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SEVAN particle-detector network for Solar Physics and Space Weather research

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A network of detectors called SEVAN (Space Environmental Viewing and Analysis Network) is planned in the framework of the International Heliophysical Year (IHY), to improve fundamental research of the Solar accelerators and Space Weather conditions. The network will detect changing fluxes of the most of species secondary cosmic rays at different altitudes, latitudes and altitudes those constituting powerful integrated device in exploration of solar modulation effects.
Surface particle detectors measure time series of secondary particles born in cascades originated in the atmosphere by nuclear interactions of the "primary" protons and nuclei accelerated in galaxy. During violent solar explosions sometimes additional particles, accelerated at sun's environments, are added to this "background" flux. If solar particles are energetic enough they also will generate secondary particles reaching earth surface. Therefore, registration of changing time series of secondary particles shed light on the high-energy particle acceleration mechanisms by solar flares and Coronal Mass Ejection driven shocks. Network of particle detectors located at middle-to-low latitudes is sensitive to the highest energy solar particles. The enigma of particle acceleration in supernovae remnants, super-massive black holes, clusters of galaxies can be researched using particle beams accelerated by sun and detected at earth. The shock acceleration is a universal process responsible for the same physical process (particle acceleration) on the different scales.
Time series of intensities of high energy particles can also provide highly cost-effective information on the key characteristics of the disturbances of interplanetary magnetic field.
Recent results on of the detection of the extreme solar events (2003, 2005) by the monitors of the Aragats Space-Environmental Center (ASEC) illustrate wide possibilities opening with introduction of new particle detectors measuring neutron, electron and muon fluxes with inherent correlations.
One of the major advantages of multi-particle detectors is probing of the different populations of the primary cosmic rays, initiated particle cascades in terrestrial atmosphere. With basic detector of SEVAN network we are measuring fluxes of neutrons and gammas, of low energy charged component and high energy muons. This diversity of information obtained from SEVAN network located mostly at low and middle latitudes will give possibility to estimate the energy spectra of the highest energy SCR. SEVAN network will be sensitive to very weak fluxes of SCR above 10 GeV, very poorly explored highest energy region.
First modules of SEVAN network are in operation in Armenia, in 2008 SEVAN modules were installed in Croatia and Bulgaria, in 2009 we plan to install new SEVAN modules in Slovakia and India.