

Report on the 2004 Competition of the NSERC Subatomic Physics Grant Selection Committee (GSC-19)

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Introduction

This report, summarizing the preparations of GSC-19 and the outcomes for the 2004 competition, is intended for the Canadian subatomic physics community and the NSERC Committee on Research Grants. The focus of the report is on the fiscal management of the GSC-19 envelope, with details provided for the benefit of new and returning GSC members. More information regarding the regular GSC procedures can be found in reports from past GSC chairs.[1]

Committee

The 2004 committee membership is shown in Table 1. There were only two theorists this year, instead of the usual three, because of the smaller number of theory applications that were expected for the competition. As a result the committee comprised of 11 members, instead of the normal 12, and there were only two new members joining this year. The committee received direction and assistance from NSERC staff: Kate Wilson, Michèle Beaudry, Sandra Zohar, and Valérie Augier. Our program officer, Michèle, transferred to another division in December 2003, and was replaced by Sandra. Due to their hard work, the transition went smoothly.

Table 1: 2004 Subatomic Physics Grant Selection Committee (GSC-19)

Name	Institution	Term ends	Expertise
Dean Karlen - Chair	Univ. Victoria & TRIUMF	2004	Experimental HEP
Louis Lessard	Université de Montréal	2004	Experimental HEP/Astro
Nigel Lockyer	Pennsylvania University	2004	Experimental HEP
Brad Sherrill	Michigan State Univ.	2004	Experimental IEP
Edward Brash	University of Regina	2005	Experimental IEP
Malcolm Butler	Saint Mary's University	2005	Theoretical NP/IEP
Marcela Carena	Fermilab	2005	Theoretical HEP
Noemie Koller	Rutgers University	2005	Experimental NP
Richard Van Kooten	Indiana University	2005	Experimental HEP
David Sinclair	Carleton University	2006	Experimental NP
David Smith	Centre d'Études Nucléaires de Bordeaux-Gradignan	2006	Experimental HEP/Astroparticles

Preparations for the 2004 competition

Site Visits

The GSC site visits this year were to the west coast institutions. It began on Sunday, October 5, 2003, with a one day policy and orientation meeting in Victoria for the GSC members. On Monday, the committee visited the University of Victoria and on Tuesday, TRIUMF. Wednesday morning was devoted to the University of British Columbia, and in the afternoon, the committee heard presentations at TRIUMF from representatives from Simon Fraser University.

The purpose of the site visits is informational, not for evaluation of grant applications. It serves to provide information to the community about NSERC and the GSC processes. It allows the community to give feedback to NSERC, and allows the committee to see the research environment firsthand, especially important for foreign GSC members who may not be familiar with Canadian university conditions.

Site visit reports were written and are available to this committee and subsequent committees to follow up on important issues identified by the GSC.

External reviews

External review committees are set up each year to provide a detailed evaluation of certain large grant requests, or to review the progress of ongoing projects. These committees include the GSC chair and usually one or more other GSC members. Their reports are made available to the entire GSC, as appropriate. In July, a review of TIGRESS found that the conditions from the 2003 competition award were satisfied and recommended that funds be released by NSERC for the purchase of the detector elements. At the beginning of November, a committee met with the ATLAS/Canada group to review the progress of the experiment and to consider its application for funding for costs to complete and install the detector, and two smaller associated equipment grants. At the end of November, the SNO agency review committee science subcommittee was supplemented by three GSC members for a progress review and a detailed examination of the grant requests to continue SNO operations and University groups. In December a committee met with the proponents of large astroparticle and neutrino grant requests, a relatively new and growing area for GSC-19. Finally, a committee met with the TWIST collaboration in January, to review its progress.

Large Project Day (February 6, 2004)

On the day prior to the start of the competition, a number of large projects were invited to make short presentations to the GSC. The groups were asked to respond to written questions provided well in advance from the GSC. Oral questions also followed their presentations. The GSC heard presentations from Jean-Michel Poutissou on TRIUMF and Richard Keeler on IPP.

2004 Competition prognosis

A summary of the budget information as known during the 2004 competition is shown in Table 2 and compared to the previous two competitions.

