

Subatomic Physics Evaluation Section Annual Report

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1. Introduction

This report summarizes the activities of the Subatomic Physics (SAP) Evaluation Section (SAPES) in fiscal year 2017-18, including the results of the 2018 competition. The report is provided to the Canadian subatomic physics community. The format and content of the report follow the reports from previous years very closely.

The Subatomic Physics Evaluation Section is a standing review committee that oversees a suite of programs. Funding for the Subatomic Physics suite of programs has been made through an independent envelope mechanism since 1991. Subatomic Physics Individual and Project Discovery, Research Tools and Instruments (SAP-RTI), and Major Resources Support (SAP-MRS) grant applications 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 subatomic physics program. The envelope structure also helps SAPES maintain as appropriate a balance between operations and capital investments as possible. 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 2016 and covered the period 2017-2021 with a look ahead to 2026.

Another unique strength of SAPES is the extent to which it solicits reviews by international experts of the highest calibre. All major Project, SAP-RTI and SAP-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

reviewers 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 the SAP 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 moderately increased budget of the SAPES envelope in the past years, and due to the internationally-recognized excellence of the Canadian SAP research leading to increased responsibilities in both National and International Experimental Projects it has been difficult for the 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. Several high-priority research programs are in the ramping-up phase of their activities, while others are at the full scientific exploitation stage. The success of the subatomic community in securing infrastructure funding through CFI has also led to ever-increasing demands on the SAP envelope for operational funds.

Looking back ten years ago (a relatively small window over the typical timescale of SAP projects), 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 the constrained support provided to the “flagship research programs” over the past 5 years as they neared the stage of data-taking and science exploitation, 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. This concern has proved prescient, as the increasing demands on operational funds have led to pressure on the ability of the envelope to support small-scale “seed funding” for equipment through the RTI program.

The most recent LRP report “Canadian Subatomic Physics Long Range Plan 2017-2021” reiterated and strengthened these concerns. A number of policy recommendations made in that report pertained to NSERC. Specifically the report stressed the need for long-term support of large international projects, and the need to retain the current SAPES envelope system. Another recommendation pointed to the need for careful management of envelope and the need for growth of the envelope to allow for new projects to be developed. The report points out that NSERC funding for subatomic physics has not kept pace with CFI successes, leading to an envelope in danger of being committed to ongoing CFI projects with no flexibility to support “opportunity funds” for impactful and urgent new initiatives.

There is an urgent need to 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, despite the increase of funds through SAPMR. 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). Recognizing that there has been gradual and substantial increase to the envelope's funding starting in 2014, a trend that needs to be maintained and strengthened now more than ever if the Canadian SAP research program is to continue to produce excellent science both now and in the future.

2. Update on the Envelope Funding

The pressure on the Section's funding envelope has been building for 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 non-operational funds into the SAP program in excess of 50% of the entire SAPES envelope, including substantial capital investments from CFI and various provincial government agencies. Other substantial investments by the Canadian government in science and technology, such as the Canada Research Chairs (CRC) program, the Canada Excellence Research Chairs (CERC) program, and now the Canada First Research Excellence Fund (CFREF) have also resulted in, and will continue to enable the fast growth of the number and the quality 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-related costs. Up until recently, repeated attempts to foster the necessary level of coordination between CFI and NSERC had not succeeded. Two years ago SAPES Co-Chair Adam Ritz participated in a meeting of representatives of NSERC, CFI, and members of the Subatomic Physics Long-Range Plan Committee to discuss the issues and propose solutions. This was the start of more frequent interactions between the funding agencies. Starting in competition cycle 2016, CFI presented at Large Project Day as one of the Canadian institutes supporting subatomic physics research in Canada. During the FY2017 CFI funding competition, SAPES Co-Chair Karsten Heeger was an ex officio member of the Multidisciplinary Assessment Committee which met in Toronto in December 2016, providing input as needed. These latest developments are seen as a very positive sign that more contact between the peer

review processes of NSERC and CFI is developing. As stated in the last Long Range Plan (2011-2016), without such coordination there is a risk for research funding to be spread too thin, leading to failure of major parts of the Canadian subatomic physics program. An alternative risk would be for research funding to be focused only on a few state-of-the-art major infrastructures, leaving several others unexploited.

