Hybrid particle detector network located at Middle-Low latitudes for Solar Physics and Space Weather research

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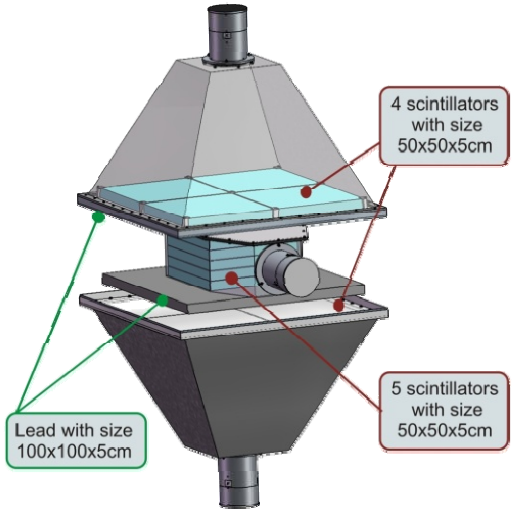
Space Environmental Viewing and Analysis Network (SEVAN)

A network of middle to low latitude particle 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.



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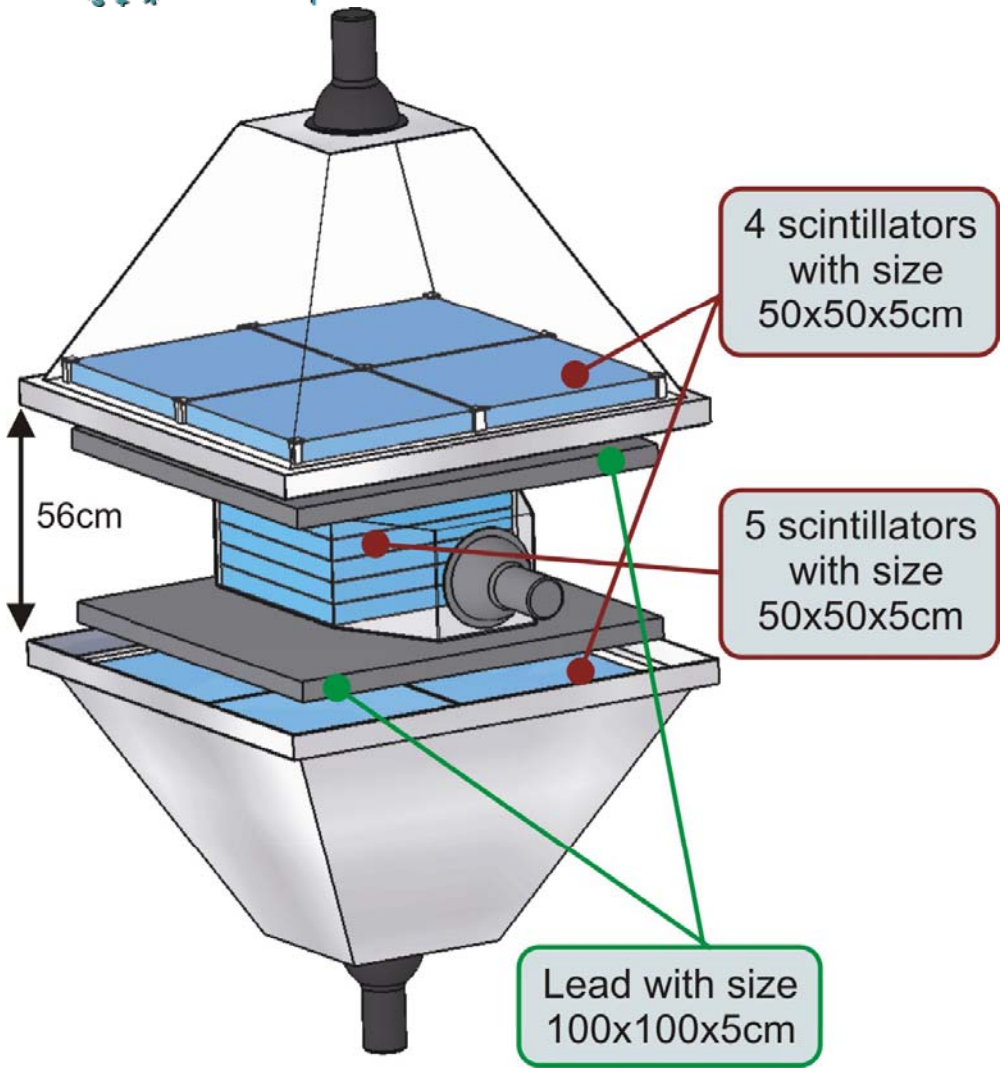
Construction of the SEVAN basic unit



