January 24, 2006

To: The Canadian subatomic physics community
From: Ken Ragan, Chair, SAP Long Range Planning Committee

Re: Initial feedback from SAP LRP process

Dear Colleague,

As you know the subatomic physics community in Canada is in the midst of a long range planning (LRP) exercise. Many of you participated in the preparation of briefs to the LRP committee late last year, and attended the Montreal town hall meeting where those briefs were presented and discussed widely by the community.

The LRP committee met in early January to discuss the views raised at the town hall meeting and to establish its view of the future, for each of the three budget scenarios specified by NSERC in its charge to the committee. We are currently establishing our report based on those discussions and expect it to appear by early summer.

In the meantime, however, NSERC has requested some rapid feedback as guidance to GSC19 in its deliberations over the next few weeks. I attach here for your information the letter we have sent to NSERC to provide that guidance.

I would like to stress that the view of the LRPC for the longer term is very optimistic. Our community is strong and competent, and our science is exciting. With the appropriate level of support, our field has a bright future in Canada.

Unfortunately, we do not currently have that level of support from the NSERC GSC19 envelope. In the very short term, in fact, we are in rather dire straits due to the need to fund SNOlab operations. Although we hope that those operations will be funded by new monies, those new monies have not yet been identified. Thus, our advice to the GSC is based on the current situation, with no funding scenario beyond the current GSC19 envelope ("status quo") and assuming that SNOlab operations must be funded from that envelope.

This dire current situation is the reason the community must work together, under the auspices of the LRP report that we are preparing, to make the case for increased funding and a defined funding mechanism for SNOlab operations. If we can speak with one voice and be successful in our lobbying, we can then exploit the tremendous opportunities in front of us.

Yours respectfully,

Ken Ragan
Chair, LRPC

January 18, 2006

To: Samir Boughaba, NSERC
From: Ken Ragan, Chair, SAP Long Range Planning Committee

Re: Initial feedback from SAP LRP process

Dear Samir,

This is a brief report to apprise you of the initial findings of the Subatomic Physics Long Range Planning process being carried out under the aegis of NSERC.

As you know, a committee was struck in summer 2005 with the charge to look at the evolution of the SAP field over the next decade. We were asked to comment on each of three different funding scenarios for the NSERC SAP (GSC19) envelope, but also asked to consider the interplay of other factors such as CFI, TRIUMF, and the proposed MSIP.

The committee requested input from the community and received briefs representing all major aspects of the SAP efforts in Canada. A town-hall meeting was held in Montreal in early December 2005 where the briefs were presented and discussed by the community. The committee then met for three days at TRIUMF in early January. This memo reports on the initial findings of the committee after those deliberations, specifically in order to provide some feedback useful to the GSC in the current competition.

The long-term scientific future and opportunities could be very bright for the field. However, as will be explained below, there are insufficient funds to realize this potential in all but the most optimistic scenarios, and we find that the outlook today appears bleak.

Canada's SAP community is building on an exceptionally good base. Specifically, the projects identified in the previous (2001) five-year plan as being our highest priorities are in good shape. Construction of the Canadian portion of ATLAS is nearing completion and we have delivered our components of the detector and the accelerator on time and on budget; the group is now ramping up to the exploitation stage and the start of beam in 2007. ISAC-I is complete and operating, and ISAC-II accelerator construction is nearly complete and exploitation is starting. The SNO experiment has been extremely successful and has definitively resolved the solar neutrino puzzle, and SNOlab construction is proceeding apace. The Canadian community also participates in a broader program of less high-profile efforts and that breadth of the community is a source of strength.

This position is, in part, the result of funding from both NSERC and non-NSERC sources. New faculty hires, including CRCs, have revitalized our demographics; CFI funding has been essential in providing these new

researchers with start-up funds, as well as providing major construction funds for SNOlab, for computing, and for detector development.

Building on this strong base, we see the flagships of the program in the next decade as being:

- exploitation of ATLAS physics
- exploitation of ISAC physics
- establishment of a strong and dynamic program at SNOlab
- participation in a long-baseline neutrino program (specifically the T2K experiment in the short term)
- continued R&D to position ourselves for ILC participation
- operation of a number of smaller efforts to provide breadth

With this recent history of excellence and growth, the next decade could be one of exceptional accomplishment. Unfortunately, the stark reality is that the scientific vision and potential we envisage cannot be fully realized within the current GSC19 envelope. Over the past 5 years, the subatomic community has received approximately $70M from non-NSERC sources (compared to about $110M from the GSC19 envelope), chiefly from the CFI. Achieving the community's vision requires that this external funding continue. In addition, new funds, either added to the GSC19 envelope or from non-NSERC sources, will be required. Specifically, **if operations for the SNOlab facility** (estimated to be $5M per annum from 2007) **must be funded from the current envelope, the research program will be put in serious jeopardy**, and the community will be left unable to realize its vision and to optimally exploit the new SNOlab facility.