Since the 2006 Long-Range Plan was released, new funds were allocated to NSERC by the federal government in Canada’s 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 devoted half of those funds to enhance the support given to Early Career Researchers (ECRs) across all disciplines in the form of supplements to their Discovery grants. ECRs with active grants in subatomic physics have received such supplements. Even though this is a welcome development, it has translated into a limited influx of funds into the envelope (\$125k). In *Budget 2014*, NSERC received an additional \$15M “to support advanced research in the natural sciences and engineering”. These funds are being phased into the Discovery grants program over the five-year cycle, with approximately \$3M being added to the budget each year starting in 2014-2015. The share of \$3M being added to the subatomic physics envelope is approximately \$158k. Given that much of the spending in the subatomic physics envelope is directed toward Project Grants of three-year duration, the funds will be phased in over a three year period, with the addition of \$474k in FY 2015, \$632k in FY 2016 and \$790k in FY2017. In *Budget 2016*, the Government announced \$30M of “new annual funding for discovery research”. Again these funds are being phased into the Discovery grants program over the five-year cycle, with the addition of \$772k in FY 2016, \$1,152k in FY2017, 1,132k in FY2018, \$1,503k in FY2019 and \$1,874k in FY2020. In *Budget 2018* the Government announced \$354.7M over five years (\$90.1M per year ongoing) to NSERC. The distribution of these funds among NSERC programs has yet to be approved and announced, but it expected near the end of FY2018.

3. Subatomic Physics Evaluation Section Membership

This year's SAPES comprised 12 members, including three theorists. Three new members joined for full three-year terms. Our new members were Angela Bracco (University of Milan), Alex Buchel (University of Western Ontario), and Magnus Wolke (Uppsala University). The full approved SAPES membership is given below.

| Name | Organization | Final Year |
|--------------------------|-------------------------------|-------------------|
| Angela Bracco | University of Milan | (2020) |
| Alex Buchel | University of Western Ontario | (2020) |
| Alfredo Galindo-Uribarri | Oak Ridge National Laboratory | (2019) |
| Karsten Heeger* | Yale University | (2018) |
| Hans Kraus | University of Oxford | (2019) |
| Heather Logan | Carleton University | (2018) |

| | | |
|---------------------------|------------------------------------|--------|
| Jeffery Martin (Co-Chair) | University of Winnipeg | (2019) |
| Gabriel Martinez Pinedo | Technische Universität Darmstadt | (2018) |
| Tor Raubenheimer | Stanford Linear Accelerator Center | (2019) |
| Niki Saoulidou (Co-Chair) | University of Athens | (2019) |
| Brigitte Vachon | McGill University | (2019) |
| Magnus Wolke | Uppsala University | (2020) |

*was not able to complete entire last year of 3-year membership term.

The Co-Chairs 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-Chairs also wish 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. Special thanks also go to this year's retiring members, Karsten Heeger, Heather Logan and Gabriel Martinez Pinedo for three years of outstanding service to the Canadian SAP community; it is deeply appreciated.

It is a pleasure for the Co-Chairs to thank NSERC staff for their expert guidance and help in the months leading up to the competition, and during the many long days of competition week: Shashini Jayaratne and Campbell Whillans (Program Assistants), Kim Bonnet and Caroline Bicker (Program Officers), Emily Diepenveen (Team Leader), Elizabeth Boston (Director, Mathematical, Environmental and Physical Sciences), and Pierre Charest (Vice-President, Research Grants and Scholarships).

