

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

**David Sinclair, Chair GSC-19**  
**Carleton University**  
**April 2006**

## Introduction

This report summarizes the activities of the subatomic physics Grant Selection Committee (GSC-19) for the fiscal year 2005-06, together with the outcomes of the 2006 competition. The report is provided for information to both NSERC's Committee on Grants and Scholarships (COGS) and the subatomic physics community.

Subatomic physics is characterized by large-scale and long-term projects. Forward planning and management of the GSC funding envelope is thus a critical part of the activities of the GSC. This year, a new long-range plan is being developed by the community through an exercise separate from the GSC activities. Early input from the long-range planning committee was received by the GSC and aided in the decision making.

## Committee

GSC-19 usually consists of 12 members including 3 theorists. One of the theorists, Dr. Amarjit Soni, was unable to attend this year's deliberations. Consequently, the workload on the remaining two theorists was particularly heavy, especially as the number of theory applications was unusually high this year (27). The makeup of the committee is given below. It was a pleasure to welcome Samir Boughaba as our NSERC Team Leader and to acknowledge the wonderful guidance and assistance from Sandra Zohar. Dr. Pekka Sinervo, Group Chair for Physics, attended many of our sessions and provided wise counsels on policy and historical context.

<b>Name</b>	<b>Organization</b>	<b>Final Year</b>
Georges Azuelos	Université de Montréal	(2008)
Cliff Burgess	McMaster U. / Perimeter Institute	(2007)
Marielle Chartier	University of Liverpool	(2008)
Stéphane Coutu	Pennsylvania State University	(2007)
Roy Holt	Argonne national Laboratory	(2008)
Byron Jennings	TRIUMF	(2008)
Karol Lang	University of Texas at Austin	(2008)
John Martin (Co-Chair)	University of Toronto	(2007)
Allena Opper	George Washington University	(2007)
Kumar Sharma	University of Manitoba	(2007)
David Sinclair (Chair)	Carleton University	(2006)

## **Site Visits**

The Committee members visit Canadian institutions on roughly a 3-year rotation. In mid-October 2005, the committee visited the University of Alberta, University of Saskatchewan and University of Winnipeg. A group of researchers representing the University of Regina participated in the meeting at the University of Saskatchewan. Further, while at the University of Winnipeg, the Committee had interactions with representatives of the University of Manitoba and University of Brandon. In each case, the meeting consisted of presentations by the research teams, meetings with university administrative officials, and general discussion about the research programmes and the processes to apply to NSERC's grants.

The Committee and the community find these site visits very helpful. They are not intended to be a vehicle for grant evaluation, but they provide the Committee with a much better perspective of the research teams and the conditions in which they are working. This is particularly helpful for the many foreign members of the GSC who may not be familiar with the Canadian university system.

A brief report on each visit was prepared for the Committee's use. These reports will be available for future Committees.

## **Pre-Review Process**

When the Form 180s are received, each application is assigned to one of the Committee members who is required to recommend a number of external referees for the application. Typically, half of these are taken from the list of suggested referees on the Form 180. In several cases, applicants are not following the instructions and are suggesting referees who are in conflict of interest according to NSERC's guidelines. In such cases, external referees are assigned by the Committee's Chair and NSERC.

## **Chairs' Meeting**

The purpose and outcomes of the Chairs' meeting are apparently not well understood by the community. At 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. This year, the Chairs' meeting was held on November 20, 2005. There were several applications that fell at the boundary between GSC-19 and other Committees. In each case, a meeting was convened. It involved the Chairs of GSC-19 and the alternate GSC, the Physics Group Chair, and the NSERC Team Leader(s) and Programme Officer(s). A decision on which GSC should review each of these applications was made on the basis on an assessment of which Committee had the most relevant expertise. In cases where the expertise resided in more than one GSC, one GSC took the ownership of the review and the other(s) provided consultations.

The Chairs' meeting is also the point at which the agenda for the Large Projects Day is established. The final list of external referees and reviewers is produced and the identification of major requests that need more than the normal number of external references is established.

### **Review Committees**

This year, there were: a review of TIGRESS by the standing review Committee, with the GSC Chair attending; a review of SNO as a part of the regular Agency Review Committee, with the GSC Co-Chair and one other GSC member (Dr. Stéphane Coutu) attending; and a review of the T2K proposal by an ad hoc Committee of experts, with the GSC Chair and one other GSC member (Dr. Allena Opper) attending. A review of ATLAS was not held this year, but the ATLAS group did submit a substantial progress report which was reviewed by the ATLAS review committee and made available to the GSC.

