

# CRD FRIENDS

## NEWSLETTER



Volume 1, Number 1

[www.crdfriends.org](http://www.crdfriends.org)

OCTOBER 2007

### LAUNCHING THE CRD FRIENDS NEWSLETTER

Welcome to the first **CRD FRIENDS NEWSLETTER**, the publication of the **Support Committee for Armenia's Cosmic Ray Division (SCACRD)**.

As the achievements of the Cosmic Ray Division (CRD) of the Alikhanyan Physics Institute in Armenia multiply, it becomes more and more difficult to fit all the progress on a single sheet of letter-sized paper. We aim to use the medium of this semiannual newsletter to share with you CRD's latest achievements, partnerships, and progress, as well as the Diaspora's involvement.



The CRD, one of the top five cosmic ray research organizations, operates the world's most extensive high-altitude, ground-based facilities studying space weather. But due to the economic difficulties in Armenia, CRD's resources are extremely limited. **The SCACRD was formed to raise Diaspora awareness about CRD's research and to help the outstanding scientists working IN Armenia.**

Founded in 1943 by two world-renowned physicists, brothers Artem and Abraham Alikhanyan, the CRD has a 65-year tradition of scientific excellence and education of young university graduate students. The CRD's research stations, *Nor Ambert* and *Aragats*, are located on Armenia's Mt. Aragats at elevations of 6,500 feet and 10,500 feet, respectively. The main computation center and CRD headquarters are in Yerevan, Armenia's capital. Electric power lines and the road on Mt. Aragats up to 10,500 ft. elevation were constructed to serve the CRD research stations. It would cost nearly one billion dollars to construct this infrastructure today.

The Diaspora partnership with the CRD, through financial, networking, and equipment support, continues to play a key role in CRD's world-class achievements. We want to thank all CRD supporters and urge others to back this important cause.

To learn more about the CRD and its importance to Armenia and the world, please visit [www.crdfriends.org](http://www.crdfriends.org).

Anahid D. Yeremian

### YOU ARE INVITED TO A RECEPTION WITH PROF. ASHOT CHILINGARIAN, HEAD OF COSMIC RAY DIVISION

*A short presentation by Prof. Chilingarian and a Q & A from the audience  
Will be followed by wine and refreshments.*

Sunday, December 9, 2007 from 2:00 – 4:00 pm  
St. John Armenian Church  
275 Olympia Way, San Francisco, CA  
Free Admission.

**RSVP by November 21, 2007**

**THE EVENT IS OPEN TO THE PUBLIC. PLEASE SPREAD THE WORD**

## WHAT ARE COSMIC RAYS?

Cosmic rays are subatomic particles originating from space. Cosmos means space in Greek. These particles, invisible to the naked eye, are detected with sophisticated instrumentation and analyzed with special mathematical algorithms. Physicist Victor Hess was the first to discover Cosmic Rays in 1913.



*Victor Hess and his first Cosmic Ray Detector*

The instruments used today on Mt. Aragats are very large and extremely complicated. Their location is optimal, allowing the maximum amount of information to be obtained from the acquired data.

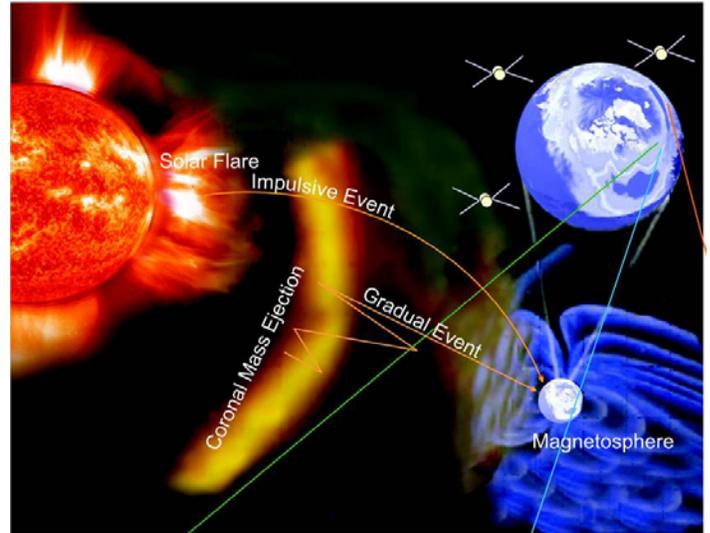
Many people are unaware that we are continually subjected to a shower of cosmic radiation. We are partially protected from this radiation by the earth's atmosphere and magnetic field. Pilots and others who spend a significant amount of time flying above 30,000 feet get more radiation per year than the average person.

