

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 2019-20, including the results of the 2020 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). It is recognized 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 of 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. Five 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, and they have continued to present at Large Project Day since. CFI also continues to recruit NSERC Expert Review Committee and SAPES members for their review committees. These developments are seen as a very positive sign that more contact between the peer-review processes of NSERC and CFI is developing, and interactions since this meeting have continued to build upon and strengthen ongoing coordination.

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 were 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 added to the subatomic physics envelope was phased in over a three year period, with the addition of \$474k in FY 2015, \$632k in FY 2016 and \$790k in FY2017 and ongoing. 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 \$391k in FY 2016, \$762k in FY2017, 1,133k in FY2018, \$1,503k in FY2019 and \$1,874k in FY2020 and ongoing. In *Budget 2018* the Government announced \$354.7M over five years (\$90.1M per year ongoing) to NSERC. The amount allocated to the subatomic physics envelope was \$726K in FY2019, \$1.9M in FY2020. The planned amounts for future years are, \$3.3M in FY2021, and \$3.78M ongoing.

3. Subatomic Physics Evaluation Section Membership

This year's SAPES comprised 12 members, including four theorists. Six new members joined SAPES this year; five Members for full three-year terms and one for a year term. Co-Chairs have been highlighted in the table below.

Name	Institution	Term	Expertise¹
Alex Buchel	University of Waterloo Perimeter Institute	2017-2020	Th. Particle Physics & Strings
Paul Garrett	University of Guelph	2019-2023 <i>2021: Applicant</i>	Exp. Nuclear Physics
Thomas Gregoire	Carleton University	2018-2021	Th. Energy Frontier
Kara Hoffman	University of Maryland	2019-2020	Exp. High Energy Physics
David Hornidge	Mount Allison University <i>Dalhousie University</i> <i>University of Regina</i>	2018-2022 <i>2021: Applicant</i>	Exp. Strongly Interacting Matter (IEP/NP)
Charles Horowitz	Indiana University	2018-2021	Th. Nuclear Astrophysics
Georgia Karagiorgi	Columbia University	2019-2022	Exp. High Energy Physics, Neutrino properties
Alison Lister	University of British Columbia	2019-2022	Exp. Energy Frontier, Dark Sector
Tor Raubenheimer	Stanford Linear Accelerator Center / Stanford University	2019-2020	Exp. Accelerator R&D

Roxanne Springer	Duke University	2019-2022	Th. Nuclear Physics
Magnus Wolke	Uppsala University	2017-2020	Exp. Strongly Interacting Matter & Precision Frontier
Alexander Wright	Queen's University	2019-2022	Exp. Particle Astrophysics

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, Alex Buchel, Kara Hoffman, Magnus Wolke and Tor Raubenheimer for 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 (Program Assistant), Catherine Harrison and Philip Bale (Program Officers), Emily Diepenveen (Team Leader), Andrea Benoit (Deputy Director), Elizabeth Boston (Director, Mathematical, Environmental and Physical Sciences), and Danika Goosney (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 November 12, 2019 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 teleconferenced orientation meeting, competition week is the first and only time per year that Section members meet in-person. 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.

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 2.6 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

typically sought for SAP-RTI or SAP-MRS 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 three *ad hoc* expert reviews were conducted in November and December of 2019. One SAPES Co-Chair 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 applications submitted by the DEAP-3600, ALPHA and nEXO collaborations.

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.

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 Sunday, March 1, 2020. The agenda is found in [Appendix I](#).

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 Director of the CINP and representative from CFI. Collaborations invited to present were DEAP, ALPHA and nEXO.

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, \$5.213M was available for the 2020 competition. This year, SAPES received 57 applications. At the start of competition, the total funds requested for fiscal year 2020 amounted to \$9.445M. Consequently, at that point in the competition, the funding rate for fiscal year 2020 was 55%. For comparison, the funding rates for the years 2009 to 2019 were , 66%, 46% (57% without SNOLAB operations), 61%, 69%, 53%, 52%, 64%, 55% (50% without the Federal Budget 2016 increase), 57%,74%, and 64% respectively.

