

Subatomic Physics Evaluation Section Annual Report

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I. Introduction

This report summarizes the activities of the Subatomic Physics (SAP) Evaluation Section (SAPES) in fiscal year 2012-13, including the results of the February 2013 competition. The report is provided for information to the NSERC Committee on Grants and Scholarships, and to the Canadian subatomic physics community. The format and content of the report follow the reports from previous years very closely.

SAPES is unique among NSERC Evaluation Sections since it operates within an annual budget envelope. Individual, Team and Project Discovery, Research Tools and Instruments (RTI), and Major Resources Support (MRS) grant applications in subatomic physics are evaluated together by SAPES. This comprehensive approach is essential given the complexity and inter-dependency of many proposals, which are often and ever-more frequently parts of international programs and collaborations, and involve many universities and national laboratories. This approach is also essential for planning and stability of execution of large-scale and long-term projects, and for maintaining a balance between large projects and the smaller research efforts that are essential to the breadth and future success of the Canadian SAP program. The envelope structure also helps SAPES to attempt to maintain an appropriate balance between operations and capital investments. Moreover, the SAP community's five-year Long-Range Plan includes the community's priorities, and provides guidance to SAPES' deliberations. The most recent Long-Range Plan was produced in 2011.

Another unique strength of SAPES is the extent to which it solicits reviews by international experts of the highest calibre. All major Team, Project, RTI and MRS grants are separately reviewed by *ad hoc* or standing committees of internationally-recognized experts drawn from institutions from around the world. These committees perform exhaustive scientific, technical, and budgetary evaluations, and produce detailed written reports which provide exceptionally valuable input to SAPES for its assessment of the grant applications. Moreover, SAPES generally selects a substantial proportion of international external referees for each proposal, from the smallest individual discovery grant to the largest project proposal. Finally, the membership of SAPES is itself substantially international, with half or more of its members generally coming from institutions in the U.S. and Europe. This level of international review provides an exceptionally high degree of scrutiny and validation of the research funded by this Evaluation Section.

In its [report](#), *The State of Science and Technology in Canada, 2012*, the Council of Canadian Academies identified Nuclear and Particle Physics as one of the sub-fields in which Canada excels and leads the world in terms of scientific impact. Despite the internationally-recognized excellence of Canadian SAP research, and the unique strengths of the SAPES envelope structure and review processes, the past several years have been increasingly difficult for this Evaluation Section to financially support the community's short- and long-term objectives at an appropriate and competitive level to ensure the maximum scientific return on substantial investments already made. Specifically, the SAPES budget has been practically flat for the past six years, while the number of full-time faculty has increased by more than 10% over the same time; this year alone, the Canadian subatomic physics community welcomed 9 new young faculty, a 4% increase to the number of researchers supported by NSERC through Subatomic Physics grants in FY2012-13. Several high-priority research programs are in the ramping-up phase of their activities, while others are at the full scientific exploitation stage.

The scenario of a flat envelope was thoroughly analyzed in the 2006 LRP report, with the conclusion that it would lead to a curtailing of research operating support and affect growth possibilities in Canadian SAP research activities. In such a scenario, it was recognized that the ability of the Canadian subatomic physics community to exploit the major capital investments of the past decade and to achieve its long-term scientific vision would be jeopardized.

The 2011 LRP [report](#), *The Subatomic Universe: Canada in the Age of Discovery*, describes an average funding increase of only 6.5% for the “flagship research programs” over the past 5 years as their ramp-ups continued, with concurrent reductions from elsewhere in the envelope. The report warns that if this trend continues, funding for investment in equipment will suffer as a consequence of increasing needs from small and large projects in an era of decreasing budgets.

Each year, the SAPES worked diligently to optimize the use of the available funding despite the challenging situation. Up until the 2013 competition, these reductions, while challenging to the program, made limited funding possible for Discovery and MRS grants as well as RTI grants. This proved to be quite a challenge during the 2013 competition, as will be discussed in detail in Section IX.

There is an urgent need to protect and exploit the considerable investments that have already been made in SAP research. One can justifiably state that the Canadian SAP program has become a victim of its own excellence and successes, and that the currently available operating funds are enough only to maintain existing activities at a constrained level that is not always sufficient to allow Canadian researchers to contribute to the full extent of their potential. Clearly, the internationally-recognized excellence and contributions of the Canadian SAP community, coupled with the unique strengths of the SAPES envelope, ensure that additional investments in this area will yield exceptionally high returns in cutting-edge knowledge and the training of highly-qualified personnel (HQP). As stated in the 2011 LRP report, and demonstrated by the outcome of the 2013

competition, such additional investments are now more needed than ever if the Canadian SAP research program is to continue to produce excellent science both now and in the future.

