Proposal for TRIUMF Commitment (5YP 2015-2020)

Date:
September 14, 2012

PROJECT/COMMITMENT TITLE: Maintaining the capabilities of the TRIUMF Detector Group

PROPONENT: C.A. Miller **TRIUMF CONTACT:** C.A. Miller

PRINCIPAL COLLABORATORS: Clients of the TRIUMF Detector Group

PROJECT DESCRIPTION:

The TRIUMF Detector Group has a long history of collaborating with researchers at Canadian universities in the design and construction of various state-of-the-art detector systems as Canadian contributions to experiments both at TRIUMF and at foreign laboratories. About 6 years ago, this capability was augmented by the new machine tools, infrastructure and talent assembled for the CFI-funded Laboratory for Advanced Detector Development (LADD). Furthermore, LADD brought expertise and tools for the design and construction of the electronic signal processing systems that are vital for the acquisition of large volumes of data from modern detectors. This major upgrade was instrumental for the following highly productive period, which saw the very successful design and construction of large detector systems for T2K, and more recently several new detectors for experiments and facilities for ISAC. Besides serving the TRIUMF scientific community, the Group also provides services for other TRIUMF divisions such as machining of special materials, and some technical manpower to help other on-site projects in urgent need.

Based on plans for future experiments presented at the recent TRIUMF Science Division Retreat, and no doubt summarized in the other submissions to the present PPAC, the heavy demands experienced by the Detector Group over the last few years can be expected to continue or intensify. The facilities and equipment now available to the Group for mechanical construction appear to be adequate to cope with the anticipated demands. However, much of the electronic test equipment that predates LADD is now obsolete or unreliable, and should be replaced. In the electronic development laboratory, this includes several 20-30 year-old fast pulse generators at $16k each, and one high-frequency oscilloscope for about $60k. Several small portable scopes for setting up and debugging experiments would add about $70k. Also, the temperature-controlled oven is near end-of-life, no longer providing reduced temperatures, and needs replacement for about $50k. Furthermore, the MHESA area for testing and prototyping detectors requires some new NIM bins and modules for about $40k. In sum, the scale here is well beyond the modest amount normally included in the annual budget for maintenance of the Group's equipment.

The personnel complement of the group has reached a critical situation, and requires attention. Some of the Group's extensive knowledge and experience specific to the design of detectors and their special infrastructure will be lost over the next few years as key people retire. Their replacement will be essential to maintain present capabilities, and some bridging of those positions is needed for transfer of the skills and knowledge. Succession planning is in place to address this process, although funding for bridging depends at present on opportune timing of relevant CFI funding for client projects. **Nevertheless, in the area of design, only maintaining the present complement will not be adequate to respond to future needs in a timely manner. The Group has managed to avoid delaying present projects only through a combination of special circumstances together with an efficiency and intensity of effort combined with long work-days by one designer that cannot be expected to be replaced. Hence we propose that, beyond replacement of retirements, the Detector Group be augmented by an additional designer position. Experience has shown that the ideal type of person for such a position is a background in experimental physics together with strong technical aptitudes. Possible candidates have been identified in the TRIUMF community.**

SCIENTIFIC JUSTIFICATION:
Most of the experimental program at TRIUMF, and also much of the work done abroad by Canadian researchers in subatomic physics depends on the TRIUMF Detector Group for special specific design capabilities and construction skill and equipment.

RELATIONSHIP TO BROADER CANADIAN RESEARCH COMMUNITY:
See above.

BROADER IMPACTS:
The Detector Group is a repository of relevant expertise and technical manpower that contributes to the evaluation and realization of medical and industrial applications of particle detector technologies. Current examples include diagnostic medical scanners and exploration for underground minerals.

MAJOR MILESTONES:

Description	Date

RESOURCE REQUIRMENTS:

CASH FLOW REQUIREMENTS						
\YEAR SOURCE \	ONE	TWO	THREE	FOUR	FIVE	TOTAL
TRIUMF	$70k	$80k	$60k	$50k	$40k	$300k
EXTERNAL						
TOTAL						$300k

TRIUMF NON-CASH RESOURCES						
\YEAR RESOURCE\	ONE	TWO	THREE	FOUR	FIVE	TOTAL

EXTERNAL FUNDING INFORMATION:

ONGOING OPERATIONAL REQUIREMENTS:

DECOMMISSIONING REQUIREMENT:

Accepted: Date: