

# **Subatomic Physics Grant Selection Committee (GSC-19) Annual Report**

**Howard Trottier, Chair GSC-19  
Simon Fraser University  
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## **I. Introduction**

This report summarizes the activities of the subatomic physics (SAP) Grant Selection Committee (GSC-19) in fiscal 2008-09, and includes the results of the February 2009 competition. The report is provided for information to the NSERC Committee on Grants and Scholarships, and to the Canadian subatomic physics community. The format of the report largely follows the summaries from previous years.

GSC-19 is unique among NSERC Grant Selection Committees since it operates within an annual budget envelope. Individual and Group Discovery, Project, Research Tools and Instruments (RTI), and Major Resources Support (MRS) grant applications in subatomic physics are evaluated together by GSC-19. 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 SAP program. The envelope structure also helps GSC-19 to attempt to maintain an appropriate balance between operations and capital investments. Moreover, the community's priorities as established in five-year Long Range Plans (the latest in 2006) provide important guidance to the Committee's deliberations throughout the process.

Another unique strength of this GSC is the extent to which it solicits reviews by international experts of the highest calibre. All major group, project and equipment 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 on-site scientific, technical, and budgetary evaluations, and produce detailed written reports which provide exceptionally valuable input to the GSC for its assessment of the grant applications. Moreover, GSC-19 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 the GSC is itself substantially international, with half or more of its members generally coming from institutions in the US and Europe. This level of international review provides an exceptionally high-degree of scrutiny and validation of the research funded by this GSC.

Despite the internationally-recognized excellence of Canadian SAP research, and the unique strengths of the GSC-19 envelope structure and review processes, it is becoming increasingly difficult for this Committee 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. This is due in large part to the fact that the GSC-19 budget has essentially remained flat since many years, while at the same time the SAP community has been extremely successful in its achievements on the international stage and in attracting many new, high-calibre researchers, who are naturally attracted by the excellence of the community and its attendant successes.

The budgetary pressure, which GSC-19 faced in the 2009 competition, was perhaps unprecedented in its nature. Many major research projects supported by the community in its recent Long Range Plans are at the start of their operating phases, and require substantial operating funds to reap the scientific dividends that have been sown by the major capital and R&D investments that have already been made by NSERC, and to a lesser extent by other federal and provincial organizations.

Governments and their funding agencies should recognize the urgent need to protect and exploit the considerable investments they have already made. One can justifiably state that the Canadian SAP program will become a victim of its own excellence, if in fact that time is not already at hand, unless the necessary additional operating funds are secured. The internationally-recognized excellence of the Canadian SAP community, and the unique strengths of the GSC-19 envelope, ensure that additional investments in this area will yield exceptionally high returns in cutting-edge knowledge and highly-qualified personnel training.

## **II. Update on the Envelope Funding**

The pressure on the Committee's funding envelope has been building for the last several years. In particular, substantial investments by federal and provincial government funding agencies have annually injected funds into the SAP program of as much as 50% of the entire GSC-19 envelope (this includes substantial capital investments from CFI and various agencies of the Ontario government, but does *not* include 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.

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. Since the 2006 Long Range Plan was released, new funds were allocated to NSERC by the federal government in the 2007 and 2008 budgets, but were specifically provided for clearly targeted priority areas which did not include SAP. Funding reductions to NSERC were announced in the fiscal 2009

budget, with an eventual steady-state cut of approximately 3.5% to be reached over the next three years. Although “core” areas, presumably including SAP, are not supposed to be directly affected by these cuts, the potential impact of the phasing out and refocusing of affected programs on the SAP community remains to be understood.

The scenario of a flat envelope is thoroughly analyzed in the 2006 LRP, with the conclusion that growth trends in SAP cannot be maintained in this situation. In particular, given that operations costs over the lifetime of a facility are comparable to the initial capital investments, and with substantial capital coming from outside the envelope, it is clear that an operations crisis in SAP looms, unless significant new sources of funds are secured. This year’s competition provides a clear demonstration that undesirable pressures on the scientific return on past investments are already being forced on the community (thus also reducing the opportunities for HQP training made possible by recent investments), with so many of the community’s top projects now reaching their operations phase, and without sufficient operations funds being available.

The announcement of substantial new funding for the CFI in the fiscal 2009 budget will bring additional opportunities for capital investments in many areas. Given the excellence of the SAP program, one can anticipate substantial new capital funds to flow into the community from outside the envelope. This situation is both a blessing and a curse, with the SAP community poised to face even greater future challenges to the management of its operations.