II. Update on the Envelope Funding

The pressure on the Section's funding envelope has been building for the last several years; it has now reached a level that is difficult to manage. In particular, substantial investments by federal and provincial government funding agencies have annually injected funds into the SAP program in excess of 50% of the entire SAPEs envelope, including substantial capital investments from CFI and various agencies of the Ontario government (but excluding NRC funding of TRIUMF). Other substantial investments by the Canadian government in science and technology, such as the Canada Research Chairs (CRC) program, have also resulted in a fast growth of the number and the quality of young faculty in SAP at many Canadian institutions. The latter increase has, in turn, been accompanied by a substantial growth in the number and quality of graduate students and other highly qualified personnel.

The SAP community has been very effective in making use of CFI's programs for major capital equipment. This additional source of funding is welcome, but it is important to highlight the fact that it is in turn generating further pressure on the envelope as the latter is the main funding source in support of research and operating costs. It is unfortunate that repeated attempts to foster the necessary level of coordination between CFI and NSERC have not yet succeeded. The Section can only reiterate the recommendation made in the 2011-2016 Long Range Plan in this respect.

Such renewal and expansion are very welcome, and demonstrate the excellence and vitality of the Canadian subatomic physics community. They pose, however, exceedingly difficult funding challenges in a fixed budget scenario for the envelope. Since the 2006 Long-Range Plan was released, new funds were allocated to NSERC by the federal government in the annual budgets, but were mostly provided for clearly targeted priority areas which did not include SAP. In *Budget 2011*, NSERC received \$15M to "support outstanding research in the natural sciences and engineering fields, such as the Strategy for Partnerships and Innovation (SPI)." NSERC has devoted half of these funds to enhance the support given to early career researchers (ECRs) across all disciplines in the form of supplements to their Discovery grants. ECRs were identified through consultations as the group that would most benefit from additional resources. ECRs with active grants in subatomic physics have received such supplements; this includes Project grants in which ECRs are co-applicants. Even though this is a welcome development, it has translated into a limited influx of funds into the envelope.

NSERC has announced in April 2012 that some programs outside the envelope would be affected as a result of its contributions to the Government of Canada's efforts to balance its budgets. NSERC has recognized the particular organizational and operational requirements of the subatomic physics community, as well as the strong endorsement of the community

to the envelope mechanism, which was reiterated in the 2011 LRP report. The announced changes do not affect the Subatomic Physics envelope's suite of programs. Similarly, the changes to the application process of RTI grant applications outside the envelope do not apply to the subatomic physics community. Members of the community will continue to be able to submit their RTI grant applications directly to NSERC.

III. Evaluation Section

This year's SAPES comprised 12 members, including three theorists. Three new members joined this year; they were Andrzej Czarnecki (University of Alberta), Morten Hjorth-Jensen (University of Oslo and Michigan State University), and Stefan Westerhoff (University of Wisconsin – Madison). The full SAPES membership is given below.

Name	Organization	Final Year
Philip Burrows	Oxford University	(2013)
Priscilla Cushman	University of Minnesota	(2014)
Andrzej Czarnecki	University of Alberta	(2015)
Bonnie Fleming (Co-Chair)	Yale University	(2013)
Gerald Gwinner (Co-Chair)	University of Manitoba	(2014)
Morten Hjorth-Jensen	University of Oslo/Michigan State University	(2015)
Mark Huyse	Katholieke Universiteit Leuven	(2013)
Dugan O'Neil	Simon Fraser University	(2014)
Erich Poppitz	University of Toronto	(2014)
Paul Reimer	Argonne National Laboratory	(2014)
Carl Svensson	University of Guelph	(2013)
Stefan Westerhoff	University of Wisconsin – Madison	(2015)

The Co-Chair would like to acknowledge the very demanding task faced by SAPES members throughout the year, up to and especially through competition week. Very long hours of deliberations ensured that each proposal was fairly and consistently evaluated according to the selection criteria. The remarkable professionalism and dedication of SAPES members is manifest in the high quality of the Section's recommendations. The co-Chair also wishes to sincerely thank SAPES members for their careful and constructive attitude throughout the competition, and for ensuring the conduct of our many discussions in a pleasant atmosphere indeed. In particular, a special thanks to co-Chair Gerald Gwinner. Special thanks also go to this year's retiring members, Philip Burrows, Mark Huyse, and Carl Svensson, for three years of outstanding service to the Canadian SAP community; it is deeply appreciated.

