



Canadian Institute of Nuclear Physics Institut canadien de physique nucléaire

Newsletter #13, November 2018

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 Board of Directors (2018-19)

The CINP Institutional Members had their annual meeting via teleconference on May 4, 2018. One of the agenda items was to elect two new Board members. The new Board is listed below, along with their assigned responsibilities.

Name	Institution	Role	E-mail	Term Ends
Michael Gericke	University of Manitoba		mgericke @ physics.umanitoba.ca	June, 2020
GF 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 @ triumph.ca	June, 2019
Jeffery Martin	University of Winnipeg	Vice-President	j.martin @ uwinnipeg.ca	June, 2020
Chris Ruiz	TRIUMF		ruiz @ triumph.ca	June, 2021

We thank outgoing outgoing member Dave Hornidge (Mt. Allison) who stepped down from the CINP Board. He served two terms as Board member, 2011-14 and 2015-18.

2. Undergraduate Student Conference Support

The CINP awarded four \$500 travel grants to support undergraduate students giving talks on nuclear physics related projects at the 2018 Canadian Undergraduate Physics Conference (CUPC) held at the University of Alberta in Edmonton, AB on August 15-18, 2018. The applications were evaluated by: Drs. Chris Ruiz (TRIUMF) and Garth Huber (Regina/CINP).

Student	Supervisor	CUPC Talk Title
Antoine Belley (McGill)	Thomas Brunner (McGill)	Development of an electroluminescent light source to characterize SiPMs for nEXO
Dixin Chen (McGill)	Thomas Brunner (McGill)	Performing experiments on a laser ablation ion source
Michael Gennari (Waterloo)	Petr Navratil (TRIUMF)	Nonlocal translationally invariant density no-core shell model
Frank Wu (SFU)	Kris Starosta (SFU)	Measurement of electromagnetic transition rates in ^{40}Ca

All students were asked to acknowledge the financial support by the CINP in their presentation.

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:

- In collaboration with other agencies, NSERC is working on a new Research Classification Standard. In July, the CINP Executive Director, Garth Huber, was asked to provide feedback on a preliminary version of the subatomic physics related subject codes, which would eventually be used instead of NSERC's current research topic lists to help select the appropriate evaluation section, referees, etc. for incoming grant applications.
- The CINP and IPP will present the joint document on *The Context and Environment of Canadian Subatomic Physics Research at Canadian Universities* to the Subatomic Physics Evaluation Section (SAPES) at their November 20 fall policy meeting. This document is needed because many SAPES members are not very familiar with the Canadian research funding process and the research environment at Canadian universities. We would like to thank the many CINP members who helped update this document last year. It can be downloaded from: <http://cinp.phys.uregina.ca/node/219>
- The CINP will make a 15 minute in-camera presentation to SAPES on *The Breadth of Canadian Nuclear Physics Research and Important Current and Future Priorities* at Large Projects Day, scheduled for Sunday, February 24, 2019 in Ottawa. **Please send information on your significant 2018 research highlights, new research capabilities, or honors received by February 13,** to Garth Huber (contact information at the end of the newsletter) who will prepare the presentation from your submissions and relevant information from the Subatomic Physics Long Range Plan.
- The CINP Executive Director, Board and Scientific Working Group Chairs are in the final stages of preparing input to the *European Strategy for Particle Physics 2020*. This is in response to their call for written submissions from universities,

laboratories and national institutes, taking into account developments in fields related to particle physics, and the perspectives of the broader international community. We will send our input to CERN by the December 18 deadline.