4. Orientation/Policy Meetings

Each year, SAPES launches its operations during an orientation and policy meeting. This is a critical opportunity for the new members to familiarize themselves with NSERC and SAPES operating procedures, and to be informed of the process leading to competition week. Directors of CINP and IPP, as well as returning members, welcome the opportunity to respond to questions of new 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 October 24, 2017 via 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. 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 tele-conferenced orientation meeting, competition week is the first and only time per year that Section members meet. This is viewed by much of the Canadian SAP community as a negative development.

Again this year SAPES members were given the CINP-IPP jointly prepared document on

the context of the Canadian research environment, with the opportunity to ask questions. The document provides an overview of the roles that various Canadian funding agencies play in supporting subatomic physics research and provides details about Canadian subatomic physics research institutes. The document further provides information about the structure and different options for Canadian M.Sc. and Ph.D. programs, followed by details about the regional differences in the training of Highly Qualified Personnel (HQP). An Appendix listing the typical level of graduate student support at different Canadian universities across the country is included.

This year a teleconference was held prior to competition week in order to hold a calibration, also referred to as a Mock Review. This allows members to review and discuss actual applications from past cycles in order to familiarize themselves with the evaluation criteria, and the merit indicators grid. In advance of the review of applications the SAPES reviewed NSERC's policies and guidelines, and was presented the most up-to-date budget for the 2018 competition. The pre-competition calibration session is seen as very useful and should continue to be part of the yearly lead-up to competition week.

5. Pre-Review Process

The review of the Notifications of Intent to Apply (NOI) for a Subatomic Discovery Grant took place in August and September. Programs which require NOIs include SAP Discovery Grants (Individual and Project), SAP Major Resources Support, and SAP Research Tools and Instruments (Category 2&3).

The review of Individual NOIs may involve the SAPES Co-Chairs as well as Section Chairs of the Physics Evaluation Group. The objective of this step in the review process is to discuss those applications whose research topics cross the boundaries of two or more Sections within the Physics Evaluation Group or those which relate to a discipline other than physics. For each application the lead Section (or Evaluation Group, if the research topic relates to another discipline) is identified, as well as the need for expert input to/from other Evaluation Groups.

When the Notifications of Intent to Apply for SAP-RTI (Category 2 & 3) or SAP-MRS grants are received NSERC, in consultation with the Co-Chairs, assigns each application 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 SAP Discovery or SAP-MRS grant applications that request an average of \$500k/year or more. Likewise, a third internal reviewer is systematically assigned to Category 2/3 RTI grant applications.

In the case of SAP Discovery grant applications (Individual and Project), the first reviewer is required to recommend five external reviewers for each of his/her assigned proposals. Typically, up to two of the external reviewers could be chosen from the list of suggested reviewers on the Notification of Intent to Apply. It is in the applicant's interest to suggest reviewers who are not in a position of conflict according to NSERC's guidelines. Members

generally select a substantial fraction of external reviewers who are from outside Canada. This year an average of 2.7 external reviewer reports per SAP Discovery grant application were received.

Similarly, once SAP-RTI - Category 1 grant applications are received NSERC, in consultation with the Co-Chairs, assigns first and second internal reviewers. External reviewer reports are not sought for SAP-RTI grant applications.

6. Ad hoc Expert Review Committees

Ad hoc expert reviews are typically held for Subatomic Physics Project grant applications requesting more than an average of \$1M per year as well as SAP-RTI – Category 3 grant applications. During this year’s competition cycle two *ad hoc* expert reviews were conducted in November 2017. One SAPES member was present for each as ex officio. These reviews were related to the standing review of the ATLAS-Canada collaboration, and the SAP Discovery Project application submitted by the TITAN collaboration.

Full reports with recommendations, including budget recommendations, 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.

Finally, Co-Chair Jeffery Martin attended the meetings of the Advisory Committee on TRIUMF (ACOT) held on November 3-4 2017 and April 20-21, 2018; Emily Diepeveen, also attended on behalf of NSERC.

