Department of Energy's Advanced Detector Research Program

Michael Procario*
Division of High Energy Physics
U.S. Department of Energy
(Dated: November 7, 2001)

Following the recommendation of the 1998 HEPAP planning subpanel the Department of Energy has begun a program to fund detector research by university-based high energy physicists. The first awards were made in 2001 to six investigators working on new ideas for silicon tracking detectors, photodetectors, calorimetry, and radio frequency detection of neutrinos.

I. INTRODUCTION

Future experiments will require improved and in some cases completely new detectors. New accelerators provide higher energies or luminosities that strain the capabilities of current detectors. Many new non-accelerator experiments will only be feasible if new detectors with higher precision, lower backgrounds, or sometimes lower cost are developed. How will the research to produce these advances be funded?

During the SSC era the Texas National Research Laboratory Commission sponsored a well funded program of generic detector research aimed at the SSC experiments. While the SSC was never completed, current experiments like CDF, D0, CNS and ATLAS have benefitted from what was learned in that program.

In 1998 the Gilman subpanel recommended a program to support detector research at the universities. The first step in implementing this recommendation is the creation of the Advanced Detector Research (ADR) Program at the U.S. Department of Energy (DOE). Funding for this program comes from the DOE Division of High Energy Physics University Program. The first awards were made in 2001. There were six awards for a total of $450,000.

II. PROGRAM DESCRIPTION

The goal of the ADR program is to support detector research by university physicists. It is aimed at detectors that can contribute to planned but not yet approved experiments or possible upgrades of current experiments. The program does not support the final experiment specific engineering and development of detectors. That work is expected to be supported by the projects.

The program is run competitively somewhat like the DOE's Outstanding Junior Investigator program. Proposals are all due at the same time, and all are externally peer reviewed. The best reviewed proposals are ranked by a panel of experts on the quality of the science and relevance to high energy physics. Support can be requested for up to three years.

All proposals to DOE are judged by their scientific merit, but in this program we concentrated three particular aspects of scientific merit.

- What physical measurements would be made possible by the new detector technology? How important are those measurements to the field of high energy physics?
- Is the proposed research, generic detector research that can potentially benefit more than one experiment?
- What is the magnitude of potential impact versus the risk of failure?

Complete information on how to submit proposals can be found at the Division of High Energy Physics website, http://doe-hep.hep.net/. Proposals for 2002 are due to DOE by October 30, 2001. A total of $500,000 of funding is planned for 2002.

---

*michael.procario@science.doe.gov; http://doe-hep.hep.net/

Field of Research	Number of proposals	Number of grants
Calorimetry	4	2
Detectors for non-accelerator experiments	3	1
Electronics	2	0
Photodetectors	4	2
Particle identification	1	0
Scintillating trackers	1	0
Semiconductor trackers	4	1
Totals	19	6

TABLE I: Proposals and grants by detector type

III. FIRST YEAR RESULTS

The first year announcement was posted in August 2000. Proposals were due by December 5, 2000. A total of 19 proposals were received. Table I shows how the proposals and winners were distributed among various detector types.

All proposals were externally reviewed by three experts in the field. A review panel then used the external reviews in part to recommend a ranking of the proposals. Through this process six proposals stood out as superior to all the others. No effort was made to distribute the selections across the different areas, but the winners did cover a variety of detector topics: photodetector, tracking, calorimetry, and non-accelerator physics. Three winning proposals requested one year of support. One winner requested two years support. Two winners requested three years support, but the reviewers found that the proposed work in the first year was much stronger than the later years, so only one year was awarded.

Three of the winners were young investigators, who were either not yet tenured or very recently tenured. Three were very experienced detector builders. However, all were people with a strong interest in detectors.

IV. OTHER DETECTOR RESEARCH PROGRAMS AT DOE

There are two other programs at DOE which support detector research, Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR). SBIR is funded by a congressionally mandated 2.5% set-aside of DOE's extramural research budget. The STTR set-aside is 0.15%. Both SBIR and STTR allow collaboration between small businesses and non-profit research institutions like universities, but STTR requires 30% to 60% of the funds to go to the nonprofit. The nonprofit can receive funding through subcontracts or consulting arrangements with the small business. A single application can be made to both programs.

A Phase I grant can currently be funded up to $100,000 and the work typically lasts 6 months. The Phase I is aimed at demonstrating that the research is feasible. After a successful Phase I a company can seek Phase II support which can currently be up to $750,000. This is more money than is in the entire ADR program in FY 2001. The most successful proposals for high physics detectors have been those where the company has a close working relationship with an active high energy physicist. For the right idea with the right business partner SBIR or STTR can be a very valuable funding resource.