SUBATOMIC PHYSICS ENVELOPE MULTI-YEAR COMMITMENTS BY CATEGORY Beginning of Competition 2020					
	2020	2021	2022	2023	2024
RTI - COMMITTED	\$138,357	\$0	\$0	\$0	\$0
RTI - 2020 Competition					
RTI - TOTAL	\$138,357	\$0	\$0	\$0	\$0
THEORY - COMMITTED	\$2,441,000	\$1,706,000	\$1,156,000	\$707,000	\$0
THEORY - 2020 Competition					
THEORY - TOTAL	\$2,441,000	\$1,706,000	\$1,156,000	\$707,000	\$0
EXP OPS** - COMMITTED	\$17,005,736	\$8,505,507	\$540,000	\$271,000	\$0
EXP OPS - 2020 Competition					
EXP OPS - TOTAL	\$17,005,736	\$8,505,507	\$540,000	\$271,000	\$0
MRS - COMMITTED	\$2,507,387	\$1,773,715	\$1,400,000	\$1,400,000	\$0
MRS - 2020 Competition					
MRS - TOTAL	\$2,507,387	\$1,773,715	\$1,400,000	\$1,400,000	\$0
TOTAL - COMMITTED	\$22,092,480	\$11,985,222	\$3,096,000	\$2,378,000	\$0
TOTAL - 2020 Competition	\$0	\$0	\$0	\$0	\$0
GRAND TOTAL	\$22,092,480	\$11,985,222	\$3,096,000	\$2,378,000	\$0
TOTAL ENVELOPE	\$27,305,886	\$28,683,651	\$29,159,960	\$29,159,960	\$29,159,960
REIMBURSEMENT from past FY	\$0	\$0	\$0	\$0	\$0
AVAILABLE	\$5,213,406	\$16,698,429	\$26,063,960	\$26,781,960	\$29,159,960

Table 1. Overall budget available as presented before Competition 2020

9. The 2020 Competition

The competition was held in Ottawa over a period of five days, from Monday March, 2 to Friday March 6, 2020. 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 Project Subatomic Physics Discovery Grant applications. Once these reviews were completed, SAPES members were divided into two Sub-Sections: the SAPIN and RTI-1/MRS Sub-Sections. The SAPIN Sub-Section reviewed all the 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 on Wednesday, March 4. 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 \$7.402M had been recommended from the envelope, to be compared to a total of \$5.213M that was available to SAPES, and \$9.445M 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 March 5. The Team Leader presented the results: the revised recommendation by the Section was for \$5.598M from the envelope, compared again with the available sum of \$5.213M.

Round 3 deliberations concluded in the afternoon of Friday, March 6. The Team Leader presented the results: the revised recommendation by the Section was for \$5.331M from the envelope, compared again with the available sum of \$5.213M.

With recommended total funding of \$5.331M from the envelope, and a total request for \$9.445M, the funding rate for this year's competition is 55%.

Additional funds of \$225k subsequently became available at year-end. \$118k was added back to the competition budget based on Round 3 recommendations, leaving \$107k to be carried forward to the 2021 competition.

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 2012 through 2020.

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 endeavors.

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 endeavors 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 endeavors, 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 Post-2020 Comp					
	2020	2021	2022	2023	2024
RTI - COMMITTED	\$138,357	\$0	\$0	\$0	\$0
RTI - 2020 Competition	\$485,006	\$0	\$0	\$0	\$0
RTI - TOTAL	\$623,363	\$0	\$0	\$0	\$0
THEORY - COMMITTED	\$2,231,000	\$1,636,000	\$1,156,000	\$707,000	\$0
THEORY - 2020 Competition	\$857,000	\$877,000	\$877,000	\$877,000	\$877,000
THEORY - TOTAL	\$3,088,000	\$2,513,000	\$2,033,000	\$1,584,000	\$877,000
EXP OPS** - COMMITTED	\$16,990,736	\$8,505,507	\$540,000	\$271,000	\$0
EXP OPS - 2020 Competition	\$3,682,000	\$2,840,500	\$2,378,500	\$258,000	\$258,000
EXP OPS - TOTAL	\$20,672,736	\$11,346,007	\$2,918,500	\$529,000	\$258,000
MRS - COMMITTED	\$2,507,387	\$1,773,715	\$1,400,000	\$1,400,000	
MRS - 2020 Competition	\$307,500	\$301,500	\$305,500	\$75,000	\$75,000
MRS - TOTAL	\$2,814,887	\$2,075,215	\$1,705,500	\$1,475,000	\$75,000
TOTAL - COMMITTED	\$21,867,480	\$11,915,222	\$3,096,000	\$2,378,000	\$0
TOTAL - 2020 Competition	\$5,331,506	\$4,019,000	\$3,561,000	\$1,210,000	\$1,210,000
GRAND TOTAL	\$27,198,986	\$15,934,222	\$6,657,000	\$3,588,000	\$1,210,000
TOTAL ENVELOPE	\$27,305,886	\$28,683,651	\$29,159,960	\$29,159,960	\$29,159,960
REIMBURSEMENT from past FY	\$0	\$106,900	\$0	\$0	\$0
AVAILABLE	\$106,900	\$12,856,329	\$22,502,960	\$25,571,960	\$27,949,960

