Recording System for Cosmic Ray Measurements at Lomnický štít

Igor Sihársky, Ronald Langer and Karel Kudela (kudela@kosice.upjs.sk)

Institute of Experimental Physics, Slovak Academy of Sciences, Watsonova 47, 040 01 Košice, Slovakia

Abstract: New system for recording information on cosmic ray intensity in multichannel measurements of cosmic rays at Lomnický štít (LS, 2834 m) is described. System allows to register data with 1 sec resolution, writing barometric pressure and other meteorological parameters. In addition to neutron monitor measurements, the system is used in testing mode also for the SEVAN installation at the site (developed by Yerevan Phys. Inst.) and in modified version is used for the thermal neutron detection (jointly with FIAN Moscow) as well as for dosimetric measurements. System under development will be useful for space weather monitoring and possible alerts, as well as for studies of relations between cosmic rays and atmospheric electricity. Current status of experiments at LS and in Košice are the perspectives are reported.

1. Introduction

Cosmic Ray Measurements in High Tatra mountains started in 1957 in connection with the IGY. Since 1982 the neutron monitor with relatively high statistical accuracy is measuring at Lomnický štít [1]. After the first solar neutron response recorded on the ground, namely during the solar flare on June 3, 1982 at Jungfraujoch [2] and at LS [3], the time resolution was improved to 1 min. Position is suitable for study of protons accelerated to high energy in solar flares and for detection of the relation between solar activity and cosmic rays.

2. New infrastructure

Small size (80x54x23 mm), minimum power consumption (<1 W) timing GPS receiver for time base humidity sensor (Vaisala PTB330) very precision external barometer with indoor temperature and ethernet interface for remote management and data writing (Nemox).

4.1. Resolution 1 sec

Example of NM LS data around the recent FD on October 13-15, 2013. From bottom to top: 1 sec resolution, averaging by 5 min, 1 min and 10 sec. Recordings can be used for checking possible signature in fluctuations.

4.2. SEVAN – testing mode measurements in Košice

SEVAN instrument was in testing mode in Košice during the period Sep. 2012 to March 2013. After that it is currently under installation at Lomnický štít.

4.3. Meteo and lightning

Cosmic rays play important role in atmospheric processes (e.g. [2]). Since June 15, 2012 we are a participant on the global lightning detection network Blitzortung.org. As a participant we have an access into this lightning database, what we want to improve for study the possible relations between cosmic rays and meteorological parameters. Also as a participant (since August, 2006) on the LINET – professional lightning detection network (http://www.nowcast.de) we assist in running one of LINET receiving device in Košice.


5. Current status, plans for future

Compared to other mountain investigations (e.g. [7]) the measurements at LS (Liulin, device [7] are available for selected intervals. Simultaneously, at low altitude, namely in Košice, there were several methodological works of electronic and software/recording character leading to the increased temporal resolution (1 s) and also to measurements of thermal neutrons and of lightning. We illustrate the new development and current status of the measurements and conclude with plans for near future.

References:

Contact:
prof. Karel KUDELA, kudela@kosice.upjs.sk
Institute of Experimental Physics
Slovak Academy of Sciences
Watsonova 47, 040 01, Košice, SLOVAKIA