100 – traversal of the low energy charged particle (~<200MeV);

010 – traversal of the neutral particle;

111 & 101 – traversal of the high energy muon (~>250MeV);

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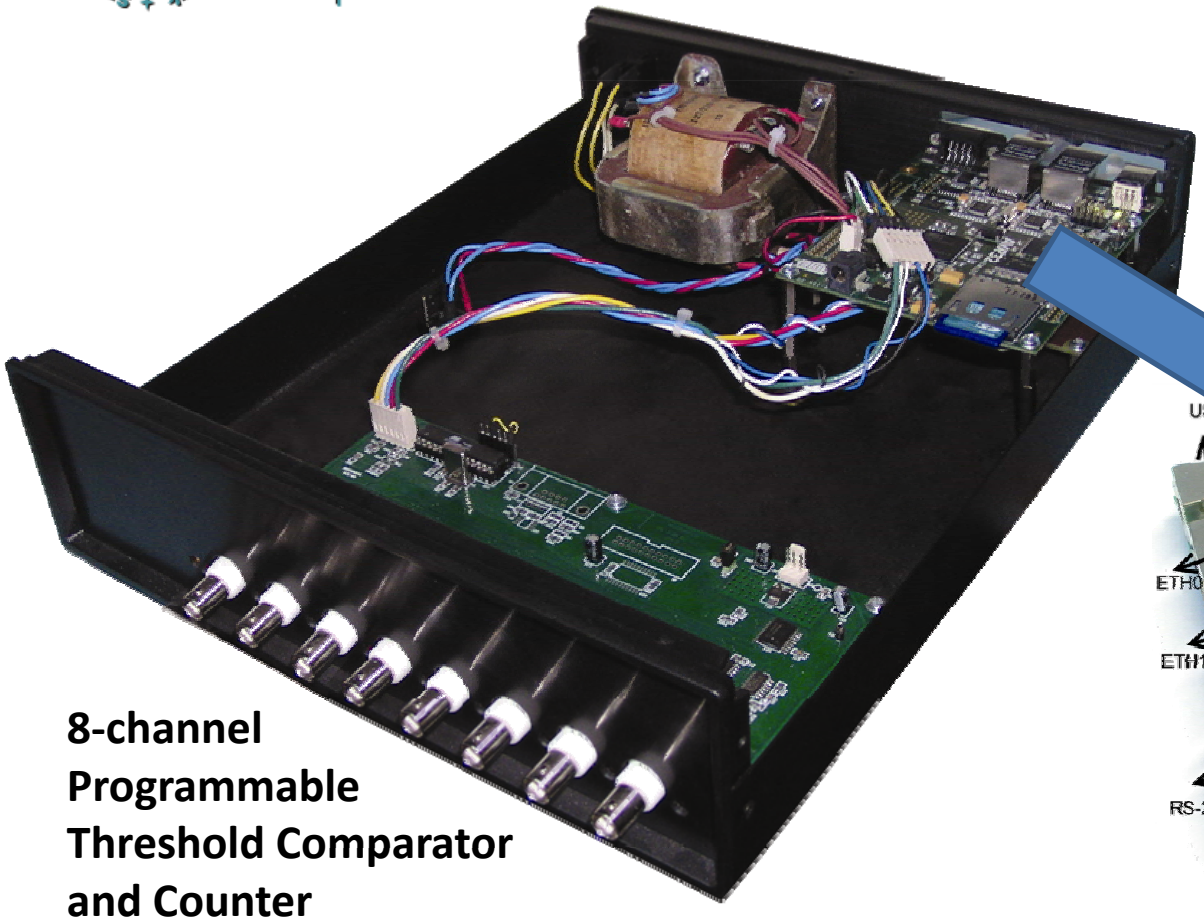
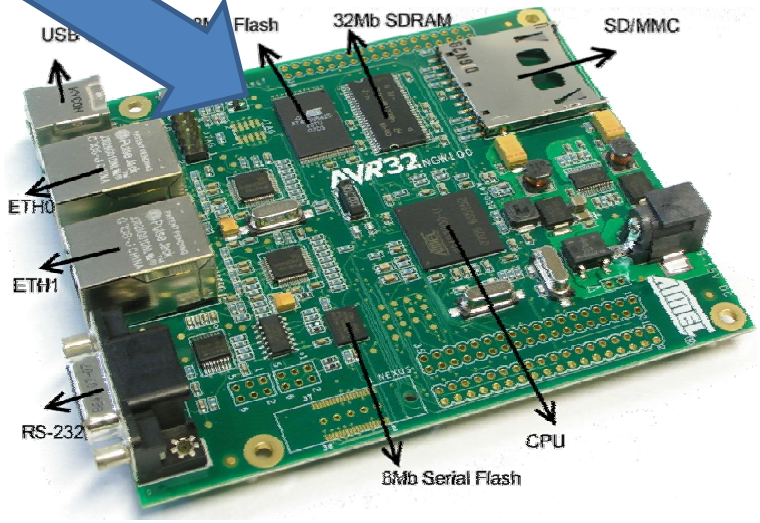
Electronics for the SEVAN



