

1st Meeting of the Advisory Committee (AC) of the ASEC Collaboration Nor Amberd, 17 May 2019

Minutes:

Attendance:

Committee members: J. Knapp (chair), H. Gemmeke, M. Panasyuk, E. Mareev, A. Petrukhin, R. Mirzoyan, M. Fleischer

AANL Director: Ani Aprahamian
CRD Director: Ashot Chilingarian

Members of the ASEC Collaboration and guests of the Cosmic Ray Department.

Welcome:

A. Chilingarian welcomes the AC members and the Collaboration Members of the Aragats Space-Environmental Center (ASEC) attending. This is the constituting meeting of the AC, whose task it will be to advise the Collaboration and the CRD and YerPhI management about research projects conducted at the Aragats and Nor Amberd facilities

Presentation of the ASEC activities:

The Spokesperson of the ASEC Collaboration, A. Chilingarian, presents the current status and the plans of the collaboration for 2019. (slides available on the ASEC webpage)

Questions & Answers:

H. Gemmeke: suggests to collaborate with LOFAR on lightning issues.

A. Chilingarian: appreciates such a collaboration; ASEC can provide logistics for LOFAR antennas at Aragats. ASEC locates lightning discharges with an interferometer and a network of circular antennas and synchronizes it with particle fluxes on microsecond time scales.

J. Knapp: What will likely be the results of ASEC Collaboration in the end of 2019?

A. Chilingarian: Results on TGE and atmospheric electricity physics, as well as on lightning initiation. A new main topic of our research - Natural Gamma Radiation (NGR), one of the major geophysical parameters and is directly connected with cloud electrification, lightning initiation and, thus, with possible changes in the operation of the global electric circuit (GEC) due to climate change. At low energies, NGR is due to natural isotope radiation, at mid energies it is based on the newly discovered electron accelerators in thunderclouds and at high energies it comes from solar protons and electrons and from ionizing radiation in our Galaxy and the Universe. We developed facilities and methods

to investigate all these energy domains. Our detectors, registering atmospheric discharges and particle fluxes, are synchronized on microsecond time scales and are among the best in the world for this purpose. Research results will be shown first at the TEPA-2019 conference, then submitted to journals. Each month preliminary analysis results are available from CRD sites as slides from the Tuesday seminars at the Cosmic Ray Department (CRD).

H. Gemmeke: Do you plan to install some more detectors?

A. Chilingarian: An improved interferometer for lightning localization is installed and we wait for lightning flashes to tune it; a 6 m² scintillation detector is planned to be installed under the roof of the second experimental hall at August. Two SEVAN detectors are planned to be installed at DESY Hamburg and Berlin and included in the SEVAN network.

M. Panasyuk: Which Gamma Ray detectors are planned for operation on Aragats?

A. Chilingarian: To finally decide on the origin of the additional flux of low energy gamma rays (0.3 - 2 MeV) during disturbances of the electric field on Aragats we plan a campaign with different spectrometers, including a high-precision Germanium spectrometer.

J. Knapp: How many people do you have to work for ASEC? What is the manpower per activity?

A. Chilingarian: 45 people, 15 PhDs, and engineers (chart attached).

A. Yeremian: How do you organize the activity of CRD?

A. Chilingarian: I and my deputy Karapetyan Tigran coordinate ASEC activity.

H. Gemmeke: Priorities of different projects?

A. Chilingarian:

1. Efficient Registration of TGEs on time scales from nanosecond to minutes, in the energy range from 0.2 to 100 MeV.
2. Simultaneous registration of the atmospheric discharges and particle fluxes on nanosecond time scales; research on high-energy particle production in thunderstorms.
3. NGR research: measurement of differential energy spectra in interval 0.3 -100 MeV; investigation of the structures of energy spectra at high and low energies;
4. Registration of the individual Extensive Cloud showers (ECSs) initiated by CR electrons entering a strong electrical field and initiating a electron-photon cascade;
5. Location and time evolution of lightning strikes.
6. Investigate possible direct connections between solar and atmospheric physics (for instance the relation between CME and lightning).
7. Frequency of different lighting types and corresponding particle fluxes.

We plan to do all and present reports at the TEPA conference in October: items 4 and 6 depend on the occurrence of very strong solar and atmospheric activities in 2019.

After discussions in the AC, the following Action Items were formulated to be addressed by ASEC Collaboration until the next meeting.

Action Items:

- For the benefit of the ASEC AC, please provide a mission statement of the Cosmic Ray Department, including directions of research and technology, aims (scientific & organizational) for the next decade, development of the department (staff, technology, talent management), ... This eases the assessment of suitability of proposed projects for the future.
- The AC should get an official mandate for its work, defined by the CRD Directorate. The by-laws should spell out the working details of the advisory committee.
- Clarify the structure of, and the relation between, CRD and ASEC.
(ASEC: scientific collaboration; CRD administrative unit of AANL and host of ASEC activities.)
- Provide information on the current resources (staff, investments, equipment) for CRD, ASEC and the various subprojects within ASEC and CRD. Define the resource needs for operation and possibly extension in the near-term future.
- Identify the main problems you perceive for successful research in the near future.
- Provide your plans for recruiting and retaining good staff as well as for attracting and educating new young people in the near-term future.
- Facilitate communication between international groups in order to explore common scientific interests in the community for potentially joint measurements at the ASEC.
- Put all the information and documents relating to ASEC and the AC Meetings on a dedicated and well-structured website.
- Improve the CRD webpages so that relevant information can readily be found (e.g. structure of CRD and ASEC, responsible staff with their duties and contact details, list of seminars, publications, pdfs of publications).

Resume:

The AC supports the current activities at ASEC, the developments that have been started and the plans presented at the meeting. The action items listed above will put ASEC, with the help of the ASEC AC, on a good track for future research at Aragats and Nor Amberd.

Signed by

J. Knapp (AC Chair)

M. Zazyan (ASEC Secretary)

Noted by

A. Chilingarian (ASEC Spokesperson)