Table 2: Budget data (in k\$) as known during the 2004 competition

	FY2002	FY2003	FY2004
Base envelope	20,940	21,170	21,515
Carry forward	-50	799	764
Other increments*	250	768	371
RTI/SRO taxes*	0	-732	-225
Overall envelope	21,140	22,005	22,425
Funds already committed	-7,352	-12,539	-13,214
Total funds available	13,788	9,466	9,211
Number of grant requests	80	63	64
Total requested	17,475	15,108	15,589
Total awarded	12,989	8,701	
Balance	799	764	

* estimates for 2004

The line “Other increments” includes new funds from NSERC in support of new applicants with amounts of (230k, 230k, 285k) in the three years. The reallocation process resulted in 155k and 86k coming into our envelope for the past two years. In 2003, a large amount of unspent funds were “found” and added to our envelope. That year the envelope was taxed 732k because of the moratorium on the equipment grants in other GSCs. For 2004, a smaller tax of 89k was calculated, but an additional tax of 136k for the new Special Research Opportunities (SRO) program is also applied. Our community can apply for grants through the SRO program and any funds awarded will come from outside our envelope. The CRO and IOF programs have been absorbed into the SRO.

On the surface, the prognosis for the 2004 competition looked similar to that of 2003, in terms of funds available, number of applications, and total amount requested. An important difference, however, is that a much larger portion of the available funds was needed to maintain the ongoing operations of the existing program for 2004.

Prior to competition week, the need for ongoing operations was estimated by the sum of all returning grants, a total of \$7.8M. Since none of the projects being renewed appeared to warrant significant drops in support, a similar amount would be needed to continue these projects in 2004. This would leave only \$1.4M in discretionary funds, with which the GSC could allocate to new requests, increased operations of the ongoing program, and banking for the future. In fact, the amount of discretionary funds was substantially smaller, since the GSC is constrained to have a high success rate for new applicants and follow the reallocation awards. New grant requests in the competition amounted to \$4.4M, while increases to existing operating grants totaled \$3.3M.

The situation for the 2005 competition was also forecast under similar assumptions. If the entire \$9.2M in the 2004 competition was allocated to ongoing operations, the 2005 budget would have a shortfall of almost \$0.6M, if operations were to be kept at a constant

level in that competition. In addition, a few large new important projects are expected to be proposed for the next competition. There was significant pressure, therefore, to keep operational expenditures in control in the 2004 competition, and to reserve some funds for the 2005 competition.

In comparison, the 2003 competition was relatively easier. There was a larger amount of terminated grants, a reduction in the ongoing commitments, a reduction in operations due to a few downsized experiments, and a larger increment to the overall budget. For that year, \$3.6M in new grant requests were awarded, including significant capital commitments made in support of the ISAC II program, and almost \$0.8M was banked for the 2004 competition. The ISAC II capital investments were spread over many years, and put significant pressure on the 2004 and 2005 competitions.

Table 3 shows the data used for discretionary funding estimates for the 2004 and 2005 competitions prior to the 2004 competition. Also shown are the figures for 2003, to show how these change from year to year. It should be noted that the actual discretionary amounts can be higher, if some renewed operating grants are reduced from the previous year, as was the case for 2003.

Table 3: Data used for simple estimates of the discretionary funds are shown for the 2003 – 2005 competitions, prior to the 2004 competition. All amounts are in k\$. The term b corresponds to the multiyear awards given for 2005 in the 2004 competition. The term c corresponds to the single year operating grants given for 2004 in the 2004 competition. The 2005 estimates are shown for a worst case scenario, in which the 2004 competition spends its available budget on operations ($b + c = 9,211$). The bottom row shows the amounts requested for new grants and increases to renewal of operating grants. The discretionary funds can be allocated to these areas.

		2003	2004	2005
A	Overall envelope	22,005	22,425	22,066
B	Continuing grants	12,539	13,214	5,958 + b
C	Operating renewal from previous year	5,512	7,841	7,494 + c
D	Estimated discretionary funds (A-B-C)	3,954	1,370	- 592
	New and increased operating requests	9,596	7,748	?

Competition process

Round 1

In round 1 of the competition, the grant requests are examined in the most detail. Committee members are familiar with all the requests, but in order to ensure each application is given careful consideration, two referees are assigned to each request. During round 1 the referees present the request to the full committee and give independent funding recommendations. General discussion follows. After a general understanding of the main issues, the committee comes to a consensus whether to fund and the duration. The funding levels are voted upon in a secret electronic ballot, and the median is assigned as the award amount for this round. The process proceeded according to schedule and took 3 full days to complete. In the third day, the committee broke into two; a theory subcommittee, and a computing/ equipment/ MFA subcommittee. During

the round 1 process, no budget tally is performed, so that all applications are treated equally.

Prior to the beginning of the competition, the chair made it clear to the committee that the budget situation was much more difficult than in the previous two competitions and the referees were asked to be very strict in their funding recommendations. This point was stressed in order to prevent the round 1 budget from being in significant shortfall. It was noted by the chair and others that the round 1 process in fact was significantly harsher to applicants than in the previous competitions.