### **Large Projects Day**

Prior to the beginning of the deliberations, the Large Projects Day provided an opportunity for the Principal Investigators of projects requesting grants of \$400K per year or more, or teams that were affected by major changes in their activities, to make presentations and answer questions. Presentations were also made by IPP, TRIUMF and SNOLAB.

Further, the Chair of the Long Range Planning Committee made a presentation on the findings of the LRPC, so that the GSC's decisions could be made with the fullest understanding of the community-supported priorities. In summary, the LRPC indicated that the top priorities supported by the community were ATLAS, ISAC, SNO/SNOLAB, T2K, and a programme which maintained breadth. At ISAC-II, the top priority for new equipment was the recoil separator EMMA. The LRPC urged the GSC to protect the capital budget by holding operating funds at a fixed level.

The agenda for the Large Projects Day is given in Appendix 1.

### **Funding Decisions**

The funds available to the committee are shown in Table 1. The budget contains funds recovered from the commitment to KOPIO. This is a bitter-sweet windfall as it arose from the cancellation of a project in which Canada was playing an internationally recognized leadership role. As discussed below, however, it did allow two of the community-supported top priorities to move forward. Further, due to a year-end increase in NSERC's RTI budget, the envelope received an additional \$118K that assisted in funding equipment requests. The envelope also received \$255K for new applicants. All new applicants, including those in project grant requests, were taken into account to determine this allocation. Moreover, the envelope received \$86K as part of the 2002 reallocations exercise. Furthermore, this is the last year in which the envelope had to

### Competition Subatomic Physics Envelope Budget

(millions of dollars)

Budget Item	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11
Base Budget	20.665	20.665	20.665	20.665	20.665	20.665
Cumulative Permanent Additions:						
New Applicants*	1.250	1.505	1.505	1.505	1.505	1.505
Reallocations	0.287	0.373	0.459	0.459	0.459	0.459
Transfers	0.000	0.000	0.000	0.000	0.000	0.000
Temporary Transfers:						
ATLAS Cost-to-Completion	0.750	0.075	0.075	-0.300	-0.300	-0.300
SRO Contribution	-0.137	-0.137	0.000	0.000	0.000	
From other GSCs	0.000	0.000	0.000	0.000	0.000	
Total Fiscal Year	22.815	22.481	22.704	22.329	22.329	22.329
Actual Spending	19.517					
Carry-forward	0.416					
Commitments	-2.882	-13.855	-6.40	-2.10	-0.55	
KOPIO installment cancellation		0.740	0.500			
RTI budget adjustment		0.1180				
<b>Available for Spring Competition</b>		<b>9.900</b>				

\* The allocation for new applicants past FY2006 is not known at this time

Table 1. Budget available during the competition

make a payment (\$137K) to the SRO (Special Research Opportunity) program as a compensation for the excess funding (\$410K) that the envelope received from the CRO (Collaborative Research Opportunities) program. The subatomic physics community was not eligible to apply for CRO grants, and the envelope was compensated accordingly. When the SRO program replaced CRO, it was decided that the SAP community would be eligible to this new program. Consequently, the envelope had to reimburse the excess funding it received at the time. This reimbursement was spread out over three years (FY2004, FY2005, and FY2006). Moreover, the envelope received \$75K from the RTI program (other than SAP) as part of the ATLAS cost-to-completion (CTC) payment. The overall payment of the \$1.5M towards the CTC is detailed in Table 2. Transfers of \$750K, \$75K, and \$75K in FY2005, FY2006, and FY2007 from the RTI budget to the envelope were decided in order to permit the payment of the CTC by FY2007. The envelope has to reimburse \$900K to the RTI program in three instalments of \$300K each in FY2008, FY2009, and FY2010, respectively.

Note that Table 1 reflects the budget as known at the beginning of the competition, prior to the end of the fiscal year (March 31<sup>st</sup>). The commitments shown for FY2005 are those for the remaining of the fiscal year. The total budget shown for the competition (\$9.9M) includes the carry-forward of \$416K from FY2005.