7. Large Project Day

It has proved extremely useful to devote one day prior to the beginning of the competition to hearing presentations by applicants of SAP Discovery and SAP-MRS grant applications requesting an average of \$500k per year or more, as well as applicants of SAP-RTI – Category 3 grant proposals. This is referred to as Large Project Day (LPD). These large proposals are typically complex, with extensive budgets, international commitments and project planning timelines which go far beyond those of smaller scale grant applications. The success or failure of a scientific program can depend on factors beyond the control of the Canadian research team. There have been notable examples in recent years in which the funding decisions in a host country forced changes in the scientific direction of the Canadian team between time of grant submission and assessment by SAPES. The opportunity to question the applicants in writing and in-person in advance of the SAPES deliberations is critical to thorough evaluations and judicious recommendations to NSERC.

The focus of LPD is to meet with representatives of large Canadian projects and with management representatives from the Canada Foundation for Innovation (CFI), 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 Monday, January 29, 2018. The agenda is found in [Appendix 1](#).

This year presentations by Canadian institute representatives, as well as applicants of collaborations submitting Large Project applications, were conducted *in camera* with the SAPES. The talks with the representatives of Canadian institutes provided the SAPES with the perspective of the communities served by their organizations and answered questions previously submitted by the members. Applicants then made presentations and answered questions previously submitted by NSERC and the members. The two observers present for Large Project talks and Q&A were the Directors of the CINP and the IPP. Collaborations invited to present were ATLAS, DEAP, SNO+ and TITAN.

8. Beginning of the Competition

The funds available to the Section at the beginning of the competition are shown in [Table 1](#).

Taking into account on-going commitments from previous competitions, \$9.6M was available for the 2018 competition (38% of the envelope). This year, SAPES received 39 applications. At the start of competition, the total funds requested for fiscal year 2018 amounted to \$12.9M. Consequently, at that point in the competition, the funding rate for fiscal year 2018 was 74%. For comparison, the funding rates for the years 2007 to 2017 were 55%, 66%, 66%, 46% (57% without SNOLAB operations), 61%, 69%, 53%, 52%, 64%, 55% (50% without the Federal Budget 2016 increase), and 57% respectively.

| SUBATOMIC PHYSICS ENVELOPE | | | | |
|--|---------------------|---------------------|---------------------|---------------------|
| MULTI-YEAR COMMITMENTS BY CATEGORY | | | | |
| Start of 2018 Comp | | | | |
| | 2018 | 2019 | 2020 | 2021 |
| RTI - COMMITTED | \$0 | \$0 | \$0 | \$0 |
| RTI - 2018 Competition | \$0 | \$0 | \$0 | \$0 |
| RTI - TOTAL | \$0 | \$0 | \$0 | \$0 |
| THEORY - COMMITTED | \$2,682,800 | \$2,128,600 | \$1,136,000 | \$550,000 |
| THEORY - 2018 Competition | \$0 | \$0 | \$0 | \$0 |
| THEORY - TOTAL | \$2,682,800 | \$2,128,600 | \$1,136,000 | \$550,000 |
| EXP OPS** - COMMITTED | \$10,952,470 | \$4,053,957 | \$2,255,000 | \$1,867,000 |
| EXP OPS - 2018 Competition | | | | |
| EXP OPS - TOTAL | \$10,952,470 | \$4,053,957 | \$2,255,000 | \$1,867,000 |
| MRS - COMMITTED | \$1,673,000 | \$265,500 | \$0 | \$0 |
| MRS - 2018 Competition | \$0 | \$0 | \$0 | \$0 |
| MRS - TOTAL | \$1,673,000 | \$265,500 | \$0 | \$0 |
| TOTAL - COMMITTED | \$15,308,270 | \$6,448,057 | \$3,391,000 | \$2,417,000 |
| TOTAL - 2018 Competition | \$0 | \$0 | \$0 | \$0 |
| GRAND TOTAL | \$15,308,270 | \$6,448,057 | \$3,391,000 | \$2,417,000 |
| TOTAL ENVELOPE | \$24,833,911 | \$25,036,331 | \$25,407,251 | \$25,383,651 |
| REIMBURSEMENT - FORWARD BORROW FROM PAST COMPETITIONS | \$96,588 | \$0 | \$0 | |
| AVAILABLE | \$9,622,229 | \$18,588,274 | \$22,016,251 | \$22,966,651 |

Table 1. Overall budget available as presented before Competition, Jan. 29, 2018.

