VI. OTHER EDUCATIONAL AND COMMUNITY OUTREACH ACTIVITIES

OVERVIEW

Education remains a key part of our mission, especially training young nuclear physicists for the next generation of research, stewardship and homeland security. We are involved in many programs, including education at undergraduate, graduate, and post-doctoral level. We are also involved in using our expertise and capabilities to support programs in local Universities and in our community.

a. Minority Program (B. Zeidman)

The primary aim of the minority program is increasing the number and quality of minority participants in physics and other sciences. This involves ongoing interactions with minority students and faculty during visits to colleges and universities with substantial minority populations and a number of other activities. Among these efforts is inclusion of qualified scientists and students from minority institutions in research being performed by ANL scientists; e.g., collaborations on experiments, short-term appointments, and internships, such as SRP and SULI. In addition, attendance at meetings of minority organizations and visits to educational institutions provide chances for individual interactions and discussion of a wide variety of topics, e.g., research opportunities at ANL and other DOE laboratories, graduate education, internships, employment possibilities, etc., that influence choices of major field and career development.

The strongest interactions with minority students result from visits to minority institutions where it is possible to have discussions in depth with individual students. During the academic year, the program involves recruiting trips to minority schools, having been visited in prior years. Included in these visits were seminars that discussed research performed by the Physics Division, particularly in the Medium Energy and Heavy Ion programs. Since ANL experiments at JLab include collaborators (both faculty and student) from some of these universities, (e.g., Florida International University, Hampton University, North Carolina A&T University, Southern University, New Orleans, UTEP) some members of the audience are often active participants in the research being discussed. Inasmuch as many students from these colleges may also have been at ANL as participants in the SRP and SULI (ERULF) programs, it is possible to make direct connections between the research being discussed and persons present or known to the audience. SRP and SULI students recruited under the programs performed research in several ANL divisions other than PHY during the past year. Institutions recently visited include: Clark-Atlanta University; Morehouse; Spelman; North Carolina A&T; North Carolina Central; Hampton; Norfolk State; Howard University; Morgan State; Fisk; and Vanderbilt. Southern University, Xavier University, and Dillard University are visited annually. A FAST (Faculty And Student Team) team from Southern-Baton Rouge worked with the RIA group during the summer.

The detailed discussions with students that occur during visits to their home institutions are often followed by discussions during meetings of minority organizations. Frequently, students will introduce me to other students who share common interests and attempt to recruit them to apply to ANL as well. One major area of overlap is that between PHY and HEP where the common interest in particle physics is particularly attractive. Another benefit of these interactions is an opportunity to outline features of the DOE labs and describe the complementary nature of their programs. Indeed, sometimes they effect other activities which include: serving on the Advisory Board of the COSM center at Hampton University and on the Advisory Committee of the ITSSTEM program at North Carolina Central University; attending meetings of the National Conference of Black Physics Students; participation in meetings of the National Society of Black Physicists and of the National Society of Hispanic Physicists.

Another activity involves serving as Distinguished Adjunct Professor in the Physics Department at Hampton University and thesis advisor or committee member for PhD students. A number of Hampton PhDs have received degrees based upon data from ANL experiments, one of who is currently an Asst. Prof. at Norfolk State University. A number of former undergraduate interns have returned to perform their thesis research at ANL under the supervision of ANL scientists. Some of the interns who have received their Ph.D. degrees have been named in previous reports.

b. Third RIA Summer School (R. V. F. Janssens, E. F. Moore, C. Davids, D. Seweryniak, A. Hecht, K. Sharma, J. Clark, Y. Wang, M. P. Carpenter, T. L. Khoo, S. Zhu, C. J. Lister, F. G. Kondev, S. Fischer, I. Ahmad, B. Back, D. Peterson, and J. P. Greene)

The RIA Summer School, held within the Physics Division (PHY) and the Division of Educational Programs (DEP) at Argonne National Laboratory from August 8 to 14, 2004, was the third of a series of summer programs aimed at educating young researchers about the challenges of radioactive ion beam physics. Through these annual schools the research community continues to educate young scientists so that they will be able to exploit fully the opportunities created by the Rare Isotope Accelerator (RIA). All the schools held thus far have been jointly organized by the 88-Inch Cyclotron (I. Y. Lee), ATLAS (R. Janssens), HRIBF (W. Nazarewicz), and MSU/NSCL (B. Sherrill). This annual event will continue to rotate among these laboratories, with the next school scheduled to take place at Berkeley from July 31 to August 6, 2005.