- As a representative of the Canadian nuclear and particle physics community, the CINP Executive Director co-signed (along with Directors of IPP, TRIUMF, SNOLab and Perimeter) a letter of thanks to Kirsty Duncan, Minister of Science, for the Canadian contributions to the CERN High Luminosity Upgrade. These contributions develop a healthy relationship of reciprocity with CERN and open the door to Canadian contributions in other high profile international scientific projects.
- Every spring, the CINP Executive Director is asked to suggest new members of the NSERC Subatomic Physics Evaluation Section (SAPES), to replace the specific expertise of outgoing members. **If you have any suggestions for the 2019-20 committee, please let Garth Huber know** (contact info at the end of the newsletter). Your suggestions can be either international or domestic, from any subatomic physics sub-discipline. When making suggestions, please keep in mind the Tri-Council conflict of interest guidelines, which stipulate that committee members cannot be applicants in that competition.
- The Advisory Committee on TRIUMF (ACOT) is a panel of international experts that meets and reports to the NRC twice a year. Garth Huber represents the CINP as a "community observer". The committee generally finds our input to be quite valuable, providing a Canadian perspective on TRIUMF's planning and operations. **If you have specific information that would be useful to the CINP's input, please let Garth Huber know.** The next meeting of ACOT is scheduled for April 8-10, 2019 in Vancouver.

Winter Nuclear & Particle Physics Conference



WNPPC 2019



4. Winter Nuclear and Particle Physics Conference (WNPPC 2019)

(submitted by GF Grinyer, Regina)

The 56th annual Winter Nuclear and Particle Physics Conference (WNPPC) will take place from February 14 – 17, 2019 in Banff, Alberta. The WNPPC is the national meeting for the Canadian subatomic physics community. This year's conference will highlight all aspects of experimental and theoretical research in subatomic physics in Canada including electroweak and Higgs physics, properties of neutrinos, QCD and hadron structure, nuclear structure, nuclear and particle astrophysics, dark matter and energy and new physics beyond the Standard Model. The WNPPC provides a special forum for junior researchers (students, postdocs) and is a stimulating and engaging environment for everyone interested in subatomic physics research in Canada.

Important dates:

December 14, 2018 – early registration deadline (free for students!)

January 11, 2019 – abstract submission deadline

Additional information can be found on the conference website:

<http://wnppc.triumf.ca/2019/>

5. 2019 WNPPC Graduate Student Travel Awards

The Canadian Institute of Nuclear Physics (CINP) is making available up to six graduate student travel awards to the 2019 WNPPC. Each award will be for up to \$600 towards student travel expenses. Students must be enrolled in graduate studies at a Canadian university and performing research in experimental or theoretical nuclear physics. **The application deadline is January 14.** For more information and application forms, please visit:

<http://cinp.phys.uregina.ca/node/180>

6. 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.



7. 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.

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.

Available Funds:

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. So far, we have approved 5 awards totaling \$4764, with \$2736 remaining to be spent by March 31, 2019.

How to Apply:

The application form can be obtained from the CINP website at:

<http://www.cinp.ca/node/565>

Submit your application 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 logo for the Junior Scientist Travel Support Program (JSci) features the letters 'JSci' in a stylized font. The 'J' is blue and the 'Sci' is dark blue. A red horizontal line is positioned above the 'i'.

8. Grad classes offered by TRIUMF (submitted by Marcello Pavan, TRIUMF)

TRIUMF is offering an opportunity for graduate students at TRIUMF's member universities who would like to take specialized graduate-level courses when such courses are not available at their home institution.

Starting in January 2019, two courses will be taught at TRIUMF, which will be made available by videoconference to off-site students:

1. UBC Physics 528 (Elementary Particle Physics) will be taught by Dr. David Morrissey, a theoretical particle physicist at TRIUMF.

2. UBC Physics 560-201/UVic Physics 522 (Physics and Engineering of Particle Accelerators) This course is led by TRIUMF Accelerator Division head Oliver Kester with guest lecturers for some topics.

Note that next Fall 2019, it is anticipated, but not yet confirmed, that UBC Physics 505 (Introductory Nuclear Physics) will be taught again at TRIUMF.