9. The 2018 Competition

The competition was held in Ottawa over a period of four days, from Tuesday January 30 to Friday February 2, 2018. The first day started with a review of the logistics. The Evaluation Section then started Round 1, and proceeded with the review of the applications.

The format of the discussions followed NSERC's guidelines and SAPES internal procedures. For each application, the first internal reviewer presented all aspects of the proposal and made his/her recommendations (ratings, funding, duration). This was followed by additional comments and/or a presentation by the second internal reviewer, who also made recommendations. For grant applications requesting support in excess of an average of \$500k per year, and Category-3 RTI grant applications, a presentation focused on the budget was made by a third internal reviewer. 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 reviewers, as well as reports from *ad hoc* expert committees where applicable. All SAPES members then had the opportunity to comment. At the end of the discussion, each member was asked to rate the application against NSERC's selection criteria: Excellence of the Researcher(s), Merit of the Proposal, Record and Plan for training Highly Qualified Personnel (HQP), and Need for Funds. Guided by the results of the selection criteria, SAPES then determined whether to recommend funding the application, the level of support, and the 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 in advance of the identification of internal reviewers and discussion; those in conflict were not informed of the reviewer assignments or the result, even by the end of the competition.

The entire Evaluation Section reviewed experimental Individual and Project Subatomic Physics Discovery Grant applications. Once these reviews were completed, SAPES members were divided into two Sub-Sections: the Theory and RTI-1/MRS Sub-Sections. The Theory Sub-Section reviewed all the theory Individual grant applications. The RTI-1/MRS Sub-Section reviewed the Category-1 SAP-RTI grant requests (up to \$150k) and SAP-MRS grants requesting < an average of \$500k per year.

SAPES members were asked not to keep a cumulative total of the recommended awards, in order not to bias the review of applications discussed towards the end of the round, and to ensure that all applications were treated consistently and fairly.

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, 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 a given round.

The Round 1 deliberations concluded after lunch on Wednesday January 31. 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 \$10.037M had been recommended from the envelope, to be compared to a total of \$9.622M that was available to SAPES, and \$12.977M in requested funds.

Prior to the start of Round 2, a discussion took place to establish the guiding principles for the re-evaluation of all proposals in an attempt to balance the budget. The principles were applied to all proposals; all proposals were assessed on their merits, taking into account the Section's evaluations of the four criteria for each proposal, which had been recorded in Round 1. All proposals were reviewed and revised funding recommendations made (up or down), again using secret electronic vote. As in Round 1, any application could be flagged if a member or NSERC staff felt that some aspect of the revised recommendation necessitated further deliberations.

Round 2 deliberations concluded in the evening of Thursday February 1. The Team Leader presented the results: the revised recommendation by the Section was for \$9.625M from the envelope, compared again with the available sum of \$9.622M. Approval was sought and received to overspend by \$3k..

With recommended total funding of \$9.625M from the envelope, and a total request for \$12.977M, the funding rate for this year's competition is 74%.

10. End of Competition Results

The Section's final multiyear budget, broken down into equipment, theory, experimental operating, and MRS allocations is shown in [Table 2](#), while [Table 3](#) gives the percentage share of the envelope in theory, equipment, and operations over the period from 2010 through 2017.