Fifty two graduate and postdoctoral students attended the school. The participants came predominantly from 25 U.S. universities and national laboratories, with an additional small participation by students from Canada (1), Europe (4) and Israel (1). The Local Organizing Committee consisted of A. Bernstein (budget, PHY), S. Fischer (hands-on program, DePaul Univ. and PHY), E. F. Moore (secretary, PHY), H. Myron (coordination, DEP), C. Reynolds (administration, DEP), F. Vivio (budget, DEP), and R. V. F. Janssens (coordination, school director, PHY).

The summer school had four main components. The mornings were devoted to lectures on major breakthroughs in RIA science. The lectures covered topics in both the experimental and theoretical physics of nuclei far from stability. The main topics of the third RIA Summer School lectures were:

- Nuclear Reactions with Exotic Beams - K. Kemper (FSU)
- Nuclear Astrophysics and the Origin of the Elements - G. Fuller (UCSD)
- Nuclear Structure Theory of Rare Isotopes- J. Dobaczewski (UT/ORNL and Warsaw University)
- Excitations in Neutron-Rich Nuclei with γ-Ray Spectroscopy Techniques - Th. Glasmacher (NSCL, MSU)

Shorter lectures focused on various aspects of exotic beam physics and on techniques and developments specific to RIA itself. These were:

- Accelerator Mass Spectrometry - P. Collon (ND)
- Exotic Beams at ATLAS – R. Pardo (ANL)
- Ion Trapping – Z.-T. Lu (ANL & UC)
- The RIA Concept – G. Savard (ANL & UC)

The afternoons provided opportunities for "hands-on" demonstrations of experimental equipment and techniques useful in RIA research. The hands-on part of the program was held at the ATLAS facility, was coordinated by S. Fischer (DePaul Univ. & ANL) and involved the participation of a large number of scientists from the ANL Physics Division staff, and of some of the lecturers and organizers of the Summer School. A safety lecture by T. Mullen (ANL, Physics Division) was part of the school's program and was a pre-requisite for participation in the "hands-on" activities. Every student participated in 5 of 7 of the following activities:

- In-Beam Measurement at the Fragment Mass Analyzer
  Cary Davids, Darek Seweryniak and Adam Hecht
- Mass Measurement Using the Canadian Penning Trap
  Kumar Sharma, Jason Clark and Yuyan Wang
- Compton Suppression of a Ge detector + $\gamma\gamma$ Coincidences with Gammasphere
  Mike Carpenter, Teng Lek Khoo and Shaofei Zhu
- Ge Double-Sided Strip Detectors and an Introduction to γ-Ray Tracking
  Kim Lister, Filip Kondev, and Susan Fischer
- X-Ray Fluorescence and γ-Ray Absorption
  Irshad Ahmad and Frank Moore
- "Heads-On" Theory Session
  Jacek Dobaczewski and Witek Nazarewicz
- α-Particle Measurements Using Si Detectors
  Birger Back and Don Peterson
- An Introduction to Target Making
  John Greene and Janelle Neubauer

Participants had the opportunity to present 10-minute talks on their research projects at their home institution. This last part of the program also included a questions-answers session with the morning lecturers about the lectures of that day. On one evening a special session was devoted to RIA R&D activities. It gave the students an overview of the many development activities going on in U.S. laboratories and was also an opportunity to see some of the RIA hardware currently under development. During the entire duration of the school, there were also numerous opportunities for open discussions between students and lecturers in an informal setting.

c. 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 and 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 supplemented by 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 RAP team captain on a volunteer basis with the region 5 team. Among his RAP related activities are the testing and evaluation of radiation detection equipment, the training of other team members in the use of some of the specialized detection equipment, the analysis of measurements obtained in the field, and deployment on

RAP responses and exercises. Frank has also participated in outreach and training activities with the Chicago Fire Department and members of the Illinois National Guard.

Frank serves as a member of 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 detection equipment.

d. Repair and Refurbishment of Germanium Detectors (C. J. Lister, R. V. F. Janssens, P. Wilt, M. P. Carpenter, E. F. Moore, and S. Zhu)

The infrastructure for keeping Gammasphere operational at a high level of performance is deep. For routine maintenance, and especially for times when Gammasphere is moved, our annealing laboratory, the "in-cryostat" repair capability, our mechanical and electronic engineering experience, and our testing and diagnosis capability are essential.

When Gammasphere is running smoothly some excess capability is available. During these times of lower activity we have used our capabilities to evaluate and perform minor repairs on detectors from around the nation, but especially from local universities, RAP teams, and laboratories. Often, minor problems can be repaired immediately. For more serious problems, a detailed diagnosis can be made which helps expedite factory repairs at the detector manufacturer. Our annual turnover of repairs is 6-10/yr.

This outreach effort is beneficial to all concerned: it exercises our capabilities and keeps our facilities in top condition, it helps train young people in detector maintenance, and it supports research in local facilities. We continue to explore expansion of this program and finding effective cost-recovery mechanisms.