As a final note with respect to the GSC-19 envelope, in the fall of 2007 NSERC initiated a process, in collaboration with other funding partners, to provide a one-time interim and exceptional financial support towards the operating costs of two key major international initiatives. SNOLAB was one of the two initiatives considered for this exceptional interim support, and received operations funding for fiscal years 2007-08 and 2008-09. This support came from a combination of NSERC, CFI, and provincial sources, with NSERC funds coming from *outside* GSC-19’s envelope. With this exceptional federal funding closing out at the end of fiscal year 2008-09, SNOLAB applied to GSC-19 in this year’s competition with a one-year MRS proposal to cover a portion of its operations for fiscal year 2009-10, during which time the facility would continue to pursue a permanent solution to its operations funding from outside the envelope. The funds sought under this MRS proposal would also satisfy a requirement for SNOLAB to obtain federal funds to complete the matching of provincial monies committed by the government of Ontario.

### **III. Committee**

This year GSC-19 was again comprised of 12 members, including 3 theorists. Four new Committee members came on board this year; they are David Hanna (McGill University), David Kirkby (University of California, Irvine), Wolfgang Lorenzon (University of Michigan), and Moshe Rozali (University of British Columbia). The Committee’s full membership is given below.

The Chair would like to acknowledge the very demanding task faced by the Committee throughout the year, up to and through competition week. Very long hours of deliberations ensured that each proposal was fairly and consistently evaluated according to the selection criteria. The professionalism and dedication of the Committee are manifest in the quality of its recommendations, which equalled the challenges it faced this year. The Chair also wishes to acknowledge the good humour, warm feelings, and hearty toasts expressed at the traditional end-of-competition supper, which he hopes will be a lasting source of good memories for all involved!

It is a special pleasure for the Chair to thank NSERC staff and leadership for their expert guidance and help in the months leading up to the competition, and during the many long days of competition week: Michèle Beaudry (Program Officer), Samir Boughaba (Team Leader), Jean-Claude Kieffer, Director, Institut National de la Recherche Scientifique - Énergie, Matériaux et Télécommunications (NSERC Group Chair for Physics), and Isabelle Blain (Vice-President, Research Grants & Scholarships), who joined the Committee for several important discussions. The Chair wishes to extend his special gratitude to Jean-Claude, who attended most of our competition sessions, and provided much valued advice at several critical junctures in the process. Finally, the Chair wishes to express his highest regards and warmest appreciation to Sam for his extraordinary professionalism and exceptionally wise counsel throughout the 2008-09 competition year; the Chair is loath to imagine the outcome of the process if Sam had not been there to inform, to advise, and to guide.

<b>Name</b>	<b>Organization</b>	<b>Final Year</b>
Juha Äystö	University of Jyväskylä	(2010)
Cornelius Beausang	University of Richmond	(2009)
Sacha Davidson	Institut de Physique Nucléaire de Lyon	(2010)
David Hanna	McGill University	(2011)
Garth Huber	University of Regina	(2010)
David Kirkby	University of California, Irvine	(2011)
Greg Landsberg	Brown University	(2009)
Michel Lefebvre	University of Victoria	(2010)
Wolfgang Lorenzon	University of Michigan	(2010)
Moshe Rozali	University of British Columbia	(2011)
Kate Scholberg	Duke University	(2010)
Howard Trottier ( <i>Chair</i> )	Simon Fraser University	(2009)

#### **IV. Policy Meeting and Site Visits**

Each year, the Committee launches its operations at a one-day policy meeting in which news from NSERC, including a detailed review of the budget, is communicated to the members. This is also a critical opportunity for the new members to familiarize themselves with NSERC and GSC-19 operating procedures, and to be informed of the process leading to competition week. The policy meeting for this competition was held in

Waterloo on Sunday October 26, 2008, and required a full working day of presentations by the Chair and Program Officer, and discussions amongst Committee members (all of whom but one returning member attended).

Following the policy meeting, it is a tradition for GSC-19 to visit Canadian institutions with subatomic physics research programs on a 3-year rotation basis. The visits are conducted for informational purposes only and are not a part of the grant evaluation process. They provide opportunities to communicate information about NSERC and the review process to researchers, while the Committee members hear presentations about the researchers' activities and learn first-hand about their infrastructure and environment. The learning process that accompanies these visits is particularly important considering the large number of GSC-19 members affiliated with non-Canadian research institutions. These visits are 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 to GSC-19.

This year, the Committee visited the Perimeter Institute on October 27, and then embarked on a tour of Prairie institutions. On October 28, the Committee was hosted at the University of Manitoba, where it also met with groups from the University of Winnipeg and Brandon University. On October 29, the Committee was hosted at the University of Regina, where it also met with a group from the University of Saskatchewan. The tour closed on October 30 with a visit to the University of Alberta.

At each visited institution, the meeting first began with presentations by the Chair, who summarized the discussions at the policy meeting and provided information on the evaluation process of grant applications. Michèle Beaudry then provided the audience with recent news from NSERC. Subsequently, the Committee met with the local administration, typically at the level of the Department Chair, Vice-President for Research, or Dean for Research, and was allotted time to interact with students and post-docs involved in NSERC-supported research. These visits provided the Committee with an extremely valuable context about research realities at each institution and allowed many informal interactions with the entire spectrum of personnel. Although necessarily fast-paced and intense, these visits are a very precious source of information about the research environment in which Canadian researchers operate and the local support or constraints they may have. An informal summary on each visit was prepared by Canadian members of the Committee. These reports are available for future Committees to consult. Since these visits are informational and not, in any way, used as part of any grant evaluation, these summaries are for internal use only.