Moreover, by the end of FY2005, NSERC performed a review of residual funds. The purpose of this review was to identify researchers for whom FY2005 was the second-to-last year of their granthold, and who held a large grant account balance. The identified researchers were asked if they agreed to defer their FY2006 instalments. Three researchers agreed to do so, freeing \$94,000. Furthermore, one researcher left Canada. Consequently, his instalments for FY2006 and subsequent years were cancelled and the corresponding amounts freed (\$62,500 per year). The commitments shown in Table 1 may include part of these budgetary adjustments.

<b>ATLAS Cost-to-Completion</b>	<b>2005-06</b>	<b>2006-07</b>	<b>2007-08</b>	<b>2008-09</b>	<b>2009-10</b>	<b>2010-11</b>
<i>(millions of dollars)</i>						
Grants to ATLAS Canada	0.750	0.375	0.375	0.000	0.000	0.000
Subatomic envelope payment	0.000	-0.300	-0.300	-0.300	-0.300	-0.300
RTI budget outside GSC19	-0.750	-0.075	-0.075	0.300	0.300	0.300

Table 2. ATLAS cost-to-completion payments.

The GSC concurred with the LRPC in the need to contain the operating expenditures to maintain a healthy future for the field. However, this was extremely difficult. The total operating allocation in 2005 was \$18.17M. To develop a target for 2006, we took this figure and added the incremental award for new applicants (\$255K) and the incremental reallocations award (\$86K), as both of these funds are aimed at operations. This gave a target of 18.51M of which \$10.59M was already committed. The carry forward in previous years was created to mainly deal with the expected capital bulge, and the KOPIO funds clearly came from capital and were allocated to new capital.

The GSC noted that the major looming problem for next year could be the need to find operating funds for SNOLAB. The GSC expressed the hope that this problem will be solved outside the envelope. SNOLAB has been created as an international facility and as such, its operation should not be a draw on funds established to support the national programme. Funding this facility from within the current envelope would seriously damage Canada's ongoing programme in subatomic physics.

The committee proceeded to review the applications in the usual way. In round 1 of the review, each application was presented by the first reviewer with additional comments from the second reviewer. Each application was then rated against the NSERC criteria (excellence of the proposal, excellence of the researchers, contribution to HQP, and need for funds). The committee then decided whether to fund, how long to fund, and the level of funding to recommend. The committee split into two sub-committees to review, in parallel, the theory and equipment applications. All of the applications were subsequently reviewed again in two additional rounds as part of budget balancing.

Reducing the operating allocations to fit within the funds available was a difficult and painful process. The reasons for the extreme pressure on the operating budget are clear: the community is starting the operation of ATLAS and ISAC-II; it wants to do the R&D necessary to develop new projects for SNOLAB; it wants to embark on T2K; it wants to increase the support for theorists; and it typically supports the new applicants at a level greater than the incremental funds received. However, it needs to do this within the confines of a budget that increases by about 1 to 2% a year. Thus, very hard decisions had to be made in order to support the highest priority areas of the programme.

In considering the operating grants, the committee does not look at the division of funds between different areas of subatomic physics. Each application is considered strictly on its merit.

In the previous long range plan, one of the recommendations was that theory grants should increase, on average by 10% so that the total fraction of the envelope allocated to theory should increase from 10% to 11%. It is clear that in recent years the GSC has been much more generous to theory than this recommendation suggested. This was the fourth year of a payment to the envelope with respect to the 2002 reallocations exercise (first payment in 2003 of an amount of \$115K, followed by increments of \$86K). One last payment is due in 2007. An exceptional number of theory grants were up for renewal this year (27 compared to 18 last year), and the average award was of \$36K, down from \$44K last year. Even so, the fraction of the envelope going to theory rose to 14%.

The total operating allocation for FY 2006 was of \$18.79M, which is higher than the initially set target (\$18.51M). Taking into account the very large number of requests for operating support, it would have been very difficult to further constrain the operating allocation.

The equipment situation was difficult but not nearly as difficult as the operating allocation. The committee was able to support the start of two new major projects, EMMA and T2K. The EMMA spectrometer will be used in a large fraction of the ISAC-II experiments and greatly enhances the gamma array TIGRESS. The T2K project is an international neutrino experiment being mounted in Japan, which aims to extend the knowledge of neutrino oscillations, thus building on the work of SNO. To allow these high-priority projects to go forward, the committee had to extend the funding period for EMMA (the schedule for T2K is set by external factors), and limited funds were available for the other high-quality applications for equipment support.