Cosmic rays are produced by distant stars as well as our closest star, the sun. The analysis of cosmic radiation data enhances our understanding of the processes that create this radiation. Cosmic rays from the most distant sources are affected by various forces in intergalactic space and pose immense challenges to those who attempt to determine their origins and the processes that created them.

Cosmic ray research seeks to gain understanding of the origin of cosmic rays and the story they tell about our universe. A particular interest is the sun and its effects on the earth and other planets.

## WHAT IS SPACE WEATHER?

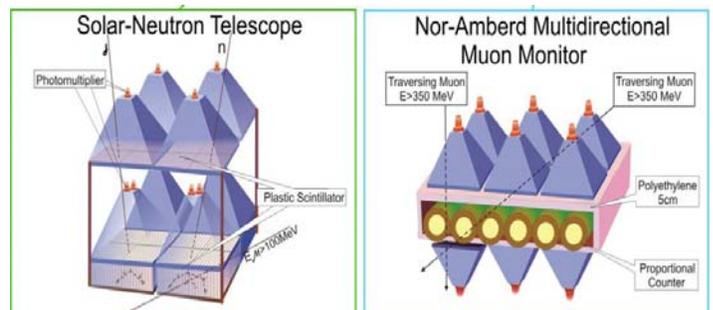
Space weather research is the special part of cosmic ray research which deals with the particles, radiation, and magnetic fields and related forces emanating from the stars and, in particular, from our sun.



*Violent explosions on the sun create Space Weather*

The effects of cosmic rays on the near-earth environment is called "space weather". Space weather effects include geomagnetic storms, which disturb the earth's magnetic field and can cause disruption of power distribution networks, resulting in electrical blackouts. Radiation storms can be dangerous for people in flight and can damage satellites. In addition, radiation storms can cause the ionosphere, the uppermost layers of the earth's atmosphere, to expand and thus interfere with satellites in low-earth orbit. Thus, the ability to forecast space weather events is important for technically advanced societies.

The Aragats Space Environmental Center (ASEC) of the Cosmic Ray Division (CRD) of Armenia's Alikhanyan Physics Institute is a vital part of the world-wide effort to understand and forecast space weather. Indeed, the ASEC is the world's best and most extensive ground-based space weather research center.



*A diagram of some of the Cosmic Ray detectors on Mt. Aragats.*

## CRD AT SOLAR EXTREME EVENTS SYMPOSIUM IN ATHENS, GREECE

The Armenian delegation to the third international symposium on Solar Extreme Events (SEE) from September 24-28, consisted of A. Chilingarian, G. Hovsepyan, A. Raymers, S. Chilingaryan, K. Arakelyan and A. Yegikyan. The SEE series of conferences was launched by co-chairs Prof. Ashot Chilingarian, head of the CRD, and Prof. Mikhail Pansyuk, head of Nuclear Physics Institute at Moscow State University (MSU). The first SEE conference was held in 2003 in Moscow and the second in 2005 at Nor Amberd, Armenia. In 2008 it will be in Lvov, Ukraine, and in 2009 it will be back in Armenia.

The seven reports presented by the Armenian delegation at SEE-07 detailed CRD's new approach for hybrid particle detectors for monitoring both neutral and charged components of secondary cosmic rays for space weather forecasting and solar physics research.

The SEVAN (Space Environmental Viewing and Analysis Network) world-wide particle detector network, spearheaded by the CRD, will use all the advantages of the new detectors and will provide a firm basis for future space weather forecasting services.

Another presentation by the Armenian delegation discussed methods to improve the world-wide network of neutron monitors to gain more detailed information about space. Forty countries are collaborating on this effort, including Armenia.

The head of the CRD, Professor Ashot Chilingarian, participated as a delegate in meetings of the INTAS (International Network for Technology and Advanced Science) consortium. Other delegates were Prof. R. Hippler (University of Greifswald, Germany), Prof. E. Fluckiger and Dr. R. Bitgoffer (University of Bern, Switzerland), and Prof. Lev Dorman (Tel Aviv University and Israel Space Agency).

The Armenian delegation was a key participant in numerous discussions of the "Real-Time Database for High-Resolution Neutron Monitor Measurements." This twelve-country European project aims to join data from facilities in each of the member countries for further analysis for the purpose of issuing space weather alerts. The electronics and data-acquisition software developed by CRD were highly appreciated by the project participants.

Overall, Armenia's participation in the SEE-07 conference was strong and effective.

## CRD IN MOSCOW AT THE 50TH ANNIVERSARY OF SPACE EXPLORATION

The Space Forum in Moscow, devoted to the celebration of the 50th anniversary of the launch of Sputnik on October 4, 1957, consisted of several symposiums at the Russian Academy of Sciences.