The constraint on "opportunity funds" is a concern of the community as noted in the 2006, 2011, and 2017 LRP's; these figures provide quantitative measures of the increasing budget pressure that continues to build within the subatomic physics envelope. Year after year, the share of the envelope committed to the support of research operations is at a record high, with little room for small-scale capital investments that are critical for emerging research 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.

| SUBATOMIC PHYSICS ENVELOPE | | | | |
|---|---------------------|---------------------|---------------------|---------------------|
| MULTI-YEAR COMMITMENTS BY CATEGORY | | | | |
| End of Round 2 | | | | |
| | 2018 | 2019 | 2020 | 2021 |
| RTI - COMMITTED | \$0 | \$0 | \$0 | \$0 |
| RTI - 2018 Competition | \$301,716 | \$0 | \$0 | \$0 |
| RTI - TOTAL | \$301,716 | \$0 | \$0 | \$0 |
| THEORY - COMMITTED | \$2,682,800 | \$2,128,600 | \$1,136,000 | \$550,000 |
| THEORY - 2018 Competition | \$465,000 | \$482,000 | \$488,000 | \$449,000 |
| THEORY - TOTAL | \$3,147,800 | \$2,610,600 | \$1,624,000 | \$999,000 |
| EXP OPS** - COMMITTED | \$10,952,470 | \$4,053,957 | \$2,255,000 | \$1,867,000 |
| EXP OPS - 2018 Competition | \$8,141,000 | \$8,337,000 | \$8,155,000 | \$229,000 |
| EXP OPS - TOTAL | \$19,093,470 | \$12,390,957 | \$10,410,000 | \$2,096,000 |
| MRS - COMMITTED | \$1,673,000 | \$265,500 | \$0 | \$0 |
| MRS - 2018 Competition | \$717,471 | \$728,955 | \$740,817 | \$0 |
| MRS - TOTAL | \$2,390,471 | \$994,455 | \$740,817 | \$0 |
| TOTAL - COMMITTED | \$15,308,270 | \$6,448,057 | \$3,391,000 | \$2,417,000 |
| TOTAL - 2018 Competition | \$9,625,187 | \$9,547,955 | \$9,383,817 | \$678,000 |
| GRAND TOTAL | \$24,933,457 | \$15,996,012 | \$12,774,817 | \$3,095,000 |
| TOTAL ENVELOPE | \$24,833,911 | \$25,036,331 | \$25,407,251 | \$25,383,651 |
| REIMBURSEMENT from past FY | \$96,588 | \$0 | \$0 | \$0 |
| AVAILABLE | -\$2,958 | \$9,040,319 | \$12,632,434 | \$22,288,651 |

Table 2. Breakdown of multiyear commitments at the end of the 2018 competition. Please note that these amounts do not include any funds allocated to NSERC in the 2018 Federal Budget.

| Subatomic Physics Evaluation Section | | | | | | | | | |
|---|---------------|---------------|---------------|------|------|------|------|------|------|
| Evolution of Envelope's Shares | | | | | | | | | |
| | 2018 | 2017 | 2016 | 2015 | 2014 | 2013 | 2012 | 2011 | 2010 |
| Theory | 12.62% | 13.23% | 14.01% | 15% | 14% | 14% | 14% | 14% | 14% |
| RTI | 1.21% | 1.72% | 2.34% | 1% | 5% | 3% | 3% | 6% | 4% |
| Total Research Ops | 86.17% | 85.05% | 83.65% | 84% | 81% | 83% | 83% | 80% | 82% |
| Exp. Ops | 76.58% | 75.42% | 74.22% | 74% | 71% | 73% | 72% | 68% | 69% |
| MRS | 9.59% | 9.63% | 9.43% | 10% | 10% | 10% | 11% | 13% | 13% |

Table 3. Envelope share in theory, experimental operations, and equipment, 2010-2018.