For more information on any of these courses, please contact the TRIUMF Academic Committee at trac@triumf.ca



9. Report from the CINP-sponsored 1st Asia Pacific Center for Theoretical Physics-TRIUMF Joint Workshop on “Understanding Nuclei from Different Theoretical Approaches”

(submitted by Manu Paranjape, Université de Montréal)

The workshop was held from September 14-19, 2018 at the APCTP headquarters in Pohang, Korea. This was a major event co-sponsored by the APCTP, since Canada joined as a member of the APCTP from June 2016. The workshop was organized by Sonia Bacca (TRIUMF), Jason Holt (TRIUMF), Yongseok Oh (APCTP), Manu Paranjape (Montreal) and J. Michael Pearson (Montreal).

The following web-site contains all the information about the workshop:

<https://www.apctp.org/plan.php/apctp-triumf-2018>

There were about 30 invited speakers [including Nick Manton(Cambridge), Mannque Rho (Saclay), Peter Navratil (TRIUMF), a total of 4 TRIUMF researchers, and several people from Japan, China, Korea and other Asia-Pacific countries], approximately 40 to 50 participants in the workshop in total. The thrust of the workshop was to bring together researchers working in the three major theoretical directions in understanding nuclei, the Skyrme model, effective field theory methods and ab-initio methods.

The program consisted of three talks in the morning and three in the afternoon of length 45 minutes including questions. Each talk was ended with a lively question and answer period. There were ample

coffee breaks where further discussions could take place. There was an opening reception, and outing to the Gyeongju historical site and a banquet.

The workshop was deemed a great success, and the second installment is being planned for the early summer of 2020, to be held this time at TRIUMF.

10. 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 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 at huberg@cinp.ca.

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.

11. Undergraduate Research Report (submitted by Mallory Snow and Aleksandrs Aleksjevs, Memorial University of Newfoundland Grenfell Campus)

This summer, I was lucky enough to receive 2 research scholarships, 1 from the Canadian Institute of Nuclear Physics (CINP) and another from the Natural Sciences and Engineering Research Council of Canada (NSERC). My research goals included tasks and topics involving phenomena in hadronic physics appointed to me by supervisor Dr. Aleksjevs. We had two goals: test Dr. Aleksjevs' computational hadronic model and generate the theory input for the MOLLER experiment.

One of the main foci of my summer research was to understand the MOLLER project, its goals, and the importance of the outcomes of the experiment, as well as to create lookup tables required in the development of the MC event generator.

I became familiar with the MOLLER experiment throughout the summer. This new generation experiment proposes to measure the parity-violating asymmetry (APV) in the scattering of polarized electrons off un-polarized electrons, using the upgraded 11 GeV beam at Jefferson Laboratory (JLab) with incredible precision. The proposed experiment is looking for a consistency (or lack of consistency) in experimentally found parameters with the theoretically predicted parameter values which can be used to search for indications of Beyond the Standard Model (BSM) physics.

One part of my summer research was to assist particle physics research group at Grenfell campus of MUN to generate look-up tables for MOLLER experiment based on the precise electroweak radiative corrections evaluated by Dr. Aleksjevs and Dr. Barkanova. I used a code given to me by my advisors, as a base, and then made an improvement suitable for generating large sets of data files for a given range of energies and scattering angles along with their corresponding asymmetries and cross sections. These data sets are then sent to the JLab where they are used in the progression of the MOLLER experiment.

In addition to doing computations, I did more research on topics suggested by my advisors. These topics included parity violation and the Wu experiment, the mystery of sterile neutrinos and the

MiniBooNE experiment, as well as looking into the proton radius puzzle and computational hadronic model. I had to look through articles dedicated to the proton radius puzzle to find and collect all the possible Feynman diagrams that have been accounted for in the extraction of the proton radius from electron-proton scattering and muonic hydrogen spectroscopy experiments, and to re-examine the sources of systematic errors in these experiments. Another task given to me was to debug the code in computational hadronic model (model used with FeynArts and FormCalc packages in Mathematica). To do this, we tested the model by constructing the Feynman diagrams for the number of hadronic decays, derived amplitudes, and after comparing with the literature fixed the code as needed.

Physics is a field of science with many unanswered questions and the search for new physics and theories beyond the Standard Model is one of the most researched topics in science right now. The fact that I, an undergraduate student at such a small university campus, was given the opportunity to not only research these topics but contribute to a new-generation experiment, perfectly exemplifies the amazing research opportunities made possible by the supportive physics department at Grenfell and the support of institutions like the CINP.