Round 2

Prior to the start of round 2, a tally of the round 1 awards was made, and remarkably the 2004 budget was overspent by only \$52k. This should not be taken out of context to suggest that SAP is not facing serious budgetary pressures. A large number of worthy applications were not funded, or funded well below an optimal amount, because of our decision to apply harsh criteria in round 1.

The estimated discretionary funding for 2005 was also reevaluated, using the round 1 award amounts. Under the assumption that operation renewals would need to be maintained for 2005, the budget would be overspent by \$0.5M. That is, if no changes were made, the 2005 budget would be balanced by reducing operating renewals from \$8.5M to \$8.0M and making no new awards. This was not considered to be an acceptable situation for the subatomic physics community. In order to leave reasonable discretionary levels for the 2005 competition, additional reductions in round 2 would be necessary at a level of approximately \$1M summed over the two years, 2004 and 2005.

Prior to round 2, a number of summary tables were presented by the chair to the committee showing the large new awards, the large changes to previous operating awards, the theory awards in comparison to previous levels of support, the funding of first time applicants, and the list of projects that were rated low for merit or need for funds. These were considered to ensure fairness and to check that constraints on the GSC for the support of new applicants and theorists were being applied.

In round 2 all applications were considered again and, in general, additional reductions were made by consensus. The process took a full day. The total awards for 2004 were reduced by nearly \$0.7M. This brought the discretionary estimate for 2005 back to a positive level of about \$0.7M, but still less than the discretionary amount for the current competition.

Round 3

On the final day, a third round took place, in which a few applications, selected by committee members, were discussed. Some changes in award levels were made through consensus. The committee agreed that should any additional funds enter the envelope for the 2004 competition, they would be applied to the carry-forward. The remainder of the day was devoted to the completion of the notifications of decision. The referees for the

applications are responsible for providing the initial drafts of the comments to be sent to the applicants in April which indicate how the committee arrived at its recommendation.

Summary of award recommendations

One quarter of applications were not recommended for funding this year. In the previous two years, the unfunded fraction was less than 10%. This is another indication of the difficult budget pressures that the GSC felt this year. A breakdown of the requests and awards is shown in Table 4.

Table 4: Grant requests and awards for the 2004 competition divided into grant types.

Type	number of requests	requested amount (k\$)	number of awards	awarded amount (k\$)
Individual	28	2,044	22	1,068
Group/Project	20	10,353	18	7,079
MFA	3	410	2	240
Equipment	13	2,782	6	236
Total	64	15,589	48	8,623

Evolution of the subatomic physics envelope

The spending from the subatomic physics envelope is shown in Table 5, divided into the disciplines. Note that large changes from one year to the next within a discipline are usually a result of capital expenditures. Due to the tight budget, the GSC did not recommend any large capital awards in this competition, as seen in Table 4. The spending for 2001 was smaller because of the large repayment of debt that year.

Table 5: Spending (in k\$) in the different disciplines of subatomic physics. Large changes from one year to the next within a discipline are usually a result of capital expenditures.

Discipline	2000	2001	2002	2003	2004
Heavy Ion, Nuclear, SAL	863	862	859	544	501
IEP - Offshore	686	845	987	968	1,065
TRIUMF (Non-ISAC)	683	646	781	581	545
TRIUMF (ISAC)	1,246	1,001	1,427	2,764	3,246
Astroparticle	168	274	672	739	804
SNO	3,586	3,641	4,265	4,265	4,390
ATLAS	4,990	3,278	3,316	3,480	2,763
B physics	650	650	804	1,017	926
Rare K	544	926	1,060	470	900
Tevatron	220	250	324	574	702
OPAL	1,375	418	503	211	53
HERA	1,205	1,135	1,040	875	727
Future accelerator	15	149	194	292	412
MFA	1,491	1,517	1,536	1,826	1,840
Computing	-	179	287	-	70
Theory	1,920	2,158	2,347	2,635	2,898
Total	19,641	17,928	20,403	21,238	21,842

Reallocation process

The results from the 2002 reallocation process were known only to the 2003 and 2004 committees. As the GSC is obligated to follow the recommendations from the reallocation committee, this section shows the standing after 2 years.

In the reallocation process, the GSC surrendered 10% of a nominal base (not including equipment and MFA amounts) and amounts for specific disciplines were requested. The first priority of the community was to restore the 10% lost for the balanced program in subatomic physics, as outlined in the 2001 Five year plan. This was not funded, and therefore a tax of 7.3%* should be considered to be applied across the board. The reallocation committee made awards to the remainder of the community requests, but in some cases these were not enough to restore the discipline to their pre-reallocation levels. The reallocation changes ramp into the base budgets at 25% of the full amounts for 2003, and 18.75% for the following 4 years.