It is a pleasure for the co-Chair to thank NSERC staff and the Physics Group Chair for their expert guidance and help in the months leading up to the competition, and during the many long days of competition week: James Murphy and Kim Bonnet (Program Officers), Samir Boughaba (Team Leader), and Isabelle Blain (Vice-President, Research Grants and

Scholarships). Finally, the co-Chair wishes to express her highest regards and warmest appreciation to Samir for his extraordinary professionalism, patience, commitment and expert counsel throughout the 2012-13 competition year.

IV. Orientation/Policy Meeting and Information Visits

Each year, SAPES launches its operations at a one-day orientation and policy meeting. This is a critical opportunity for the new members to familiarize themselves with NSERC and SAPES operating procedures, to be informed of the process leading to competition week, and to interact with the returning members. News from NSERC, including a detailed review of the competition budget, is also communicated to the members. The orientation and policy meeting for this competition was held on November 2, 2012 via teleconference. This replaced an in person meeting of the NSERC staff and new members with returning members on the phone. Given budgetary constraints, all members and NSERC staff attended by teleconference.

Until the 2011 competition, it had been a tradition, following the policy meeting, for SAPES to visit Canadian institutions with subatomic physics research programs on a 3-year rotation basis. The visits were conducted for informational purposes only and were not a part of the grant evaluation process. They provided opportunities to communicate information about NSERC and the review process to researchers, while the Section members heard presentations about the researchers' activities and learned first-hand about their infrastructure and environment. The learning process that accompanied these visits was particularly important considering the large number of SAPES members affiliated with non-Canadian research institutions, in addition to the variety of sub-disciplines covered by the envelope. These visits were also a valuable opportunity for Canadian members to get a full sense of the research environments of their colleagues from one end of the country to the other over their three years of service on SAPES.

Since the 2011 competition, owing to operating budget pressures at NSERC, these information visits are no longer held. With these discontinued visits and the now fully teleconferenced orientation meeting, competition week is the first and only time per year that Section members meet. This is viewed by members of SAPES, and indeed much of the SAP community, as a negative development. The benefits to the review process that leads to multimillion funding recommendations completely justify the relatively modest costs involved in the information visits. The Section appreciates the budgetary constraints under which NSERC is operating. The Section strongly recommends, however, that NSERC considers reinstating these visits.

Given that the schedule for competition week was quite tight and that the fall orientation meeting was only teleconferenced, a second pre-competition teleconference was held for new and returning members, just prior to competition week, to remind the members of NSERC's policies and guidelines, and present the most up-to-date budget for the competition. Such a session used to be held right at the start of competition week in previous years. The Evaluation Section members indicated that such a pre-competition session was very useful and that it should become part of the yearly lead-up to competition week.

V. Pre-Review Process

The review of the Notifications of Intent to Apply for a Discovery Grant (Form 180), took place in September. Discovery grants include Individual, Team, and Project grants. The review involved all the Section Chairs of the Physics Evaluation Group, including the SAPES Co-Chairs, and the Group Chair. Its objective was to discuss those applications whose research topics crossed the boundaries of two or more Sections within the Physics Evaluation Group or related to a discipline other than physics. For each application, the intent was to identify the Section (or Evaluation Group, if the research topic related to another discipline) that should take the lead for the review and determine the need to provide or receive expert input to/from other Evaluation Groups. In the case of SAPES, which operates in a standalone mode with a separate membership, the need to provide or receive expert input was related to the other Sections of the Physics Evaluation Group.

As a result of this process, two applications reviewed by SAPES in the past were transferred out to a Section of the Physics Evaluation Group, while one application reviewed by the Physics Evaluation Group in the past was transferred to the Section. Moreover, for three Subatomic Physics individual grant applications, members from the Physics Evaluation Group, with relevant expertise, were asked to participate in the deliberations during competition week. Likewise, members of SAPES participated in the review of two Individual Discovery grant applications in other Sections of the Physics Evaluation Group.

Furthermore, when the notifications of intent to apply (Form 180 for Discovery Grants and Form 181 for MRS) are received, each application is assigned by the Chair to first and second internal reviewers, who are SAPES members with the most appropriate expertise, and with careful consideration of balancing the full workload among all of the members. Additionally, a third reviewer is systematically assigned, with special responsibility for budget scrutiny, for applications that request funds averaging \$500k/year or more.

In the case of Discovery grant applications, the first reviewer is required to recommend five external referees for each of his/her assigned proposals. Typically, up to two of the external referees could be chosen from the list of suggested referees on the Form 180. It is in the applicant's interest to suggest referees who are not in conflict of interest according to NSERC's guidelines. Internal reviewers generally recommend a substantial fraction of

external referees who are from outside Canada. This year, an average of 3.2 external referee reports per application was received.

Similarly, once RTI grant applications are received, the Chair assigns first and second internal reviewers to each of them; a third internal reviewer is systematically assigned to Category-3 grant applications. External referee reports are not typically sought for Category-1 and Category-2 RTI grant applications.

VI. Ad hoc Expert Review Committees

Ad hoc expert reviews are typically held for Discovery grant applications requesting more than an average of \$1M per year or for Category-3 RTI grant applications. In this year's competition, four *ad hoc* expert reviews were conducted prior to the competition, in the fall of 2012, and one of the SAPES Co-Chairs was present as an observer for each of them. These reviews related to the Category-3 RTI grant application submitted by ATLAS-Canada, the MRS grant application submitted by the Institute of Particle Physics (IPP), and the Discovery Project grant applications submitted by DEAP-3600, and SNO+. The ATLAS-Canada review was held in Montréal on November 30 and December 1, 2012, the IPP review was held in Montréal on December 2, 2012, the DEAP-3600 review was held by teleconference on November 26 and December 5, 2012, and the SNO+ review was held by teleconference on November 29 and December 7, 2012.

The reviews were carried out by *ad hoc* or standing Committees of experts. Full reports with recommendations, including budget recommendations when applicable, were prepared for SAPES. The reports, without the budget recommendations, were sent by NSERC to the applicants prior to Large Project Day. The reports *with* the budget recommendations are sent to the applicants after the results of the competition are announced.

The Co-Chairs did not attend the meeting of the Advisory Committee on TRIUMF (ACOT) held on November 30-December 1, 2012. They will be attending the ACOT meeting on May 31-June 1, 2013.

VII. Large Project Day

It has proved extremely useful to devote one day prior to the beginning of the competition to presentations by applicants of Discovery and MRS grant applications typically requesting an average of \$500k per year or more, besides applicants of Category-2 or Category-3 RTI grant proposals. This is referred to as Large Project Day (LPD). It is also now customary to meet on LPD with management representatives from the Canadian Institute of Nuclear Physics (CINP), the Institute of Particle Physics (IPP), the Perimeter Institute, SNOLAB, and TRIUMF. LPD was held this year in Ottawa on Sunday, February 10, 2013. The agenda is attached as Appendix 1.

The day began with *in camera* presentations by William Trischuk and David Bailey (Director and Secretary/Treasurer, respectively, of the IPP), Kumar Sharma and Garth Huber (President of the Board of Directors and Executive Director, respectively, of the CINP), Nigel Smith (Director of SNOLAB), Reiner Kruecken (Associate Director of TRIUMF), and Cliff Burgess (representing the Director of the Perimeter Institute). They provided the Section with the perspective of the communities served by their organizations and answered questions previously submitted by the Evaluation Section. The IPP MRS grant application was also presented by William Trischuk and David Bailey. Applicants then made presentations and answered questions previously submitted by the Evaluation Section; this was done in an open session that was attended by about two dozen members of the community. The invited projects were, in order of presentation, ATLAS, Belle-II, ALPHA, DEAP-3600, and SNO+.

Following these public presentations, the Evaluation Section met *in camera* with Isabelle Blain (Vice-President, Research Grants & Scholarships) who provided an extensive update on recent activities and initiatives at NSERC.

VIII. Beginning of the Competition

The funds available to the Section at the beginning of the competition are shown in Table 1.

An amount of \$150k was subtracted from the envelope for fiscal year 2013-14 as the last reimbursement installment of a four-year forward borrowing commitment from the 2009 competition. There was a carry-forward of \$49k from last year's competition into this year's budget, mostly due to various payment adjustments and deferrals.

Taking into account on-going commitments from previous competitions, \$7.452M was available for the 2013 competition (33% of the fiscal year budget). This year, SAPES received 68 applications, a record high. At the start of competition, the total funds requested for fiscal year 2013 amounted to \$14.106M. Consequently, at that point in the competition, the projected average funding rate for fiscal year 2013 was 53%. For comparison, the funding rates for the years 2007 to 2012 were 55%, 66%, 66%, 46% (57% without SNOLAB operations), 61%, and 69% respectively.