11. Recommendations to the DAS Program

This is the eleventh year of the Discovery Accelerator Supplements (DAS) program. The present objective of this program is to provide substantial and timely additional resources to researchers who have a superior, established research program that is highly rated in terms of originality and innovation, and who show strong potential to become international leaders within their field. SAPES directly allocates one DAS award. During regular deliberations SAPES members may nominate Individual Discovery grant applicants for a

DAS Supplement following the assessment of the merit criteria. Following the final round, once the competition budget is balanced, all the potential candidates are discussed in detail against the DAS selection criteria and objectives. The members rate each nomination according to how well it meets the objectives of the program on a scale of 1 (very well) to 4 (No Support) through a secret vote, and the nominee(s) are selected by numerical tally of the Section's votes. This year, the quota for SAP DAS awards was one (1), as in recent years.

The DAS program is not intended to support 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; however this option has not been exercised to date.

12. Policy Matters

At the end of the competition, the Evaluation Section and NSERC representatives came together for a session devoted to policy matters. Elizabeth Boston (Director, Mathematical, Environmental and Physical Sciences) and Emily Diepenveen (Team Leader, Physics and Computer Science) attended this session.

Topics discussed during the policy meeting included: the amount of orientation material, the introduction of pre-competition calibration session; the quality and usefulness of Expert Review Reports; the week's deliberations; meeting logistics; the format of Large Project Day.

Orientation conference call

SAPES members confirmed all information presented was necessary. Members recommended breaking up the content into two parts spaced out over a week or two. This would shorten the time on the call and facilitate more discussion with members, as some hesitated to ask questions knowing the amount of material to be covered.

Calibration Session

SAPES members found the calibration session very helpful to ensuring their assessment and recommendations were well aligned with the evaluation criteria and merit indicators. SAPES recommended holding this session 3-4 weeks in advance of competition week.

Project Grid

NSERC presented a set of proposed descriptions for the Merit Criteria ratings: Exceptional, Outstanding, Very Strong, Strong, Moderate and Insufficient specifically for evaluation of Project grant applicants. Members provided feedback by email in the weeks following Competition.

LPD Presentations

SAPES members all agreed that in-person presentations were much more effective than virtual presentations.

Appendix 1



**NSERC
CRSNG**

*Investing in people, discovery and innovation
Investir dans les gens, la découverte et l'innovation*

SUBATOMIC PHYSICS EVALUATION SECTION - 2018

COMPETITION

LARGE PROJECT DAY

**Monday January 29, 2018
Constitution Square
350 Albert Street, Ottawa, Ontario
Room 18-175**

All presenters, including Large Projects, will meet with SAPES *in camera*.

| | | |
|---------------|---|--------------------|
| 9:00 – 9:15 | Committee opening discussion | |
| 9:15 – 9:35 | Meeting with Perimeter Institute | <i>C. Burgess</i> |
| 9:35 – 9:55 | Meeting with SNOLAB | <i>N. Smith</i> |
| 9:55 – 10:15 | Meeting with CFI | <i>O. Gagnon</i> |
| 10:15 – 10:45 | *Coffee Break | |
| 10:45 – 11:15 | Meeting with TRIUMF - joining remotely | <i>R. Kruecken</i> |
| 11:15 – 11:35 | Meeting with IPP | <i>M. Roney</i> |
| 11:35 – 11:55 | Meeting with CINP | <i>G. Huber</i> |
| 11:55 – 13:00 | *Lunch | |
| 13:00 – 13:30 | “Precision measurements with the TITAN ion trap system at ISAC” | <i>J. Dilling</i> |
| 13:30 – 14:00 | “The ATLAS Experiment at the Large Hadron Collider” | <i>P. Krieger</i> |
| 14:00 – 14:30 | “DEAP-3600 Operation and Analysis” | <i>M. Boulay</i> |
| 14:30 – 15:00 | *Coffee Break | |
| 15:00 – 16:30 | Committee policy discussions | |

*Coffee Breaks and Lunch served in Room 18-125

Last updated: Jan 17, 2018