A summary of the requests and awards is shown in Table 6. One method to calculate the net consequences of the reallocation process is to apply a 7.3% reallocation tax for all disciplines in subatomic physics. For the calculations presented here, the tax is applied to the average of the 2000 and 2001 awards as shown in Table 5. The award after applying the tax is then multiplied by 0.25 for 2003 increment and 0.1875 for the subsequent year increments.

Table 6: Results from the 2002 reallocation exercise (amounts in k\$). The award values can be interpreted in different ways. One interpretation is calculated by applying a reallocation tax across all disciplines. The last two columns show the increments for each discipline for 2003 and the subsequent 4 years, respectively.

Proposals	Request	Award	Tax	Δ2003	Δ2004
Balanced program	1,384	0	-1,384	-346	-260
Highest priority projects					
ISAC	325	175	-83	+23	+17
SNO	245	130	-266	-34	-24
ATLAS	360	190	-304	-29	-21
Particle astrophysics	330	175	-16	+40	+30
Theory and new applicants	430	920	-150	+193	+144
Advanced technology development	480	255	-6	+62	+47

The reallocation “increments” for the highest priority projects are insignificant compared to their funding levels. The actual increases to the three other reallocation award disciplines exceed the reallocation increments. The GSC therefore appears to be abiding by the constraints imposed by the reallocation recommendations.

* Roughly calculated as 10% times the ratio of the operating to total envelope (i.e. 13.8 M\$ / 18.8 M\$)

In 2004 the envelope increased by \$285k for new applicants and by an additional \$144k for both theory and new applicants through the reallocation process. There were a total of 11 new applicants, for which the average award was approximately \$50k. Many of the 12 returning theorists had significant increases to their funding levels; the average increase was almost \$10k. Awards to new applicants and returning theorists exceed the increments to the envelope for those categories.

Five year plan

In rounds 2 and 3, the GSC compared the funding recommendations to the five year plan.[2] The awards were found to be consistent with this plan, which also recommended a substantial carry forward into the final year of the plan, 2005. The planning process for the next five year cycle should get underway later this year or early next year, after the announcement of the budget for TRIUMF for the period 2005-2010. The document should be completed in time for the 2006 competition and the submission deadline for the 2007 reallocation exercise, should that take place.

Prognosis for 2005 and beyond

The GSC is not provided with enough information to make accurate projections into future years. Past chairs have recommended that proponents for large projects submit their intentions using Form 180, but this has not taken hold. One of the important functions of the Five Year Plan committee is to solicit this information directly from the community.

In absence of more detailed information, the prognosis for 2005 and beyond can be estimated by examining the capital expenditures already committed and expected. Funding requirements for operational expenditures fluctuate less from year to year, although they steadily increase primarily due to new applicants.

Figure 1 shows the committed capital expenditures over the past 8 years and the commitments made for the next 5 years. The large expenditures in 1999 and 2000 for the ATLAS project were only possible because of limited capital spending in other areas and by reprofiling the envelope, in which money was borrowed from future years and paid back, primarily in 2001. The capital expenditures in 2004 and 2005 are reaching similar levels, but now are being handled, in part, by funds carried forward from 2002.

Using the data shown in Tables 7 and 8, the discretionary funding for the 2005 competition is estimated to be \$683k. There are, however, a number of projects to be renewed in the 2005 competition that are winding down, and a savings of a few \$100k could be made to provide extra discretionary funds. If all the funds available in the 2005 competition are awarded to operations, and if operations continue at a constant level through the 2006 fiscal year, the 2006 budget will have \$1,295k available for new projects or increases of existing projects. It appears that the entire carry forward will need to be spent in the 2005 competition, given the limited discretionary funds in that year.

