# Studies of the Energy Spectra of incident cosmic radiation by the networks of particle detectors

**Ashot Chilingarian, Gagik Hovsepyan**

*Cosmic Ray Division, Alikhanyan Physics Institute, Alikhanyan Brothers 2, Yerevan 375036, Armenia*

## Abstract

There are numerous indications that particle acceleration took place in supernovae remnants, by pulsars, super-massive black holes, in the galaxy clusters and by stars. As a universal mechanism operated on different scales the stochastic and shock acceleration is pointed. It is very important to use our nearest star – the sun, as laboratory in studying particle acceleration phenomena. The surface particle detectors, along with space-born spectrometers are capable of detecting solar particles in the energy range from KeVs till several Tens of GeV. The large surface arrays are detecting particle in energy range from ~100 TeV till EeV. This richness' of information on particle fluxes on different scales can be used in studying physical processes responsible for particle acceleration in Universe.

Surface detectors measuring Extensive Air Showers (EAS) initiated by Primary Cosmic Rays (PCR) incident on terrestrial atmosphere have been in operation since the last 50 years with main goal to explore the major enigma of Cosmic Ray (CR) origin and acceleration. Recent achievements of the Atmospheric Cherenkov Telescopes and X-ray space laboratories, establishing the supernova remnants (SNRs) as source of hadronic cosmic rays pose stringent conditions on the quality of the EAS evidence. After establishing the existence of the "knee" in all particle spectrum the most pronounced result from EAS studies is the rigidity dependent shift of the knee position to the highest energies. This feature first observed by the exploiting the separation of the primary beam in different groups of mass in MAKET-ANI, EAS-TOP and KASCADE experiments also pointed to the SNR blast shocks as CR source. The MAKET ANI detector is placed on mountain Aragats (Armenia) on 3200m above sea level ( $40.5^0$N, $44.2^0$E ). More than $1.3 \cdot 10^6$ showers with size greater than $10^5$ particles were registered in 1997-2004. The detector has effectively collected the cores of EAS, initiated by primaries with energies of $5 \cdot 10^{14} - 10^{17}$eV. Results from the MAKET-ANI experiment on the energy spectra of the "light"(p+He) and "heavy" (O+Si+Fe) nuclear groups are compared with spectra obtained by balloon experiments, as well as with other available EAS spectra.