Table 2. Breakdown of multiyear commitments at the end of the 2020 competition

Subatomic Physics Evaluation Section Evolution of Envelope's Shares									
	2020	2019	2018	2017	2016	2015	2014	2013	2012
Theory	11.35%	13%	13%	13%	14%	15%	14%	14%	14%
RTI	2%	3%	1%	2%	2%	1%	5%	3%	3%
Total Research Ops	86.35%	84%	86%	85%	84%	84%	81%	83%	83%
Exp. Ops	76.01%	74%	77%	75%	74%	74%	71%	73%	72%
MRS	10.35%	10%	10%	10%	9%	10%	10%	10%	11%

Table 3. Envelope share in theory, experimental operations, and equipment, 2012-2020

11. Recommendations to the DAS Program

This is the thirteenth 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), Andrea Benoit (Deputy Director) and Emily Diepenveen (Team Leader, Physics and Computer Science) attended this session.

Recommendations to NSERC included:

- Having a discussion on the possibility of relaxing the Conflict of Interest rules during deliberations, so as to mitigate the movement of members in and out of the room. Members in conflict would not participate in the discussion or vote.
- Having a discussion about the difficulty for accelerator physicists to get funding due to many of them not being in an academic position (i.e. this could affect the training of HQP in that field)
- Looking into increasing the page limit for the HQP description (in part due to the new EDI element that is now required).
- Elaborate the meaning of the reported hours devoted to research (in relation, for example, to FTE) within the program literature.
- The **Merit Indicator Grid** adapted for the evaluation of project grant applications was used for the third time this year. SAPES agreed that this was a valuable tool.
- SAPES members agreed that **in person presentations by applicants** at Large Project Day (LPD) were more effective than virtual presentations.
- Several modifications to formatting/presentation of applications were put forward, to facilitate the reviewing process.
- Members flagged workload issues within SAPES, in particular reviewing applications outside of their area of expertise. This led to NSERC considering the possibility of having 5 voting members on each application, while other members in the room (who are not in conflict) can provide input and add to the discussion. This would be a shift from having all present SAPES members vote on each SAPPJ/SAPMR/SAPEQ application. This suggestion was well received by SAPES.

Appendix I



**NSERC
CRSNG**

Investing in people, discovery and innovation

Investir dans les gens, la découverte et l'innovation

SUBATOMIC PHYSICS EVALUATION SECTION – 2020 COMPETITION

LARGE PROJECT DAY

Sunday, March 1, 2020
NSERC Office – Constitution Square
350 Albert Street, Ottawa, Ontario
Meeting Room 18-125

9:00 – 9:10	Committee meets <i>in camera</i>	
9:10 – 9:15	NSERC President Opening Remarks	
9:15 – 9:35	Perimeter Institute	<i>C. Burgess</i>
9:35 – 9:55	TRIUMF	<i>R. Kruecken</i>
9:55 – 10:15	SNOLAB	<i>N. Smith</i>
10:15 – 10:45	<i>Coffee Break</i>	
10:45 – 11:05	CFI	<i>O. Gagnon</i>
11:05 – 11:25	CINP	<i>G. Huber</i>
11:25 – 11:45	IPP	<i>M. Roney</i>
11:45 – 12:45	<i>Lunch</i>	
12:45 – 13:15	DEAP-3600 – <i>in camera</i>	<i>M. Boulay</i>
13:25 – 13:55	nEXO – <i>in camera</i>	<i>J. Farine</i>
14:05 – 14:35	ALPHA – <i>in camera</i>	<i>M. Fujiwara</i>
14:45 – 15:15	<i>Coffee Break</i>	
15:15 – 16:30	Committee meets <i>in camera</i> – Pre Competition Briefing	