## **V. Pre-Review Process**

When the Form 180s (Discovery – Individual, Group, Project) and Form 181s (for MRS) are received, each application is assigned by the Chair to first and second internal reviewers, who are Committee members with the most appropriate expertise, and with careful consideration of balancing the full workload among all of the members. In the case of Form 180s, the first reviewer is then required to recommend five external referees for each of his/her assigned applications. 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.

## **VI. Chairs' Meeting and GSC Structure Review Meeting**

The annual Chairs' meeting was held in Ottawa on Sunday November 23, 2008. In this meeting, each GSC Chair reviews all of the applications to his/her GSC to ensure that (i) each application has a suitable set of external reviewers and (ii) each application is being reviewed by the most appropriate GSC. There are usually only a few applications that fall at the boundary between GSC-19 and other Committees. In any such case, a meeting involving the Chairs of GSC-19 and the alternate GSC, the Group Chair(s), and the NSERC Team Leader(s) and Program Officer(s) is convened. A decision on which GSC should review the application is made based on an assessment of which Committee has the most relevant expertise. This year, there were two such consultations, but no application was moved into or out of GSC-19. As usual, various other tasks were carried out during the meeting. The list of external referees was finalized and the list of grant applications needing a site visit was established. The Chair identified the participants to be invited to make a presentation at Large Project Day and organized the preliminary agenda for it.

The Chair also attended the GSC Structure Review Meeting which was held in Ottawa on Thursday December 4, 2008. While the GSC restructuring process will have essentially no impact on the operation of GSC-19, which will preserve its present envelope structure and review procedures, the Chair felt it worthwhile to attend this meeting so as to keep informed of these major changes at NSERC.

## **VII. Review Committees**

Six large grant applications in this year's competition were subject to site visits by *ad hoc* or standing Committees of internationally-recognized experts in each area. An engineering review of the currently supported SNO+ project was also conducted. Such reviews generally last one-to-two days, and each Committee is generally charged with making thorough scientific, technical, and budgetary analyses of the proposal before it. These analyses go well beyond what is possible by review of only the written

applications. The Committees hear detailed presentations by the researchers, who are exhaustively questioned about all relevant aspects of the proposal. Full reports with recommendations, including budget recommendations, were prepared for the GSC. The reports, without the budget recommendations, were sent by NSERC to the project collaborations prior to Large Project Day (LPD), and formed the basis of detailed questions that were submitted by the GSC to each collaboration that was invited to LPD.

The seven reviews in fiscal year 2008-09 were, in chronological order: the engineering review of SNO+ (September 5, 2008 in Edmonton); the ATLAS Project and MRS proposals (November 14-15, 2008 at TRIUMF); the T2K Project and RTI proposals (December 8-9, 2008 at TRIUMF); the Gamma-Ray Spectroscopy at ISAC Group grant request (December 11-12, 2008 at TRIUMF); the DEAP/CLEAN Project proposal (December 19, 2008 in Kingston); the SNOLAB MRS request (December 20, 2008 in Kingston); and the EXO Project and RTI proposals (January 8-9, 2009 in Ottawa).

The GSC Chair attended all of these reviews as an *ex officio* member, and GSC member Cornelius Beusang served as a full member of the Gamma-Ray Spectroscopy at ISAC review. The Chair also attended a meeting of the Advisory Committee on TRIUMF (ACOT) on March 13-14, 2009 at TRIUMF (the usual November meeting of ACOT was not held this year, due to ongoing preparations by TRIUMF of its new five-year plan).

## **VIII. Large Project Day**

It has proved extremely useful to devote one day prior to the beginning of the competition to presentations by the Principal Investigators of projects requesting grants of an average of \$500K per year or more. This is referred to as Large Project Day (LPD). It is also now customary to meet on LPD with management representatives from the Institute of Particle Physics (IPP), the Perimeter Institute, SNOLAB, and TRIUMF. This year, for the first time, a representative of the recently established Canadian Institute of Nuclear Physics (CINP) was also invited to make a presentation, which was done in the public part of the day, given that the CINP itself had an MRS proposal before the Committee. LPD was held this year in Ottawa on Sunday February 1, 2009. The agenda is attached as Appendix 1.

The day began with *in camera* presentations by Robert Myers (representing the Perimeter Institute's newly-appointed Director Neil Turok), William Trischuk (Director of the IPP), and Jean-Michel Poutissou and Gordon Ball (TRIUMF's outgoing and incoming Scientific Directors, respectively). They provided the Committee with the perspective of the communities served by their organizations. Principal Investigators then made presentations and answered questions previously submitted by the GSC; this was done in an open session that was attended by about 20 members of the community. The invited projects were, in order of presentation, the CINP, SNOLAB, T2K, ATLAS, Gamma-Ray Spectroscopy at ISAC, EXO, and DEAP/CLEAN.

