Armenia's Cosmic Ray Division Makes International Impact

It was a year ago when BAFA introduced its newest project, Advanced Science. This project complements BAFA's objectives in meeting immediate humanitarian needs in Armenia, and further expands its support of long-term development opportunities. We chose Armenia's Cosmic Ray Division (CRD) as our first Advanced Science venture, because of its excellent track record, international scope, and potential to stand on its own one day. Despite severe economic hardships, the CRD continues to advance primarily due to the dedication of its scientists who are committed to staying in Armenia. For details about this vital and vibrant scientific organization, please refer to the previous two issues of the BAFA newsletter, ARIT, and the following web sites:
www.BAFA.org & www.crdfriends.org.

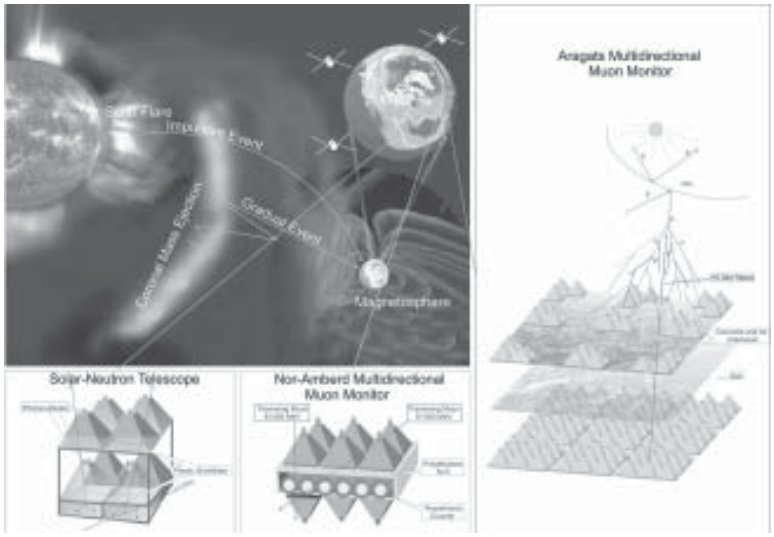
During the past year, the CRD's many great advances and accomplishments, have once again, proved it international standing. Armenia's CRD made a strong presence at the international workshop on Space Weather Forecasting in Rhodes, Greece, sponsored by NATO in March 2003. Professor Ashot Chilingarian, head of the CRD, shared his team's cutting edge research conducted at the high altitude research stations on Mt. Aragats in Armenia. The work at the CRD was so valued that the participants called for a follow-up workshop to be held in Armenia in the fall of 2004.

You, the BAFA friends, are instrumental in CRD's progress and we thank you for your continued support. In this article I thought it would be interesting to focus on one of CRD's most important projects, Space Weather.

When we think of weather, we typically think of temperature, humidity, rain, and wind. Space weather is different from that. Space weather is created by the arrival of particle "showers," and the commencement of geomagnetic "storms" as a consequence of violent irruptions on the sun. The condition is at its severest every 11 years, and currently, we are near the peak.

The loss of several billion-dollar satellites has been attributed to severe space weather in the past couple of decades. Severe space weather can also potentially harm astronauts in the space station and on shuttle flights, if it is undetected and mitigating action is not taken to protect against it. NASA's extensive investigation for what caused the catastrophic Columbia tragedy included a study of space weather effects. In that particular case, however, the cause was ruled out.

The CRD employs 100 highly skilled personnel and puts Armenia among the top 5 countries in the world with its expertise in the field of Cosmic Ray research. Using the monitors at the two high altitude stations atop Mt. Aragats, the CRD Scientists have gathered proof-of-principle data to demonstrate that with their techniques, they can predict the arrival of severe space weather approximately half an hour in advance, allowing ample time for mitigating action to save orbiting satellites and space personnel. In the past year, the CRD has written more than 10 articles for refereed international scientific journals, which were accepted for publication. This is an excellent track record on par with any major scientific institution in the world. CRD's article on Gene Expression Analysis is the 7th most downloaded paper from the Mathematical Biosciences journal web site. CRD's advances in the field of space weather have attracted the strong interest of the scientists from NASA, NOAA (National Oceanographic and Atmospheric Agency of the U. S.) and many European organizations.



Newly designed detectors by the CRD scientists to monitor how space weather happens from the sun

Undergraduate and Graduate students from the Yerevan State University continue to come to the CRD headquarters twice a week for lectures and hands on experience. Ph.D. students continue their thesis work under the watchful eyes of the CRD scientists, and the guidance of Professor Chilingarian.

Perhaps the following comments by Professor Johannes Knapp, High Energy Astrophysicist from the University of Leeds in Leeds, UK, best express the importance of CRD: *"I*

firmly believe that the Cosmic Ray Division at the Yerevan Physics Institute pursues very interesting and timely questions in the field of cosmic ray and solar physics research; enjoys international reputation for both its experimental work and its know how on novel analysis techniques; is internationally competitive (given the appropriate financial support); makes best use of the available infrastructure and personnel and builds on the invaluable experience of the people working there; and last but not least provides an excellent platform for students' education in theoretical and experimental physics as well as modern analysis techniques. I strongly support the continued and increased financial support of the scientific projects of this group. I also suggest providing funds for the maintenance of the Mt. Aragats infrastructure which once gone, will be nearly impossible to rebuild."

Some of the scientists, technicians, and students at Armenia's Cosmic Ray Division following a seminar at the Yerevan headquarters

Due to the perseverance of the Armenian scientists, technicians and support personnel, under severe financial difficulties, the CRD continues to be an internationally recognized and valued Armenian scientific institution. Recently the Armenian government has issued a postage stamp to commemorate 60 years of excellence at the Cosmic Ray Division. Please see the CRD merchandise section of the www.crdfriends.org web site for how you may purchase the first-day issue of the CRD commemorative stamp, envelop and postcard.

CRD's success is in part possible because of your generous financial support, and the staying power of all involved. We thank you for investing in the CRD and thus, the future of Armenia. We ask you to stay with us until together we can reach the goal of making the CRD totally self-supporting through international scientific grants.

Anahid Yeremian

Postage stamp issued by the Republic of Armenia to commemorate 60 years of excellence at the Cosmic Ray Division