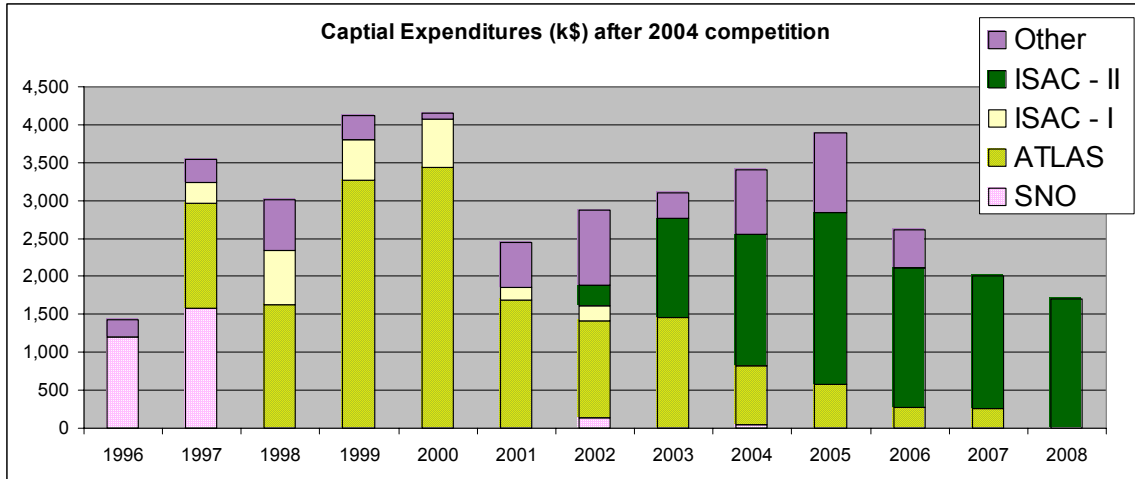


Figure 1: Capital expenditures (in k\$) for the years 1996-2008 as of March 2004.

Table 7: Budget data (in k\$) as known after the 2004 competition

	FY2002	FY2003	FY2004	FY2005
Base envelope	20,940	21,170	21,515	21,886
Carry forward	-50	799	764	588
Other increments*	250	768	371	316
RTI/SRO taxes*	0	-732	-225	-137
Overall envelope	21,140	22,005	22,425	22,653
Funds already committed	-7,352	-12,539	-13,214	-13,478
Total funds available	13,788	9,466	9,211	9,175
Number of grant requests	80	63	64	
Total requested	17,475	15,108	15,589	
Total awarded	12,989	8,701	8,623	
Balance	799	764	588	

* estimates for FY2004 and FY2005

Table 8: Data used for simple estimates of the discretionary funds are shown for the 2003 – 2006 competitions. All amounts are in k\$. The term b corresponds to the multiyear awards given for 2006 in the 2005 competition. The term c corresponds to the single year operating grants given for 2005 in the 2005 competition. The 2006 estimates are shown for a worst case scenario, in which the 2005 competition spends its available budget on operations (b + c = 9,175). The bottom row shows the amounts requested for new grants and increases to renewal of operating grants. The discretionary funds can be allocated to these areas.

	2003	2004	2005	2006
A Overall envelope	22,005	22,425	22,653	22,203
B Continuing grants	12,539	13,214	13,478	4,939+b
C Operating renewal from previous year	5,512	7,841	8,492	6,794+c
D Estimated discretionary funds (A-B-C)	3,954	1,370	683	1,295
New and increased operating requests	9,596	7,748	?	?

There are a number of very large requests expected in the next few years, including the decommissioning costs of SNO, experiments and operational support for SNOLAB, the T2K long baseline neutrino program in Japan, and the EMMA recoil spectrometer for ISAC-II. These requests alone will likely far exceed the available capital budget of about \$7.5M over period 2005-2009. Direction from the Five Year Plan on the relative funding priorities of these and other new projects will be important input for the decisions of future GSCs. Additional sources of funding for capital expenditures for these projects, including CFI, should be explored by the applicants.

Comment to Applicants

The GSC appreciates the effort by the applicants to prepare their grant applications, which for the most part are very well written. It is important that applicants clearly indicate amounts of funding from all sources (including startup and CFI funds, for example) for their part of the research project in the budget discussion section. The use of these other funds should also be explained.

Summary

Subatomic physics research in Canada continues to be dynamic and of a very high standard. The SAP envelope is under increasing pressure as the discipline grows and enters into new exciting projects at the forefront of the field. To maintain the momentum, the envelope will need further increases, possibly as a result of increased federal support of research and through the next reallocation process.

At the time of this writing, the Federal Budget was just announced, which included a \$39M increase to the NSERC budget to bring it to \$615M. It is not known at this time how the GSC-19 envelope will be affected.

References

[1] Previous GSC chairs' reports:

- S.A. Page, April 1997.
- P.K. Sinervo, May 1998.
- M.C. Vetterli, June 1999.
- P. Kalyniak, April 2000.
- R. Keeler, April 2001.
- K. Ragan, March 2002.
- N. Lockyer, 2003.

Some of these reports are available on the ipp web site: www.ipp.ca

[2] *To the Heart of Matter*, Report of the Canadian Subatomic Physics Five Year Planning Committee, June 2001.