



P.O. Box 655
Irvine Park, CA 94026

Symposium

Thunderstorms and Elementary Particle Acceleration (TEPA-2016)



GENERAL INFORMATION:

TIME FRAME: October 3-7 2016

LOCATION: Nor Amberd International Conference Centre of the Yerevan Physics Institute,
Byurakan, Aragatsotn District, Armenia.

SYMPOSIUM WEBSITE:

<http://crd.yerphi.am/Conferences/tepa2016/home>

ORGANIZERS:

Cosmic Ray Division of Yerevan Physics Institute, Armenia

Skobeltsyn Institute of Nuclear Physics of Moscow State University, Russia

INTERNATIONAL ADVISORY COMMITTEE:

- *Ashot Chilingarian, Yerevan Physics Institute, Armenia, co-chair*
- *Lev Dorman, Israel Cosmic Ray Center and Emilio Segre' Observatory, Israel*
- *Joseph Dwyer, Space Science Center (EOS) and Department of Physics University of New Hampshire , USA*
- *Gerald Fishman, NASA-Marshall Space Flight Center, Huntsville, USA)*
- *Hartmut Gemmeke, Karlsruhe Institute of Technology, Germany*
- *David Smith, University of California, Berkeley*
- *Johannes Knapp, DESY Zeuthen, Germany*
- *Karel Kudela, Institute of Experimental Physics, Slovakia*

- *Alexandr Lidvanski, Nuclear Physics Institute, Russian Academy of Science, Russian Federation*
- *Jean Lilensten, Institut de Planétologie et d'Astrophysique de Grenoble, France*
- *Evgeny Mareev, Institute of Applied Physics, Nizhny Novgorod, Russian Federation*
- *Razmik Mirzoyan, MPI, Munich, Germany*
- *Yasushi Muraki, STE laboratory, Nagoya University, Japan*
- *Michail Panasyuk, Moscow State University, Russian Federation, co-chair*
- *Marco Tavani, INAF and University of Rome "Tor Vergata", Italy*
- *Tatsuo Torii, Japan Atomic Energy Agency, Tsuruga, Japan*
- *Harufumi Tsuchiya, Cosmic Radiation Laboratory, Riken, Japan.*
- *Lev Zeleny, Space Research Institute, Russian Academy of Sciences, Russian Federation*

BACKGROUND:

The problem of thundercloud electrification and the mechanism of initiation of lightnings inside thunderclouds is one of the biggest unsolved problems in the atmospheric sciences. It is not yet understood how thundercloud electrification, lightning activity, wideband radio emission and particle fluxes relate to each other. One of the most intriguing opportunities opening by observation of the high-energy processes in the atmosphere is their relation to lightning initiation. C.T.R. Wilson postulated acceleration of electrons in the strong electric fields inside thunderclouds in 1924. In 1992, Gurevich et al. developed the theory of the runaway breakdown, now mostly referred to as relativistic runaway electron avalanches - RREA. The separation of positive and negative charges in thundercloud and existence of a stable ambient population of the cosmic ray MeV electrons in the atmosphere enables acceleration of the electrons in the direction of the earth's surface (Thunderstorm ground enhancements, TGEs) and to open space (Terrestrial gamma flashes, TGFs). Both TGEs and TGFs are connected with lightning activity and can be used for the research of poorly understood lightning initiation processes providing a key research instrument – fluxes of electrons, neutrons and gamma rays originated in the thunderclouds. The information acquired from the time series of TGEs and TGFs along with the widely used information on the temporal patterns of the radio waveforms can help in the developing of both a reliable model of lightning initiation and a detailed mechanism of electron acceleration in the thunderclouds.

STRUCTURE OF THE SYMPOSIUM:

We anticipate the following sessions:

1. Models of high-energy emissions in thunderclouds;
2. Multivariate observations of thunderstorms from the Earth's surface and from space;
3. Particle fluxes and lightnings – any causal relations?
4. Research of the Thunderstorm ground enhancements (TGEs);
5. Research of the Terrestrial gamma-ray flashes (TGF);
6. Extensive air showers, lightning and RB/RREA process;
7. Atmospheric High-energy phenomena observations by space-born facilities
8. Instrumentation

We plan also discussions on the most intriguing problems of high-energy physics in the atmosphere and on possible directions for the advancement in the collaborative studies.

Topics to be covered during oral and poster sessions:

- *Research of the Thunderstorm ground enhancements (TGEs), measurements of electron, gamma ray and neutron fluxes by the networks of particle detectors located on the Earth's surface;*
- *Research of the Terrestrial gamma-ray flashes (TGFs) observed by the orbiting gamma-ray observatories;*
- *Radio emissions produced by atmospheric discharges and particle fluxes;*
- *Lightning initiation and its relation to the TGE and TGF;*
- *Large Extensive air showers and lightning initiation (the RB-EAS) process;*
- *Neutron production during thunderstorms (lightning bolt or photonuclear reactions?)*
- *Ultraviolet and infrared emissions during thunderstorms;*
- *Monitoring of thunderstorms from the orbit;*
- *Monitoring of the thunderstorms by high speed cameras;*
- *The thundercloud structure and electric field remote sensing techniques (LIDARs and drones);*
- *X-ray emissions from the lightning;*
- *Relations to the climate and space weather issues;*
- *Possibility of joint observations by space-born and ground-based facilities.*

ATTENDANCE LIMITATION:

Due to the size of the venue and other restrictions, the number of participants will be limited to 40. Therefore, participation in the Symposium is by invitation only. Registered personnel need to submit an abstract of presentation to receive an invitation.

ABSTRACT SUBMISSION:

Abstracts should be submitted electronically on the Symposium website. The deadline for abstract submission is 31 July 2016.

REGISTRATION:

Registration to **TEPA 2016** should be done online via the Symposium website. We will provide participants with their own account on the Symposium website. These accounts will serve for the submission of abstracts, papers for Symposium proceedings and for providing information about accompanying persons.

Registration fees:

- Regular Attendees [300 Euro]
- Undergraduate and Graduate Students [150 Euro]

The fee covers the cost of transportation from and to airport, coffee breaks, as well as the Reception, the Banquet, and excursions. Payment of the registration fee will be accepted at the Symposium desk upon arrival.

CONFERENCE DEADLINES:

- 1 August 2016 Abstract submission deadline
- 1 September 2016 Contributed presentations selected and participants notified
- 15 September 2016 Symposium program in the Conference site

TRANSPORTATION AND LODGING:

The organizers will provide transportation from/to the Yerevan Airport “Zvartnots”. Information on the arrival date, time and flight number should be sent to the Local Organizing Committee. During the Symposium, the participants will be accommodated at the hotels in Nor Amberd International Conference Center of Yerevan Physics Institute, located on the slopes of Mount Aragats, near the village of Byurakan, Aragatsotn District, Armenia. The Center has a rich tradition of hosting high-energy physics schools and is well equipped for international forums.

CORRESPONDENCE:

Zaruhi Asaturyan

The reader secretary of the director of YerPhI
Yerevan Physics Institute
2, Alikhanyan Brothers street
Yerevan 0036, Armenia
Phone: 374-10-352041; 37410-359000 (Nor Amberd)
Email: info@yerphi.am