

## OTHER EDUCATIONAL AND COMMUNITY SUPPORT ACTIVITIES IN THE PHYSICS DIVISION

### a. **Enhancement of Minority Involvement in DOE Nuclear Physics Programs** (B. Zeidman)

The ANL Physics Division, through its Minority Program, continues to attract highly qualified students who apply for participation in the programs of the Physics Division and other ANL divisions. The program is directed toward identification of physics departments with relatively strong programs and faculty interested in stimulating their students to pursue research, particularly in summer programs. Returning, as well as new, minority physics majors participated in the ANL Summer Program during 2003. More than a dozen former participants are currently enrolled in programs leading to doctorates in physics.

The program is an ongoing effort based upon personal interactions with a substantial number of qualified minority students and faculty. During visits to the Physics Departments of HBCU colleges (Historically Black Colleges and Universities) and other institutions with large minority populations, lectures are presented and there are discussions of activities in physics at ANL and other laboratories, graduate programs, etc. Other activities include attendance at meetings of minority organizations and appointment as Adjunct Professor at Hampton University.

### b. **Nuclear Physics Award for Faculty in Undergraduate Institutions** (B. Zeidman)

The goal of the 'Faculty Program' is to enhance undergraduate science education through faculty awards for minority and HBCU faculty that will allow them to directly participate in the ANL Physics Division research program and increase the number of undergraduates involved in research. Several participants have obtained independent funding for continuing research collaboration with ANL that

involve undergraduate students. Minority faculty members and students who have been involved in research collaboration with the Physics Division for the past few years will return this year. In order to maximize the scope of the program, existing educational programs are utilized to supplement support for some of the participants and more formal collaborative arrangements are being discussed.

### c. **Gammasphere Operations** (M. P. Carpenter, C. J. Lister, R. V. F. Janssens, N. Hammond, T. L. Khoo, T. Lauritsen, E. F. Moore, D. Seweryniak, F. G. Kondev,\* P. Chowdhury,† S. J. Freeman,‡ and S. F. Zhu)

In the fall of 2002, Gammasphere was successfully relocated from Berkeley National Laboratory to the ATLAS facility at Argonne. All Ge detectors were annealed and all BGO bases repaired. Gammasphere was reassembled in area IV on the FMA beam line during January 2003.

In February, 2003, a beam of  $^{58}\text{Ni}$  was tuned into the Gammasphere target chamber. A test experiment using a  $^{40}\text{Ar}$  beam on various targets took place 3/11/03 – 3/14/03 with 93 Ge detectors operating in the array. The first PAC approved experiment was performed with Gammasphere during the period 3/17/03 - 3/22/03.

Through the end of the year, thirty PAC experiments have been completed using Gammasphere.

Gammasphere has been operating for a decade, and the effects of age are beginning to show. For example, in-house repairs have been performed on ~ 20 Ge detectors this year due to various problems. Four other detectors had to be sent back to the manufacturer for repairs. In order to operate Gammasphere with as many Ge counters as possible, three new detectors were purchased this past year and we are waiting for them to be delivered.

Due to failures of the resistors along the bias chain, we continue to see breakdowns on the BGO PMT bases. This results in a non-responsive channel. The PMT can be repaired by locating the failed resistor and replacing it, however, this is a very time consuming operation. It is our plan to replace all of these bases with new components which we feel is the most cost effective solution to this problem.

Finally, several upgrade paths are being pursued. A replacement for the dual crate VME acquisition system has been developed and is in the final stages of debugging. VME readout capabilities are also in the design phase with implantation expected sometime late 2004 or early 2005. Finally, a move of Gammasphere from the FMA beam line to the old APEX beam line is currently being planned.

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\*Technology Division, Argonne National Laboratory, †University of Massachusetts, ‡University of Manchester, United Kingdom

#### **d. Homeland Security Activities**

##### **Scientific Support of the Radiological Assistance Program (E. F. Moore)**

The Radiological Assistance Program (RAP) is a nation-wide Department of Energy emergency response asset which provides support to the Department of Homeland Security and other Federal, state, Tribal, and local agencies in the event of a radiological accident or incident. RAP is implemented on a regional basis and has eight Regional Coordinating Offices (RCO's) in the U.S. The Region 5 RCO is based at Argonne. Region 5 serves the states of Illinois, Indiana, Iowa, Michigan, Minnesota, Nebraska, North and South Dakota, Ohio, and Wisconsin. RAP teams from one region can integrate into and assist RAP teams from other regions, as well as other national DOE assets.

The RAP mission is to provide a flexible, around the clock response capability for radiological emergencies. The RAP teams consist of a small core of full-time personnel, with the majority of the members being volunteers from the DOE facilities in which they are

based. The team members have extensive experience in various aspects of health physics, nuclear physics, and radiation safety.

Frank Moore of the Physics Division serves as a volunteer on the Region 5 RAP team. Among his duties are the testing and evaluation of radiation detection equipment, the training of other team members in the use of some of the specialized equipment, the analysis of measurements obtained in the field, and deployment on RAP responses.

Frank was also appointed this year to the RAP Equipment Advisory Team, which has the responsibility to evaluate new equipment and advise DOE Headquarters and the RAP regions on issues related to the purchase and use of radiological equipment.

#### **e. Repair of Germanium Detectors for National RAP Teams (C. J. Lister and E. F. Moore)**

Around the nation, based mainly in the National Laboratories, RAP teams are deployed to allow quick response to national emergencies. One aspect of the RAP capability is the facility to detect and assay radiological releases into the environment. This involves a variety of equipment, but germanium detectors are vital tools for spectroscopic assaying. In general, these high-resolution spectrometers are rather delicate and do not respond well to field usage. Fortunately, some quite simple preventative maintenance can keep the counters available for use.

At Argonne we have an annealing and refurbishment factory, built for the maintenance of Gammasphere detectors. When Gammasphere is moved from laboratory to laboratory, this factory is fully utilized, but between moves there is significant spare capacity for preventative maintenance. We have proposed to DOE that we use our excess capability to perform routine maintenance on detectors for the national RAP teams. To date, eight detectors have been tested, diagnosed and refurbished. Only one was in such poor

condition that it needed return to its manufacturer, ORTEC, for a full rebuild. It is expected that this routine diagnosis and treatment of minor problems will keep the national inventory in top condition for a modest cost, and will serve as a diagnosis station for identifying detectors that need full factory

refurbishment. We are working to put the administrative tools in place for this repair work to be a constant, low level activity in the laboratory, with a minimum amount of paperwork and a rapid turnaround time.

**f. Scientific Support of SciTech Museum Exhibits and Outreach Programs**  
(D. Henderson)

SciTech (Science and Technology Interactive Center) is a hands-on science museum located in Aurora, Illinois, near Argonne. With the help of volunteers and institutional support from Argonne, Fermilab, and several technological companies, SciTech has become an acknowledged leader in developing exhibits to teach modern science in a museum context.

D. Henderson of the Physics Division serves voluntarily as an exhibit developer on a regular basis. Several

other staff members volunteer from time to time. The Physics Division collaborates with SciTech in developing exhibits for the museum and for use in Argonne's public educational activities. These efforts involve no significant programmatic costs.

Mr. Henderson has been awarded, by Kane County, a certificate of appreciation for his volunteer efforts at Scitech.