2013 Competition - Subatomic Physics Envelope Budget							
BEGINNING OF COMPETITION							
<i>(millions of dollars)</i>							
Budget Item	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Base Budget¹	20.729	20.729	20.729	20.729	20.729	20.729	20.729
Cumulative Permanent Transfers:							
New Applicants / Early Career Researchers ²	1.622	1.682	1.702	1.702	1.702	1.702	1.702
Reallocations ³	0.459	0.459	0.459	0.459	0.459	0.459	0.459
Transfers due to population dynamics ⁴	-0.183	-0.183	-0.223	-0.241	-0.241	-0.241	-0.241
Temporary Transfers:							
ATLAS Cost-to-Completion	-0.300	0.000	0.000	0.000	0.000	0.000	0.000
Forward-Borrow	-0.150	-0.150	-0.150	-0.150	0.000	0.000	0.000
Total Fiscal Year	22.410	\$22.687	\$22.517	\$22.499	\$22.649	\$22.649	\$22.649
Actual Spending	22.047	22.749	22.717				
Carry-forward⁵	0.363	0.249	0.049				
Commitments Available for Competition				-15.096	-11.311	-3.140	-2.057
				7.452			

¹ Includes any past transfers from other programs.

² Following Budget 2011, a supplement of \$5,000 was provided towards the support of each Early Career Researcher (active grant) starting from FY2011. Taking into account the 2012 competition results, the cumulative increase is \$80,000.

³ FY 2007/08 was the last year for the 2002 reallocations exercise.

⁴ Net total of grants held by returning applicants whose new applications are transferred in/out from SAP Evaluation Section.

⁵ For each year, the carry forward is calculated by subtracting the actual spending from the total fiscal year allotment, then adding the previous year's carry-forward amount.

Table 1. Overall budget available at the beginning of the 2013 competition.

IX. The 2013 Competition

On Monday, February 4, 2013, the Section held a teleconference in order to prepare the competition. During this teleconference, policies and procedures were reminded to the members, and the competition budget was presented to the members. As indicated previously, such a session used to be held right at the start of competition in previous years.

The competition was held in Ottawa over a period of five days, from Monday, February 11 to Friday, February 15, 2013. The first day started with a review of the logistics. The Evaluation Section then started Round 1 of the competition, and proceeded with the review of the applications.

The format of the discussions strictly followed NSERC's guidelines and SAPES internal procedures. Previously, in the fall of 2012, at least two SAPES members were assigned to conduct an *internal* review of each application. During competition week, for each application, the first internal reviewer presented all aspects of the proposal and made her/his recommendations (ratings, funding, duration). This was followed by additional comments and/or a presentation by the second internal reviewer, who also made recommendations. For grants requesting support in excess of an average of \$500k per year, a third presentation, concentrating on budget matters, was made. These in-depth assessments were carried out independently by the internal reviewers (who were not aware of the other's identity before the first reviewer's presentation), and took into account the reports received from external referees, if available, as well as reports from *ad hoc* expert committees where applicable. Each application was then thoroughly discussed by all SAPES members. At the end of the discussion, each member was asked to rate the application against NSERC's selection criteria: (i) excellence of the researcher(s), (ii) merit of the proposal, (iii) contributions to the training of Highly Qualified Personnel (HQP), and (iv) need for funds. SAPES then decided whether to recommend funding the application, the level of funding, and the funding duration. Any recommendation was determined through secret electronic voting. The median vote was selected as the final SAPES recommendation. Members in conflict with any particular application left the meeting room before the internal reviewers were identified and the application was discussed; they were never informed, even by the end of the competition, of the final result or of the identity of the internal reviewers.

Once the review of the experimental Individual, Team, and Project Discovery grant applications, all MRS grant applications, and large RTI (Categories 2 and 3) proposals were completed, SAPES members were divided into two sub-Sections: theory and RTI-1. The theory sub-Section reviewed all the theory Individual grant applications. The RTI-1 sub-Section reviewed the Category-1 RTI grant requests (up to \$150k requested in total).

As usual, it was strictly forbidden for SAPES members to keep a cumulative total of the recommended awards, in order not to bias the review of applications discussed towards the end, and to ensure that all applications were treated consistently and fairly. As a matter of fact, taking into account the members' conflicts of interest and the split into two sub-Sections, such budget tracking is practically impossible.

Moreover, in order to ensure the integrity of the review process, applications could be flagged by any SAPES member, the Program Officer, or the Team Leader at any time in Round 1, if he/she felt that some aspects of the discussion or the recommendation necessitated further deliberations. Flagged applications are re-discussed before the budget balancing discussion that concludes the deliberations of Round 1.

The Round 1 deliberations concluded in the mid-afternoon on Wednesday, February 13. The Team Leader made a presentation on the budget, taking into account the sum of the recommended awards for all the applications. The result was that a sum of \$9.812M had been recommended from the envelope, to be compared to a total of \$7.452M that was available to SAPES, and \$14.106M in requested funds.

Prior to the start of Round 2, a thorough discussion took place to establish the guiding principles for the re-evaluation of all proposals in an attempt to balance the budget. The SAPES members were unanimous that the same set of principles would be applied to all proposals, that all proposals would again be assessed strictly on their merits, and that strict account would be taken of the Section's evaluations of the four criteria for each proposal, which had been recorded in Round 1. All applications were then re-assessed and revised funding recommendations made, again using secret electronic vote. As in Round 1, any application could be flagged if someone felt that some aspects of the re-assessment or the revised recommendation necessitated further deliberations.

The Round 2 deliberations concluded in the afternoon of Thursday, February 14. The Team Leader presented the results: the revised recommendation by the Section was for \$8.066M from the envelope, compared again with the available sum of \$7.452M.

At that stage, the SAPES members carefully reviewed the distribution of the recommended budget amongst the various categories of grant applications assessed within the envelope: operating grants (Individual, Team and Project Discovery; MRS); Categories 2 and 3 RTI grants; and Category 1 RTI grants. The exercise was conducted at a "global" category level and no specific application was singled out or discussed during this process. Taking into account the thorough and exhaustive efforts already made in Rounds 1 and 2, and after much discussion, the Section unanimously agreed that it was not reasonable to attempt to make further reductions in the operating and Categories 2 and 3 RTI recommended grants without causing severe harm to the supported activities and making those grants *de facto* ineffective. The total recommended amount, at the end of Round 2, for these grants amounted to \$7.343M. Taking into account the available budget for competition, there remained \$109k. The Section agreed to use these funds towards the support of RTI-1 grant applications.

Making use of the merit ratings assigned to the applications for each of the selection criteria in Round 1, the RTI-1 grant applications that had been recommended for funding after Rounds 1 and 2 were ranked, the priority being given to the most meritorious applications in terms of "merit of the proposal" and "need for funds". Taking into account the ratings/rankings, the Section agreed to support the top two RTI-1 grant applications out of the 18 submitted. To do so, however, it was necessary for the Section to forward borrow \$40k.

The remaining ranked list of RTI-1 grant applications was provided to NSERC, and the Section formally urged the agency to make every possible effort to allocate some year-end funds, if they become available, to the support of additional meritorious Subatomic Physics RTI-1 grant applications.

Unfortunately, the 2013 competition witnessed the realization of the prediction made in the community's 2011-2016 Long Range Plan, *The Subatomic Universe: Canada in the Age of Discovery*: with the effectively flat funding of the NSERC Subatomic Physics Envelope over the past many years, the capacity of the envelope to fund modest-scale equipment, that does not fit within the CFI scope, has been dramatically reduced. Even with some forward borrowing, it was only possible to support two out of 18 RTI-1 grant applications at a time when the community has a critical need for modest-scale equipment.

The Section urged NSERC to address this shortfall both for the 2013 competition and in outyears where the situation could only likely worsen if not expressly addressed. In its formal communication to NSERC, the Section stated: "The prediction of the Subatomic Physics Long Range Plan has thus been realized, with the ability of the NSERC Subatomic Physics Envelope to support new research and development equipment now compromised. At this stage, the Subatomic Physics Evaluation Section urges NSERC to make every possible effort to allocate some year-end funds, if they become available, to the support of additional meritorious Subatomic Physics RTI-1 grant applications in order to lessen such a negative impact." Then adding: "Looking to the future, the Section does not see any solution to this critical situation without new funding being allocated to the Subatomic Physics Envelope."

With a recommended total funding of \$7.492M from the envelope and a total request for \$14.106M, the funding rate for this year's competition is 53%.

X. End of Competition Results

The Section's final multiyear budget levels are shown in Table 2. Table 3 shows a multiyear breakdown of equipment, theory, experimental operating, and MRS allocations, while Table 4 gives the percentage share of the envelope in theory, equipment, and operations over the period from 2007 through 2013.

As forecast in the 2006 Long-Range Plan and confirmed in the 2011 Long-Range Plan, these figures provide quantitative measures of the funding crisis that has loomed over the Canadian SAP community for several years. The share of the envelope now committed to the support of research operations is at a record high of 83%, with little room for small-scale capital investments for emerging endeavours.

Small-scale capital investments by SAPES, mostly for proposals that fall outside the mandate of the CFI, are needed for R&D efforts that are crucial for the future of Canadian SAP, and to satisfy the capital needs of the smaller programs that are essential to the breadth of the community. Due to the long cradle-to-grave time scale of Subatomic Physics research programs,

some overlap between current and next-generation discovery endeavours is unavoidable if Canada is to continue to play a leading scientific role in next-generation forefront research projects. At a time when Canadian researchers are actively and fruitfully exploiting the public investments made to date in leading endeavours, it would not be opportune to consider re-allocating a substantial part of the support to these efforts towards small-scale capital investments.

XI. Recommendations to the DAS Program

This is the sixth year of the Discovery Accelerator Supplements (DAS) program. The present objective of this program is to provide substantial and timely resources to outstanding researchers who have a well-established research program, and who propose superior discovery research programs that explore high-risk transformational concepts and have the potential to capitalize on an opportunity. Contrary to the practice followed up to and including 2009, where GSC-19 (predecessor of SAPES) would put forward DAS candidates to be further reviewed by a multidisciplinary committee, SAPES now directly allocates one DAS award. During the regular deliberations for each Individual and Team Discovery grant application, SAPES members could put forward the applicant(s) after the deliberation and votes. All the potential candidates are then discussed in detail against the DAS selection criteria and objectives in Round 3, once the competition budget is balanced. Subsequently, the members rate each candidate on a scale of 1 (excellent) to 5 (below average) through a secret vote, and the nominee(s) are selected by numerical tally of the Section's votes. This year, the Section quota for DAS nominees was one (1), as in recent years.

The DAS program is not aimed at Project grant applications. As indicated in the 2009 annual report, a procedure is available for any member of a Collaboration submitting a Project grant application to be considered by SAPES for the DAS program.

XII. Policy Matters

At the end of the competition, the Evaluation Section and NSERC representatives came together for a session devoted to policy matters. Isabelle Blain – Vice-President, Research Grants & Scholarships – attended this session. SAPES members underscored the increasingly challenging funding pressures faced by the envelope and the practical inability of the latter to effectively support small-scale new research and development equipment. SAPES members reiterated their concerns about the cancellation of the fall face-to-face orientation and policy meeting and the accompanying information visits to universities and national laboratories with Subatomic Physics research programs. The members recommended that NSERC considers reinstating them. It is the Section's opinion that the benefits to the review process that leads to multimillion funding recommendations completely justify the relatively modest costs involved.

As part of NSERC's regular review of the Research Topics related to each Evaluation Group/Section, the members were asked to provide their input regarding the descriptors used for the Research Topic "Subatomic Physics".

The Evaluation Section members recommended continuing to hold a pre-competition teleconference-based orientation session as a lead-up to competition week.

2013 Competition - Subatomic Physics Envelope Budget							
END OF COMPETITION							
<i>(millions of dollars)</i>							
Budget Item	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Base Budget¹	20.729	20.729	20.729	20.729	20.729	20.729	20.729
Cumulative Permanent Transfers:							
New Applicants / Early Career Researchers ²	1.682	1.702	1.702	1.702	1.702	1.702	1.702
Reallocations ³	0.459	0.459	0.459	0.459	0.459	0.459	0.459
Transfers due to population dynamics ⁴	-0.183	-0.223	-0.241	-0.241	-0.241	-0.241	-0.241
Temporary Transfers:							
ATLAS Cost-to-Completion	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Forward-Borrow	-0.150	-0.150	-0.150	0.000	0.000	0.000	0.000
Total Fiscal Year	\$22.687	\$22.517	\$22.499	\$22.649	\$22.649	\$22.649	\$22.649
Actual Spending	22.749	22.717	22.588				
Carry-forward⁵	0.249	0.049	-0.040				
Commitments				-16.620	-6.896	-2.637	-0.580

¹ Includes any past transfers from other programs.

² Following Budget 2011, a supplement of \$5,000 was provided towards the support of each Early Career Researcher (active grant) starting from FY2011. Taking into account the 2012 competition results, the cumulative increase is \$80,000.

³ FY 2007/08 was the last year for the 2002 reallocations exercise.

⁴ Net total of grants held by returning applicants whose new applications are transferred in/out from SAP Evaluation Section.

⁵ For each year, the carry forward is calculated by subtracting the actual spending from the total fiscal year allotment, then adding the previous year's carry-forward amount.

Table 2. Multi-year budget summary at the end of the 2013 competition.