During LPD, important information was provided by Dr. Anthony Noble, Director of SNOLAB, during his public presentation. First, Dr. Noble presented a revised amount as the new request to ensure SNOLAB's full operation in FY2009-10. He then indicated that it was possible that a significant portion of the operations funds requested by SNOLAB in its MRS grant request (and which were also required to be obtained from federal sources in order to match government of Ontario commitments to the facility's fiscal 2009 operations) might come from an approved CFI Infrastructure Operating Fund (IOF) grant related to the Cryopit. Taking into account the advances in completing the Cryopit, Dr. Noble reported that SNOLAB had requested from the CFI to release these funds by summer 2009, and that a decision on this request might come within the following few days. Dr. Noble further indicated that any monies so committed by the CFI would be subtracted from the SNOLAB MRS request to GSC-19.

At the end of the day, the Committee had an *in camera* session with Isabelle Blain who updated the Committee on the on-going GSC Structure Review, and who heard concerns of GSC-19 members regarding the financial challenges faced by the envelope in general and in this competition in particular. Ms. Blain assured the members that the Committee would be kept apprised of any developments on the request for early release of CFI IOF monies for SNOLAB operations, but could not offer any guarantees at that point as to what the outcome of that request would be, or when CFI's response would come.

## **IX. Beginning of the Competition**

The funds available to the Committee at the beginning of the competition are shown in Table 1. The base budget from year to year maintains a flat profile, and no new funds have come into the envelope since fiscal year 2007-08. In particular, there was no addition of funds for new applicants who entered the envelope in either fiscal 2008-09 or 2009-10, while the amount generated by the 2002 Reallocations exercise flat-lined in fiscal 2007-08, which was the last year of the implementation of the results of that exercise.

An amount of \$300K was subtracted from the envelope for fiscal 2009 as part of the reimbursement to NSERC of the \$1.5M payment towards ATLAS' Cost-to-Completion in 2005. There was a carry-forward of \$102K from last year's competition into this year's budget prior to the competition, while \$27K was received due to an RTI budget adjustment from 2008-09 year-end funds.

Taking into account on-going commitments from previous competitions, \$11.802M was available for the 2009 competition (52% of the envelope). This year, GSC-19 received 57 applications. At the start of competition week, taking into account the revised budget request by SNOLAB, the total funds requested for fiscal 2009 amounted to \$20.483M.

## 2009 Competition - Subatomic Physics Envelope Budget

### Beginning of Competition (February 2, 2009)

*(millions of dollars)*

Budget Item	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
<b>Base Budget</b>	20.665	20.665	20.665	20.665	20.665	20.665
<b>Cumulative Permanent Additions:</b>						
New Applicants <sup>1</sup>	1.622	1.622	1.622	1.622	1.622	1.622
Reallocations <sup>2</sup>	0.459	0.459	0.459	0.459	0.459	0.459
Transfers <sup>3</sup>	0.064	0.064	0.064	0.064	0.064	0.064
<b>Temporary Transfers:</b>						
ATLAS Cost-to-Completion	0.075	-0.300	-0.300	-0.300	0.000	0.000
SRO Contribution	0.000	0.000	0.000	0.000	0.000	0.000
Forward-Borrow	1.200 <sup>4</sup>	0.000	0.000	0.000	0.000	0.000
Miscellaneous		0.075 <sup>5</sup>				
<b>Total Fiscal Year</b>	24.211	22.666	22.510	22.510	22.810	22.810
<b>Actual Spending</b>	24.572	22.667				
<b>Carry-forward<sup>6</sup></b>	0.103	0.102				
<b>Commitments</b>			-10.838	-5.452	-3.412	-2.384
<b>RTI budget adjustment<sup>7</sup></b>	0.126	0.081	0.027			
<b>Available for Competition</b>			<b>11.802</b>			

<sup>1</sup> There is no allocation of new funds for new applicants for the 2008 competition.

<sup>2</sup> FY 2007/08 was the last year for the 2002 reallocations exercise.

<sup>3</sup> \$64,000 were added to the envelope as a result of the \$1M increase to the general MRS budget (6).

<sup>4</sup> The reimbursement of the forward-borrowed amount of \$1.2M in FY 2007-08 is cancelled. This is the result of NSERC's decision to exceptionally contribute to the interim support of SNOLAB's operation for FY 2007-08 and FY 2008-09, alongside funding partners.

<sup>5</sup> This payment to the envelope relates to the fact that, following an ad hoc review alongside funding partners, NSERC is exceptionally contributing to the interim support of SNOLAB's operation from outside the envelope for FY 2007-08 and 2008-09. The entirety of the 2007 SAPMR grant to SNOLAB (\$1.275M) was paid back to the envelope (cancellation of the 4 payments of \$300K/year from the envelope to reimburse the forward-borrowed amount of \$1.2M, plus a one-time contribution of \$75K to the envelope in 2008).