The heads of NASA, ESA, ROSCOSMOS, and other leading space science organizations from many countries attended. Professor Ashot Chilingarian, head of the Cosmic Ray Division of the Alikhanyan Physics Institute, represented the Republic of Armenia. The speeches at the festive events emphasized landmarks of human achievement in space. It is worth mentioning that only the Armenian and Ukrainian representatives, from among all the former Soviet Union republics, were invited to make speeches at the forum.

Several key meetings between Professor Chilingarian and current partners solidified and identified future prospects for cooperation and for submitting joint proposals to funding agencies.



*Prof. Chilingarian, Prof. with Prof. R. Bohnne, president of COSPAR at the Forum on Space Research*

In a meeting between Professor Chilingarian and Professor Bohnne, president of COSPAR (Committee On SPACe Research), there was a suggestion to organize one of the COSPAR schools in Armenia. A particular aim of the school will be to train groups from the ten countries hosting the SEVAN detectors. The SEVAN detectors will be designed and made in Armenia.

Fortunately, the situation for Russian science funding has improved significantly in the past year. When the directors of the primary Russian space science institutes met, they were able to discuss their mutual interests in establishing joint research projects and writing proposals for grants.

## SUMMER INTERNSHIP AT THE CRD

Educating the next generation of scientists and engineers is a high priority at the CRD. More than fifteen graduate and post-graduate young scientists and engineers conduct their research or work at the CRD.

Approximately twenty third-year undergraduate physics students from Yerevan State University attend lectures at the CRD as part of their coursework.

The graduates from CRD's Ph.D. program are offered opportunities to work at the CRD as research assistants, with the possibility of promotion to senior scientist status in a few years.

In the summer of 2006, CRD launched a new program of accepting summer interns from the Diaspora. In 2007 three university interns and two high school students participated. The program was headed by CRD's most recent young Ph.D. graduate, Dr. Artur Raymers, under the mentorship of Prof. Chilingarian. Diaspora interns paid their own expenses and received no salary during their internship, but the experience they gained both in science and technology and by being immersed in the *Hayastan* culture has proven to be pivotal for them.

As Artur Raymers said, "It is important for Armenia and Diaspora students to learn and work together at the CRD. We place high priority on this."

While the students from Armenian universities are accustomed to the valuable experience they get working at the CRD, it was refreshing to hear similar impressions of the Diaspora students:

"I learned how the entire worldwide GPS and the NTP systems work and how to configure one. It was a lot of learning, but I enjoyed every minute of it." Paul Keutelian, Univ. of Illinois.



*2007 Summer Interns from Armenia and Diaspora*

"Karen Arakelyan was my advisor in electronics. He explained both the physics and practical steps for my assignments. He also imparted much knowledge about Armenia as a whole to me. I can easily call him my friend." Raffi Mardirosian, Stanford Univ.

"Artur really wanted us to have a good experience. He was VERY generous with his time to teach us." Paul Strauch, College Preparatory School, Oakland, CA.

"If I had to choose only one favorite part of the program, I would have to say the weekly Wednesday evening meetings, when Prof. Chilingarian's students made presentations on their research, and professors, scientists, and other students asked questions. Then Prof. Chilingarian made a presentation on his own research. There was something special about witnessing this group of highly motivated and intelligent young Armenians enthusiastically sharing their research to a genuinely interested audience. It gave me a refreshing glimpse into a bright future for Armenia's youth." Arpy Mikaelian, U. C., Davis.



**SAVE THE DATE AND PLAN TO ATTEND:**  
**SATURDAY, MAY 3, 2008, AT 2:00 PM, BENEFIT CONCERT FOR THE CRD AT THE CALIFORNIA PALACE OF THE LEGION OF HONOR, SAN FRANCISCO**

SCACRD operates under the umbrella of the Armenian Engineers and Scientists of America Inc. (AESA), a 501 (c) 3, tax-exempt (ID 95-3957498), charitable organization dedicated to promoting scientific and engineering excellence in the United States and Armenia. AESA has chapters in California, Michigan, and greater Metropolitan Washington DC area. [www.aesa.org](http://www.aesa.org)

In Armenia, the committee operates under the umbrella of the National Foundation for Science and Advanced Technology (NFSAT), a non-profit, non-governmental, independent organization dedicated to the promotion and funding of science and education for peace in Armenia. [www.nfsat.am](http://www.nfsat.am)

AESA and NFSAT's financial integrity are assured by annual audits in accordance with international standards by both the IRS and the independent company Grant Thornton International.