SUBATOMIC PHYSICS ENVELOPE MULTI-YEAR COMMITMENTS BY CATEGORY END OF 2013 COMPETITION					
	2013	2014	2015	2016	2017
RTI - COMMITTED	\$55,000	\$0	\$0	\$0	\$0
RTI - NEW (2013 Competition)	\$558,893	\$0	\$0	\$0	\$0
RTI - TOTAL	\$613,893	\$0	\$0	\$0	\$0
THEORY - COMMITTED	\$2,599,500	\$1,991,500	\$1,156,000	\$585,000	\$0
THEORY - NEW (2013 Competition)	\$697,700	\$690,700	\$695,700	\$543,700	\$544,200
THEORY - TOTAL	\$3,297,200	\$2,682,200	\$1,851,700	\$1,128,700	\$544,200
EXP OPS** - COMMITTED	\$11,957,948	\$9,101,000	\$1,984,000	\$1,472,000	\$0
EXP OPS - NEW (2013 Competition)	\$4,424,000	\$2,818,000	\$1,258,000	\$36,000	\$36,000
EXP OPS - TOTAL	\$16,381,948	\$11,919,000	\$3,242,000	\$1,508,000	\$36,000
MRS - COMMITTED	\$483,500	\$218,500	\$0	\$0	\$0
MRS - NEW (2013 Competition)	\$1,811,000	\$1,800,000	\$1,802,000	\$0	\$0
MRS - TOTAL	\$2,294,500	\$2,018,500	\$1,802,000	\$0	\$0
TOTAL - COMMITTED	\$15,095,948	\$11,311,000	\$3,140,000	\$2,057,000	\$0
TOTAL - NEW (2013 Competition)	\$7,491,593	\$5,308,700	\$3,755,700	\$579,700	\$580,200
GRAND TOTAL	\$22,587,541	\$16,619,700	\$6,895,700	\$2,636,700	\$580,200
TOTAL ENVELOPE	\$22,649,051	\$22,649,051	\$22,649,051	\$22,649,051	\$22,649,051
REIMBURSEMENT - FORWARD BORROW FROM PAST COMPETITIONS	-\$150,000	\$0	\$0	\$0	\$0
CARRY FORWARD FROM FISCAL YEAR 2012	\$48,917	-	-	-	-
FORWARD BORROW (2013) / AVAILABLE	-\$39,573	\$5,989,778	\$15,753,351	\$20,012,351	\$22,068,851

* EXP OPS = Experimental Operations - Includes Project grants and experimental Individual grants

Table 3. Breakdown of multiyear commitments at the end of the 2013 competition.

	2013	2012	2011	2010	2009	2008	2007*
Theory	15%	14%	14%	14%	14%	15%	16%
RTI	3%	3%	6%	4%	8%	16%	14%
Total Research Ops	83%	83%	80%	82%	82%	69%	70%
Exp. Ops	73%	72%	68%	69%	69%	59%	61%
MRS	10%	11%	13%	13%	13%	11%	10%

* Takes into account the fact that SNOLAB's MRS grant was subsequently paid from outside the envelope.

Table 4. Envelope share in theory, experimental operations, and equipment, from 2007 to 2013.

Appendix 1

SUBATOMIC PHYSICS EVALUATION SECTION

2013 COMPETITION

LARGE PROJECT DAY

Sunday, February 10, 2013

Salon Laurier (Lower Level)

Marriott Hotel, 100 Kent Street, Ottawa, Ontario

7h45 - 8h30	Committee's Working Breakfast – in camera	
8h30 - 9h15	Meeting with the Institute of Particle Physics – <i>in camera</i>	<i>W. Trischuk, D. Bailey</i>
9h15 - 9h40	Meeting with the Canadian Institute of Nuclear Physics – <i>in camera</i>	<i>K. Sharma, G. Huber</i>
9h40 - 10h05	Meeting with SNOLAB – <i>in camera</i>	<i>N. Smith</i>
10h05 - 10h30	Meeting with TRIUMF – <i>in camera</i>	<i>R. Kruecken</i>
10h30 - 10h45	Coffee Break	
10h45 - 11h10	Meeting with Perimeter Institute – <i>in camera</i>	<i>C. Burgess</i>
11h10 - 11h55	Upgrading the ATLAS Experiment at the CERN LHC	<i>R. McPherson</i>
11h55 - 13h00	Lunch	
13h00 - 13h45	The Belle-II Experiment	<i>M. Roney</i>
13h45 - 14h30	Fundamental Symmetry Tests with Trapped Antihydrogen: ALPHA Project at CERN/AD	<i>M. Fujiwara</i>
14h30 - 15h15	DEAP-3600 Installation Completion and Commissioning	<i>M. Boulay</i>
15h15 - 15h30	Coffee Break	
15h30 - 16h15	SNO+ Final Construction, Commissioning and First Data	<i>M. Chen</i>
16h15	Committee meets in camera	

NOTE: 45 min. presentations: 25 min. of presentation and 20 min. for Q&A.
25 min. presentations: 15 min. of presentation and 10 min. for Q&A.