<sup>6</sup> 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.

<sup>7</sup> The RTI budget adjustment is made using year-end funds. This amount may change up to March 31, 2009.

Table 1. Overall budget available at the beginning of the 2009 competition.

Consequently, at that point in the competition, the projected average funding rate for fiscal 2009 was 58%. For comparison, the funding rates for the years 2003 to 2008 were 58%, 55%, 58%, 60%, 55%, and 66%.

While the funding rate did not appear to be unusually low, another measure of the difficulty of this year's competition is that, at the start of competition week, the funds requested from just the four largest operations grant requests exceeded the total competition budget. By any measure, it was clear to the Committee that this would be an exceptionally challenging competition.

## **X. The 2009 Competition**

The competition was held in Ottawa over a period of five days, from Monday, February 2 to Friday, February 6, 2009. The first day started with a review of logistics, policies, and procedures, and a presentation of the budget as outlined in the previous section. The Committee 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 the Committee's internal procedures. Previously, in the fall of 2008, at least two Committee 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 (rating, funding, duration). This was followed by additional comments and/or a presentation by the second internal reviewer, who also made recommendations. These in-depth reviews were carried out independently by the two 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 site visit reports where applicable. Each application was then thoroughly discussed by the entire Committee. 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) excellence of the proposal, (iii) contribution to the training of HQP, and (iv) need for funds. The Committee 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 recommendation of the Committee. Members in conflict with any particular application left the meeting room before it was discussed, and were never informed, even by the end of the competition, of the final result.

Once the Committee completed the review of the experimental individual, Group, Project and RTI (typically Categories 2 and 3, i.e., larger than \$150K in total) and MRS (typically larger than an average of \$500K per year) proposals, it was divided into two sub-committees: a theory one and an RTI/MRS one. The theory sub-committee reviewed all the theory individual grant applications. The RTI/MRS sub-committee reviewed the RTI - Category 1 (smaller than \$150K in total) grant requests, as well as the MRS grant applications requesting an average of less than \$500K per year.

As usual, it was strictly forbidden for the GSC 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. Moreover, in order to ensure the integrity of the process, applications could be flagged by any Committee member, the Program Officer, or Team Leader, at any time in Round 1, if he/she felt that some aspects of the discussion or the recommendation necessitated further discussion.

The Round 1 deliberations concluded in the morning of Thursday, February 5. At this point the Team Leader made a presentation to the Committee on the budget, taking into account the sum of the recommended awards for all the applications. The result was that a sum of \$14.984M had been recommended, to be compared to a total of \$11.802M that was available to the Committee, and \$20.483M in requested funds. Despite the application of the most exacting standards of scientific merit and need for funds, the Committee had spent \$3.182M more than the allowed budget.

At this time, the Team Leader also followed up on Isabelle Blain's commitment to keep the Committee apprised of any developments on the request for early release of CFI IOF monies for SNOLAB operations. The Team Leader presented the Committee with an excerpt from an e-mail from Jac van Beek, Vice President of CFI, to Isabelle Blain stating that upon completion of the construction phase of the CFI Cryopit project, the IOF funding can be accessed for eligible operating and maintenance expenses, and that the funds are now available for any eligible expenses that are being incurred prior to finalization of the construction. SNOLAB's management received this e-mail as well.

After discussion, the Committee concluded that the e-mail from Jac van Beek, together with assurances from the Director of SNOLAB on LPD about the facility's intention to reduce its MRS request by the amount of the CFI IOF in case of a release during fiscal year 2009-10, were sufficient for the Committee to deem that the SNOLAB MRS request would henceforth be regarded as having in fact been reduced by a corresponding amount.

Prior to the start of Round 2, a thorough discussion took place to establish the guiding principles for re-evaluation of all proposals in an attempt to balance the Committee's budget. The Committee was 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 Committee'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 (secret electronic vote).

At the start of the last day of the competition, Friday, February 6, the Team Leader presented the results of the Round 2 deliberations. The revised recommendation by the Committee was for \$12.398M in funding, compared again with the available total of \$11.802M, for a shortfall of \$596K. A proposal was made to forward borrow \$600K to cover this shortfall, and several approaches for the eventual reimbursement of this amount were assessed. The Team Leader also reviewed the distribution of the

recommended budget at that point amongst theory, operations, and equipment grants, and presented an outlook for the 2010-11 competition budget.

The Committee also considered whether to conduct a comprehensive Round 3 review of all proposals, to see if the shortfall could be further reduced. After much discussion, the Committee unanimously agreed that it was not reasonable to attempt to make further reductions after the thorough and exhaustive efforts already made. The Committee agreed unanimously to recommend a forward borrow of \$600K to cover the shortfall in its Round 2 funding recommendations, and further to recommend that the forward borrow be reimbursed in equal amounts of \$150K per year, for four years, beginning in fiscal year 2010-11. With a recommended total funding of \$12.398M and revised requested for fiscal year 2009-10 of \$18.783M, the funding rate for this year's competition is 66%.

