focus on state-of-the-art experimental work with selected the conference theoretical talks to provide a context for this research.
Website: http://neutron.physics.ncsu.edu/NeutronSummerSchool/index.html

8. WNPPC Student Conference Support

The CINP awarded $500 travel grants to support graduate students giving talks at the 2018 WNPPC in Mt. Tremblant, QC. The applications were evaluated by a committee: Jens Dilling (TRIUMF), Michael Gericke (Manitoba), and GH. There were 9 applicants and the top six were selected for funding.

Student	Supervisor	WNPPC Talk Title
Christina Burbadge (Guelph)	Dennis Muecher (Guelph)	Characterizing $LaBr_3$(Ce) detector response for proton therapy applications
Moushumi Das (Winnipeg)	Jeff Martin (Winnipeg)	High-sensitivity atomic magnetometer for neutron EDM
Beau Greaves (Guelph)	Dennis Muecher (Guelph)	One neutron transfer into ^{22}Ne
Satbir Kaur (Dalhousie)	Rituparna Kanungo (Saint Mary's)	Determination of proton radii of neutron rich oxygen isotopes from charge-changing cross section measurements
Yukiya Saito (UBC)	Reiner Kruecken (TRIUMF)	Decay spectroscopy of neutron-rich ^{129}Cd with GRIFFIN spectrometer
Edward Thoeng (UBC)	Robert Laxdal (TRIUMF)	Beta-SRF – A new facility to characterize SRF materials near fundamental limits

9. CINP Undergraduate Research Scholarships (URS)

The 2018 competition for the CINP URS was recently completed. The intent of the program is to allow gifted undergraduates to work with a supervisor on nuclear physics research for 16 weeks this summer. The scholarship is for $4000, which must be supplemented by the supervisor. In addition, if the supervisor intends to send the student to a laboratory or work with a second collaborator for an extended period in the summer, the CINP can contribute up to an additional $1300 to help cover transportation and lodging expenses.

There were a record 14 applications received, which were evaluated by a committee consisting of: Adam Garnsworthy (TRIUMF), Sangyong Jeon (McGill) and Elie Korkmaz (UNBC). The caliber of the competition was very good, and we regret that we were only able to award scholarships to the following five students.

Student	Supervisor	Project Title	Travel
Dixin Chen (McGill)	Thomas Brunner (McGill)	Design of a laser-induced single Ba-ion source for nEXO	No
Chan Gwak (UBC)	Jason Holt (TRIUMF)	First principle nuclear theory for dark-matter detection experiments	Yes
Alejandra Nunez (Acadia)	Ruben Sandapen (Acadia)	Mesons in holographic light-front QCD	Yes
Sebastien Roy-Garand (Saint Mary's)	Rituparna Kanungo (Saint Mary's)	Transfer Reaction studies with rare isotopes at TRIUMF	Yes
Mallory Snow (Memorial)	Aleksejevs Aleksandrs (Memorial)	Study of few nucleon systems in computational hadronic model	No

10. CINP Contact Information

The CINP Institutional Members had their annual meeting via teleconference on May 4. One of the agenda items was to elect two new Board members. The new Board is listed below. The assigned duties will be updated at their next meeting during the CAP Congress in June.

Name	Institution	Role	E-mail	Term Ends
Michael Gericke	University of Manitoba		mgericke@physics.umanitoba.ca	June, 2020
G.F. Grinyer	University of Regina		gf.grinyer@uregina.ca	June, 2021
Sangyong Jeon	McGill University	Secretary	jeon@physics.mcgill.ca	June, 2019
Rituparna Kanungo	Saint Mary's University	President	ritu@triumf.ca	June, 2019
Jeffery Martin	University of Winnipeg	Vice-President	j.martin@uwinnipeg.ca	June, 2020
Chris Ruiz	TRIUMF		ruiz@triumf.ca	June, 2021

We thank outgoing outgoing member David Hornidge (Mt. Allison) for many years of service on the CINP Board.

CINP Executive Director:

If you require information about any CINP programs, please do not hesitate to contact:

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CINP Website Server:

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CINP Institutional Members:

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McGill University
University of Manitoba
University of Regina
TRIUMF
Mt. Allison University
University of Guelph
University of Winnipeg
University of Northern British Columbia

This Newsletter was edited by Garth Huber. Email regarding the content of this newsletter, or suggestions for content in future CINP newsletters should be sent to huberg@cinp.ca