Overall, this summer was an amazing first research experience which exposed me to many new parts of physics and impelled me to recognize my preference for theoretical physics. I am very honored and thankful to CINP and NSERC which made this experience possible.

Note: Undergraduate students are not required to submit any report to CINP upon their completion of their Undergraduate Research Scholarship (URS). Mallory Snow offered to do so, and we are very pleased to publish her report here. Reports from other scholarship recipients are always welcome.

12. Nuclear Science Week: How Science Fiction has influenced our perceptions of nuclear science and technology

(submitted by Jason Donev, Calgary)

The University of Calgary's Energy Education team did a series of talks for this year's Nuclear Science Week.

Human imagination is a powerful tool. On one extreme, this imagination creates stories to help us understand our world and our place in it. On another extreme, imagination explores the universe and applies those discoveries into technology. Science fiction stories synthesize these two extremes of human imagination to help people find their place in a world with rapidly changing technology.

Nuclear science has been plagued for years by the stories that are told about nuclear scientists and nuclear technology (For example, The Simpsons, figure 1). These stories fill the mind with wonder and sometimes dread. This series of talks explored how the interplay of actual science with movies, comic books, books and even a few plays have coloured the public's perceptions on nuclear science.

The views of comic book creators Stan Lee and Jack Kirby (like the Incredible Hulk in Figure 2) may have been the most influential voices in shaping public perceptions. With characters like The Incredible Hulk, The Fantastic Four and of course, Spiderman,



the public's fears of radiation changing a person's genes has been cemented into our DNA.

The talks were viewed hundreds of times by people around the world. This success has led us to wonder if more talks about nuclear science would be equally well received online.





13. Celebrating 50 years of discovery and innovation at TRIUMF (submitted by Carla Rodrigo, TRIUMF)

The year 2018 marks a major milestone for TRIUMF, as it celebrates 50 years since federal funding and approval. It has been a year of celebrations to mark the historic occasion:

- In April, TRIUMF debuted *Star Stuff*: a custom anniversary beer, in partnership with local Vancouver brewery, R&B Brewing.
- In July, TRIUMF honoured 50 years of world-class science during Science Week 2018.
- The *Unveiling the Universe* public lecture series returned to Science World, featuring 3 talks by TRIUMF scientists.

TRIUMF was also honoured to welcome both Her Excellency, The Right Honourable Julie Payette, Governor General of Canada, and the Right Honourable Justin Trudeau, Prime Minister of Canada, for tours of the lab during this anniversary year.

With all these celebrations successfully under our belts, the community looks ahead with excitement to what the next 50 years will bring for Canada's particle accelerator centre.

14. CINF Sessions at the CAP 2019 Congress

As is now customary, the CINF and IPP are hosting a joint session at the CAP Congress at Simon Fraser University in Burnaby, BC. As last year, the CINF sessions are planned near the end of the Congress, following the Vogt Medal talk. Please plan your travel accordingly.

Thursday, June 6, 2019	
Time	Event (tentative schedule)
7:30	CINF Breakfast Board Meeting (by invitation only)
9:15	CAP-TRIUMF Vogt Medal talk
9:45	CAP-CRM Prize talk
10:15	Health Break
10:45	CINF+IPP Joint Session
12:15	CINF Annual General Meeting (with lunch)



15. CINP Contact Information

CINP Executive Director:

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

Garth Huber, Ph.D.
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c/o University of Regina
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CINP Institutional Members:

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University of Guelph
University of Manitoba
University of Winnipeg
University of Regina
University of Northern British Columbia
TRIUMF

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Nuclear Structure: Adam Garnsworthy (TRIUMF)

Nuclear Astrophysics: Iris Dillmann (TRIUMF)

Fundamental Symmetries:

Gerald Gwinner (Manitoba)

Hadron Structure/QCD: Charles Gale (McGill)

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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