## **XI. End of Competition Results**

The Committee's final multiyear budget levels are shown in Table 2, which includes a post-competition adjustment of \$39K as a carry-forward into fiscal 2009, owing to on-going instalment for 2009 which has been deferred to 2010. Table 3 shows a multiyear breakdown of theory, experimental operating, MRS, and capital allocations, while Table 4 gives the percentage share of the envelope in theory, operations, and equipment over the period from 2006 through 2009.

These figures provide quantitative measures of what could reasonably be characterized as a funding crisis, one which has loomed over the SAP community for several years, as forecast in the 2006 Long Range Plan, and which is also described at the beginning of this report.

Indeed, the Committee took full note in Rounds 2 and 3 that its recommendations would result in a substantial increase in the operations fraction of the envelope while not allowing for any carry-forward that may be used for capital expenditures in future competitions. In the Committee's opinion, it is less this year's equipment fraction of the envelope that is a concern, but rather the fact that the outlook for the 2010 competition indicates that the competition budget (around \$6M) will be about the size of all the returning operating grant applications (Individual, Project, Group). A shift towards the CFI for major capital equipment has been observed over the recent past. Again, this year, most major capital needs of the community have been submitted to the current CFI competition. If this additional source of funding is welcome, it is important to highlight the fact that it will in turn generate increasing pressure on the envelope as the latter is the main funding source in support of research and operating costs. Moreover, while the pressure on the envelope due to capital requests was reduced this year, it is clear that the need for capital investments by GSC-19, including for proposals that fall outside the mandate of the CFI, will increase again in the coming years. In particular, funds from GSC-19 will be needed for the R&D efforts essential to the future of Canadian SAP, and to satisfy the capital needs of the smaller programs that are essential to the breadth of the community.

**2009 Competition - Subatomic Physics Envelope Budget**

**Post-Competition (March 18, 2009)**

<i>(millions of dollars)</i>							
<b>Budget Item</b>	<b>2007-08</b>	<b>2008-09</b>	<b>2009-10</b>	<b>2010-11</b>	<b>2011-12</b>	<b>2012-13</b>	<b>2013-14</b>
<b>Base Budget</b>	20.665	20.665	20.665	20.665	20.665	20.665	20.665
<b>Cumulative <u>Permanent</u> Additions:</b>							
New Applicants <sup>1</sup>	1.622	1.622	1.622	1.622	1.622	1.622	1.622
Reallocations <sup>2</sup>	0.459	0.459	0.459	0.459	0.459	0.459	0.459
Transfers <sup>3</sup>	0.064	0.064	0.064	0.064	0.064	0.064	0.064
<b>Temporary Transfers:</b>							
ATLAS Cost-to-Completion	0.075	-0.300	-0.300	-0.300	0.000	0.000	0.000
SRO Contribution	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Forward-Borrow	1.200 <sup>4</sup>	0.000	0.600	0.000	0.000	0.000	0.000
Miscellaneous		0.075 <sup>5</sup>					
<b>Total Fiscal Year</b>	24.211	22.666	23.239	22.510	22.810	22.810	22.810
<b>Actual Spending</b>	24.572	22.667	23.200				
<b>Carry-forward<sup>6</sup></b>	0.103	0.102	0.039				
<b>Commitments RTI budget adjustment<sup>7</sup> Available for Competition</b>	0.126	0.081	0.027	-16.311	-11.771	-3.120	-0.739

<sup>1</sup> There is no allocation of new funds for new applicants for the 2008 competition.

<sup>2</sup> FY 2007/08 was the last year for the 2002 reallocations exercise.

<sup>3</sup> \$64,000 were added to the envelope as a result of the \$1M increase to the general MRS budget (6.4%

<sup>4</sup> The reimbursement of the forward-borrowed amount of \$1.2M in FY 2007-08 is cancelled. This is the result of NSERC's decision to exceptionally contribute to the interim support of SNOLAB's operation for FY 2007-08 and FY 2008-09, alongside funding partners.

<sup>5</sup> This payment to the envelope relates to the fact that, following an ad hoc review alongside funding partners, NSERC is exceptionally contributing to the interim support of SNOLAB's operation from outside the envelope for FY 2007-08 and 2008-09. The entirety of the 2007 SAPMR grant to SNOLAB (\$1.275M) was paid back to the envelope (cancellation of the 4 payments of \$300K/year from the envelope to reimburse the forward-borrowed amount of \$1.2M, plus a one-time contribution of \$75K to the envelope in 2008).