The committee realizes that new funds have not currently been identified for the operation of SNOlab although there is a hope that this will happen in the next year. As a result, the committee investigated in detail the scenario in which the GSC19 envelope stays flat *and* we are required to operate SNOlab within that envelope. This results in a truly dire outlook.

In this extreme situation, the only way the committee found to make room for the proposed capital investments in T2K, ISAC (EMMA), and SNOlab experiments (all three were found to be of the highest priority and were recommended in all funding scenarios) was to provide no growth in overall operating funds except for a part of the incremental cost between current SNO on-site funding and the projected SNOlab operations. In other words, the operations budget for the community – all project grants, all theorist individual grants, all university-based infrastructure grants – would remain flat for the full 10-year time period of this plan. **Even in this draconian situation, capital for SNOlab experiments would be reduced to a level that would permit the Canadian community to participate in only a single modest SNOlab experiment.**

SNOlab's estimated operating costs over the first 5-years of this plan are approximately $18M. Complete elimination of all capital funds for T2K, EMMA, and **all** other non-committed non-SNOlab experiments would seriously undermine many of our flagship efforts, and would *still* not fully fund SNOlab operations, nor would their elimination allow participation in SNOlab experiments

at a level justified by the scientific goals, our community's competence and expertise, and Canadian leadership in building the new SNOlab facility.

A further problem is that in all scenarios that the LRPC could imagine, the capital outlays in 2007 through 2009 – including committed funds to TIGRESS together with high-priority items for T2K, EMMA, and SNOlab experiments – give us a "bulge" of spending impossible to accommodate in the current GSC envelope. The SAP community has demonstrated in the past that we are capable of long term planning and forward borrowing. We believe that if the SNOlab operations issue is not resolved positively in the next year, the 2007-09 problem may have to be handled in the same way. Note that forward borrowing does not solve our problems – in the status quo scenario we must forward borrow *in addition to* dramatically damaging the ongoing ATLAS and ISAC physics programs, both considered of the highest priority, through reductions in operating grants, *and* catastrophically reducing our participation in experiments at the SNOlab facility, also considered a flagship effort.

Thus, the status quo situation is a dire one indeed. However, in the absence of new monies for the SNOlab operations, that is the scenario that we must consider for the GSC.

In our strawman budget for the next three years in the flat scenario in which SNOlab operations must be funded from within the GSC19 envelope, we were able to reduce the forward borrowing required in 2007-2008 and 2008-2009 to approximately $1M per year, at a cost of a reprofiling of capital costs (see comments below), a slower turn-on of new efforts (including SNOlab), a faster ramp-down of efforts that are not on our high-priority list above, and a reduction of capital for SNOlab experiments to below $4M in the first 5 years of our planning. Let me stress that **this is not our proposal and is not viewed by the LRP as a baseline situation** – far from it, as it does serious damage to the breadth of the community and leaves us unable to fully exploit either past or current investments in an optimal fashion. Our hope is that it can be used by the GSC and NSERC to frame any discussion of forward borrowing, should a decision on SNOlab operations not be made in a timely way.

Specifically addressing capital costs under discussion in the current competition, the LRP recognizes that meaningful Canadian participation in both T2K and EMMA is time-critical; the T2K schedule is driven by the international collaboration's progress and not by the Canadian funding situation, and EMMA is urgently required to allow exploitation of ISAC beam that is imminent. Thus reprofiling of the T2K and EMMA capital, while possibly helping to manage the bulge, is not a desirable option.

Thus our specific advice to the GSC with regard to the next few years is that:

- new monies for SNOlab operations, either in the GSC19 envelope or from external sources, is the single highest policy priority in the short term; the resolution of this issue over the next 12 months will

do more than any other single event to allow the community to avoid the dire consequences outlined above.

With regard to requests specifically in front of the GSC this year, our advice is that:

- the community considers that both EMMA capital costs and the T2K program are of the highest priority; our future science output will depend on capital investment of this nature just as our current output is based on past investments;
- the GSC recognize that in the absence of a resolution to the SNOlab operations issue, the 2007 and 2008 competitions will be extremely tight as SNOlab operations ramp up;
- the GSC should maintain maximum flexibility and seek to constrain the overall operating envelope (including the infrastructure component) of the entire community, as well as explore reprofiling of capital costs.

Yours sincerely,

Ken Ragan
Chair, SAP Long Range Planning Committee