The final funding levels recommended to NSERC are shown in Table 3, while the recommended allocations of equipment funds are shown in Table 4. The share of theory, experimental operating, and capital allocations for 2006 are given in Table 5.

The post-competition budget and updated multiyear commitments are summarized in Table 6. Please note that the commitments for FY2006 and the subsequent years include the budgetary adjustments related to the review of the residual funds. There will be a carry forward of \$708K this year, which together with the \$500K returned from the

KOPIO capital award will allow the capital commitment to be met next year without forward borrowing. However, the funds available next year for new equipment will only be about \$250K. Indeed, during the previous LRP process, it was recommended to limit the equipment spending to approximately \$4M per year. This will make it difficult to begin any new major project or to meet the needs for the smaller equipment requests that arise each year. Significant equipment funds should be available starting in 2008.

FISCAL YEAR	2006	2007	2008	2009	2010
EQ - NEW <sup>1</sup>	907,076	1,354,541	1,053,844	500,000	500,000
EQ - COMMITMENTS	2,490,000	2,384,000	1,429,000	300,000	300,000
EQ - TOTAL	3,397,076	3,738,541	2,482,844	800,000	800,000
THEORY - NEW	862,000	862,000	862,000	535,000	535,000
THEORY COMMITMENTS	2,288,784	1,186,500	973,000	553,000	0
THEORY-TOTAL	3,150,784	2,048,500	1,835,000	1,088,000	535,000
EXP OPS - NEW	7,338,350	5,482,900	2,683,750	0	0
EXP OPS - COMMITMENTS	8,302,985	2,433,100	0	0	0
EXP OPS - TOTAL	15,641,335	7,916,000	2,683,750	0	0
TOTAL EXPENDITURE	22,189,195	13,703,041	7,001,594	1,888,000	1,335,000

<sup>1</sup> New Equipment for 2006 does not include \$117.4K awarded in this competition but paid in FY2005  
EQ: Equipment; EXP OPS: Experimental Operations

Table 3. Recommended Funding levels

FISCAL YEAR	2006	2007	2008	2009	2010
EMMA	85,000	500,000	500,000	500,000	500,000
T2K	629,207	854,541	553,844	0	0
Other <sup>1</sup>	192,869	0	0	0	0
ATLAS CTC	375,000	375,000	-	-	-
Reimbursement to RTI Program <sup>2</sup>	-	-	300,000	300,000	300,000
COMMITTED	2,115,000	2,009,000	1,129,000	0	0
TOTAL CAPITAL	3,397,076	3,738,541	2,482,844	800,000	800,000

CTC: Cost to Completion

<sup>1</sup> New Equipment for 2006 does not include \$117.4K awarded in this competition but paid in FY2005

<sup>2</sup> Reimbursement of \$900K lent to SAP envelope as part of the payment of ATLAS CTC

Table 4. Equipment allocations

One should note that the \$118K received as part of the RTI year-end funds were spent in FY2005. This explains the increase in FY2005 total fiscal year budget by \$118K and spending by \$117.4K. The latter amount (\$117.4K) was awarded this year.

Envelope Share - 2006	
THEORY	14.2%
EXP OPS	70.5%
CAPITAL	15.3%

*EXP OPS: Experimental Operations*

Table 5: Share of theory, experimental operating, and capital allocations

**Post-Competition Subatomic Physics Envelope Budget**

(millions of dollars)

Budget Item	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11
Base Budget	20.665	20.665	20.665	20.665	20.665	20.665
Cumulative Permanent Additions:						
New Applicants*	1.250	1.505	1.505	1.505	1.505	1.505
Reallocations	0.287	0.373	0.459	0.459	0.459	0.459
Transfers	0.000	0.000	0.000	0.000	0.000	0.000
Temporary Transfers:						
ATLAS Cost-to-Completion	0.750	0.075	0.075	-0.300	-0.300	-0.300
SRO Contribution	-0.137	-0.137	0.000	0.000	0.000	0.000
From other GSCs	0.000	0.000	0.000	0.000	0.000	0.000
Total Fiscal Year	22.933	22.481	22.704	22.329	22.329	22.329
Commitments**	-	-22.189	-13.703	-6.702	-1.588	-1.035
Actual Spending	22.517	-				
Carry-forward to next year	0.416	0.708				

\* The allocation for new applicants past FY2006 is not known at this time

\*\* Takes into account the return of the \$500K of the cancelled KOPIO instalment in FY2007

Table 6: Post-competition budget summarizing the multiyear commitments

## Policy Issues

**At the end of the grants deliberations, the committee had a session devoted to policy issues. Some of the key points that arose are summarized below.**

It is essential that the community works to increase the total resources available to support the research programme. In order to meet this year's allocation, very good research programmes had to be sharply curtailed, which will impact the long-term future of the field.