<sup>6</sup> 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 2009 competition.*

**2009 COMPETITION  
MULTI-YEAR COMMITMENTS BY CATEGORY**

**POST-COMPETITION (March 18, 2009)**

	2009	2010	2011	2012	2013
EQ - COMMITTED*	\$1,116,000	\$774,000	\$474,000		
EQ - NEW (2009 Competition)	\$677,601	\$30,000			
<b>EQ - TOTAL</b>	<b>\$1,793,601</b>	<b>\$804,000</b>	<b>\$474,000</b>		
THEORY-COMMITTED	\$2,755,000	\$1,891,000	\$1,107,000	\$630,000	
THEORY - NEW (2009 Competition)	\$772,000	\$732,000	\$712,000	\$577,000	\$577,000
<b>THEORY - TOTAL</b>	<b>\$3,527,000</b>	<b>\$2,623,000</b>	<b>\$1,819,000</b>	<b>\$1,207,000</b>	<b>\$577,000</b>
EXP OPS** - COMMITTED	\$4,937,500	\$929,000			
EXP OPS - NEW (2009 Competition)	\$10,238,000	\$9,674,000	\$7,241,000	\$15,000	\$15,000
<b>EXP OPS - TOTAL</b>	<b>\$15,175,500</b>	<b>\$10,603,000</b>	<b>\$7,241,000</b>	<b>\$15,000</b>	<b>\$15,000</b>
MRS - COMMITTED	\$2,294,000	\$2,193,340	\$1,831,195	\$1,753,932	
MRS - NEW (2009 Competition)	\$710,000	\$388,000	\$406,000	\$144,000	\$147,000
<b>MRS/MFA - TOTAL</b>	<b>\$3,004,000</b>	<b>\$2,581,340</b>	<b>\$2,237,195</b>	<b>\$1,897,932</b>	<b>\$147,000</b>
<b>TOTAL - COMMITTED</b>	<b>\$11,102,500</b>	<b>\$5,787,340</b>	<b>\$3,412,195</b>	<b>\$2,383,932</b>	
<b>TOTAL - NEW (2009 Competition)</b>	<b>\$12,397,601</b>	<b>\$10,824,000</b>	<b>\$8,359,000</b>	<b>\$736,000</b>	<b>\$739,000</b>
<b>GRAND TOTAL</b>	<b>\$23,500,101</b>	<b>\$16,611,340</b>	<b>\$11,771,195</b>	<b>\$3,119,932</b>	<b>\$739,000</b>
<b>TOTAL ENVELOPE</b>	<b>\$22,939,169</b>	<b>\$22,810,051</b>	<b>\$22,810,051</b>	<b>\$22,810,051</b>	<b>\$22,810,051</b>
<b>ADJUSTMENT (FORWARD BORROW/REIMBURSEMENT)</b>	<b>\$600,000</b>	<b>-\$150,000</b>	<b>-\$150,000</b>	<b>-\$150,000</b>	<b>-\$150,000</b>
<b>CARRY FORWARD (2009) / AVAILABLE</b>	<b>\$39,068</b>	<b>\$6,087,779</b>	<b>\$10,888,856</b>	<b>\$19,540,119</b>	<b>\$21,921,051</b>

\* The committed amount for equipment includes the \$300,000 to be paid by the envelope to NSERC's main RTI program as a reimbursement of the payment NSERC made towards ATLAS' Cost-to-Completion. Up to FY 2010-11.

\*\* EXP OPS = Experimental Operations

*Table 3. Breakdown of multiyear commitments at the end of FY2008-09.*

**2009 COMPETITION  
ENVELOPE SHARE - OPERATIONS / THEORY / EQUIPMENT**

	2006	2007	2008	2009
<b>THEORY</b>	14%	13%	15%	15%
<b>OPERATIONS</b>	71%	72%	69%	77%
<b>EQUIPMENT</b>	15%	15%	16%	8%

*Table 4. Envelope share in theory, operations, and equipment, from 2006 to 2009.*

## **XII. Recommendations to the NSERC DAS Committee**

This is the third year of the Discovery Accelerator Supplements (DAS) program. The objective of this program is to provide substantial and timely resources to outstanding researchers who have a well-established research program, and who show strong potential to become international leaders in their respective area of research. These additional resources are allocated when progress of the incumbent's research program is held back by insufficient funding. For this year's competition, GSC-19 could put forward only one candidate to the DAS program (in 2007 only one nomination was solicited, while in 2008 three nominations were permitted – in both years, one DAS was awarded to a nominee from SAP). During the deliberations, once the recommendations were made, Committee members could put forward applicants. All the potential candidates were discussed at the end of Round 3, and one candidate was selected by numerical tally of the Committee's votes.

The DAS program is not aimed at Project grants. As indicated in last year's annual report, a procedure is now available for any member of a Collaboration submitting a Project grant to be considered by GSC-19 for the DAS program. This year, no individuals were put forward by the Collaborations that submitted Project grant applications.

## **XIII. Policy Matters**

At the end of the competition, the Committee had a session devoted to policy matters. Some of the key points that arose are summarized below.

### **Total Resources**

The Canadian SAP community is victim of its own successes on the world stage. The organization of the community and its ability to set its priorities during its five-year plans have allowed for focused efforts on endeavors in which Canadian researchers are making internationally-recognized contributions. In particular, following major and targeted investments made by NSERC in areas identified in past Long Range Plans, Canadian researchers are strongly contributing to unique projects, most of which are now reaching their operations stages and require continuous and increasing financial support in order to reap the scientific benefits and train the next generation of scientific leaders and highly qualified personnel. On this basis, and taking into account the fact that NSERC's SAP envelope has not seen any substantial increase over the years, the Committee faces the necessity to further increase the current operations share of the envelope at the expense of its ability to potentially support new capital investments and initiatives.

The presence of the CFI as an additional source of funding is allowing the community to secure new funds to build and expand world-class research infrastructure and equipment.

The community is aware of the opportunities offered by the CFI, and it is increasingly making use of them. If this indeed lessens the pressure on NSERC's SAP envelope in terms of capital expenditures, it further exacerbates the pressure with respect to operating needs. At the same time it is essential that sufficient capital funds be available within the GSC-19 envelope, in order to fund R&D efforts critical to future successes, and to provide the capital required by smaller programs essential to the breadth of Canadian SAP. The Committee urges NSERC and CFI to make operating funding available at a level that will allow for the maximum scientific return on the substantial capital and personnel investments that have already been committed by these agencies, and the new capital funds that are likely to be invested in SAP. Moreover, the Committee recommends a more coordinated approach between the two agencies with respect to funding of major SAP endeavours (e.g., joint assessment of capital and operating needs at the earliest possible stage).

### **RTI Funding**

The community is once again urged to continue making every effort possible to remove *major* equipment items from Project grant requests and submit them as separate RTI grant applications. Such a distinction facilitates the GSC's task in its efforts to fairly assess all applications according to the relevant selection criteria and to accurately keep track of the capital and operating fractions of the envelope.

### **Fall Site Visits**

The Committee once again lauded the objective and value of the fall site visits, which provide an exceptional venue for all the members to meet the Canadian community and see first-hand the conditions in which they are working. The visits benefit both the GSC members and the visited institutions. The Committee will be visiting British Columbia's institutions in the fall of 2009.

### **Discovery Accelerator Supplements Program**

As discussed in the annual reports from the past two years and in Section XII above, a mechanism has been established for experimentalists who are applicants or co-applicants on Project grants to be potentially considered by the Committee as candidates for the DAS program. The mechanism was detailed in last year's annual report. In this year's competition, no individuals were put forward by the Collaborations that submitted a Project grant application. The Committee again reminds the community of the existence of such a mechanism.

### **CREATE**

The Committee would like to bring to the attention of the community the existence of a new NSERC program called Collaborative Research and Training Experience (CREATE). The objectives of this program include: to encourage collaborative and integrative approaches to the training of highly-qualified personnel; enhancing the

acquisition and development of professional skills among undergraduate and graduate students, and postdoctoral fellows; and to enhance the mobility of students in national and international facilities. Successful proposals can receive funds of up to \$150K in the first year of the grant, and up to \$300K annually in subsequent years, with at least 80% of the grant to be applied to trainee stipends.

## **Appendix 1**

## Subatomic Physics Grant Selection Committee 2009 Competition Large Project Day

**Sunday, February 1, 2009  
Laurier Room (Lower Level)  
Marriott Hotel, 100 Kent Street, Ottawa, Ontario**

7h45 - 8h30	Committee's Working Breakfast - <i>in camera</i>	
8h30 - 9h00	Meeting with Perimeter Institute - <i>in camera</i>	R. Myers
9h00 - 9h30	Meeting with the Institute of Particle Physics - <i>in camera</i>	W. Trischuk
9h30 - 10h00	Meeting with TRIUMF - <i>in camera</i>	J.-M. Poutissou / Gordon Ball
10h00 - 10h15	<b><i>Coffee Break</i></b>	
10h15 - 10h45	The Canadian Institute of Nuclear Physics	K. Sharma
10h45 - 11h45	SNOLAB Operations Support	A. Noble
11h45 - 12h45	<b><i>Lunch</i></b>	
12h45 - 13h45	T2K Long Baseline Neutrino Oscillation Experiment T2K Near Detector Integration	A. Konaka A. Konaka
13h45 - 14h45	The ATLAS Experiment at the CERN LHC ATLAS Computing Grid Infrastructure Specialists	R. McPherson R. McPherson
14h45 - 15h00	<b><i>Coffee Break</i></b>	
15h00 - 15h45	Gamma-Ray Spectroscopy at ISAC	C. Svensson
15h45 - 16h30	EXO - A Xenon Double-Beta decay detector Prototype EXO Gas-Phase Time Projection Chamber	D. Sinclair K. Graham
16h30 - 17h15	DEAP/CLEAN - Continued Development	M. Boulay
17h15	Committee <i>in camera</i> Meeting with Isabelle Blain, Vice-President - Research Grants & Scholarships	

**NOTE:** 1 hour presentations: 30 min. of presentation and 30 minutes for Q&A.  
45 min. presentations: 25 min. of presentation and 20 min. for Q&A.  
30 min. presentations: 20 min. of presentation and 10 min. for Q&A.