The committee considered the value of the fall site visits. It was felt that these were valuable both for the visited institutions and for the GSC and should continue. GSC-19 has a large fraction of foreign members, and this is a unique opportunity for them to meet



the Canadian community and understand the conditions under which they are working. It was agreed that the next site visit will be held in the fall of 2006 in British Columbia.

The Committee considered the arrangements for the SRO programme. It was felt that because science in our field was so critically dependent on long-term planning, the number of cases where the short time scales of the SRO programme would be important were small. There was a strong feeling on the committee that all of the activities in our area should be managed by the GSC. As a follow-up to this recommendation, a request to make members of the SAP community ineligible to the SRO programme, and have the SAP envelope compensated accordingly, was presented by NSERC's Physics & Astronomy Team Leader to the Management of the Research Grants and Scholarships Directorate of NSERC. This request was rejected on the basis that SRO is a programme that has been set up to address specific needs (high risk/high potential projects, windows of opportunity, pre-research/exploratory activities), and to which members of the SAP community successfully applied. It was, however, recognized that the evaluation of proposals from the SAP community should be made in a way that does not undermine the long range planning of this community and the forward planning of the GSC. Mechanisms to ensure such a careful review will be established. Members of the community are strongly encouraged to get acquainted with the SRO programme and to apply to it should their projects meet its selection criteria.

In reviewing the applications, one issue which repeatedly annoyed the Committee was the inconsistency between the commitments identified on the project requests and the corresponding commitments on the personal data forms. It is critical that the Committee understands the commitments that individuals are making, so that it can assess if a commitment to a particular project is adequate and has chances to lead to success. Further, this understanding permits to gauge the individuals' sense of priorities for the projects they are involved in. By attaching one's PDF to an application, one is effectively signing approval of the application and accepting the commitment stated. In several cases, the commitments claimed on the project applications exceeded the sum of the commitments in the PDFs by a factor of 2. The committee does not look kindly on applications that suffer from this type of inconsistency.

The committee requested that the Long Range Planning group should recommend a coherent plan on computing resources and address the priorities for MFA funding. The LRP should consider whether there are benefits to be obtained by consolidation of computing and technical resources rather than having each institution maintain these capabilities.

## APPENDIX 1

### MEETING WITH LARGE SUBATOMIC PHYSICS PROJECT COLLABORATIONS

Friday February 3, 2006  
Laurier Room, Marriott Hotel  
Ottawa, Ontario

#### AGENDA

- |               |  |
|---------------|--|
| 8:30 – 8:45   | GSC 19 <i>in-camera</i> meeting                  |
| 8:45 – 9:30   | Meeting with IPP (Trischuk) <i>in-camera</i>     |
| 9:30 – 10:15  | Meeting with TRIUMF (Poutissou) <i>in-camera</i> |
| 10:15 – 10:30 | <i>Coffee</i>                                    |
| 10:30 – 11:00 | TIGRESS (Svensson)                               |
| 11:00 – 11:45 | T2K (Konaka)                                     |
| 11:45 – 12:15 | Rare Kaon Decay (Bryman)                         |
| 12:15 – 13:00 | <i>Lunch</i>                                     |
| 13:00 – 13:45 | EMMA (Davids)                                    |
| 13:45 – 14:15 | PICASSO (Zacek)                                  |
| 14:15 – 15:00 | SNO (McDonald)                                   |
| 15:00 – 15:15 | <i>Coffee</i>                                    |
| 15:15 – 15:45 | CDF (Savard)                                     |
| 15:45 – 16:15 | SNOLAB (Sinclair) <i>in-camera</i>               |
| 16:15 – 16:35 | SAP LRP (Ragan) <i>in-camera</i>                 |
| 16:35 – 17:30 | Committee <i>in-camera</i>                       |