8-channel
Programmable
Threshold Comparator
and Counter

Atmel

Tiny Little AVR32
Board (NGW 100)



Electronics for the Space Environmental Viewing and Analysis Network (SEVAN)

K.Arakelyan, S. Abovyan, A.Chilingarian, V.Danielyan, D. Pokhsraryan.

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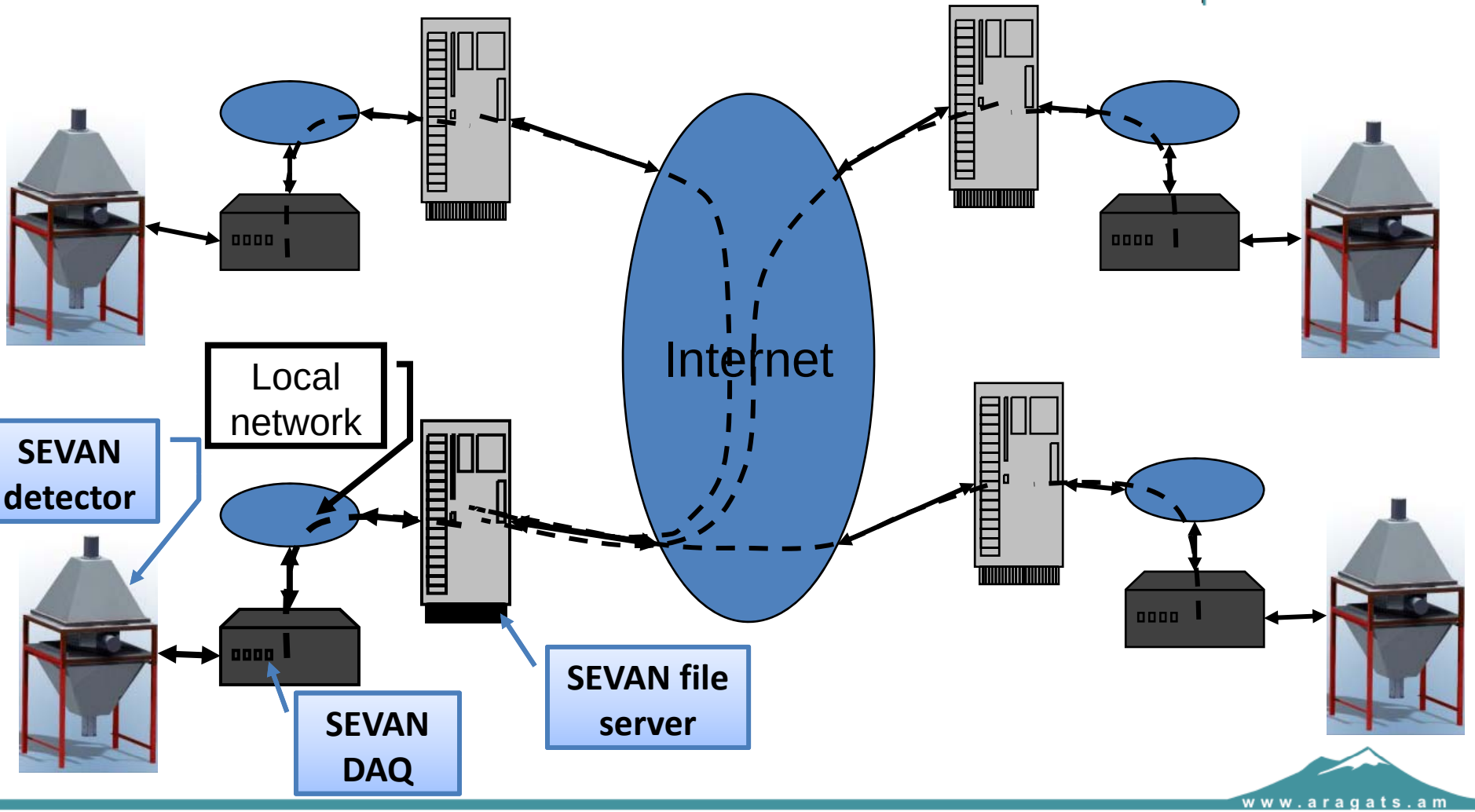
SEVAN network



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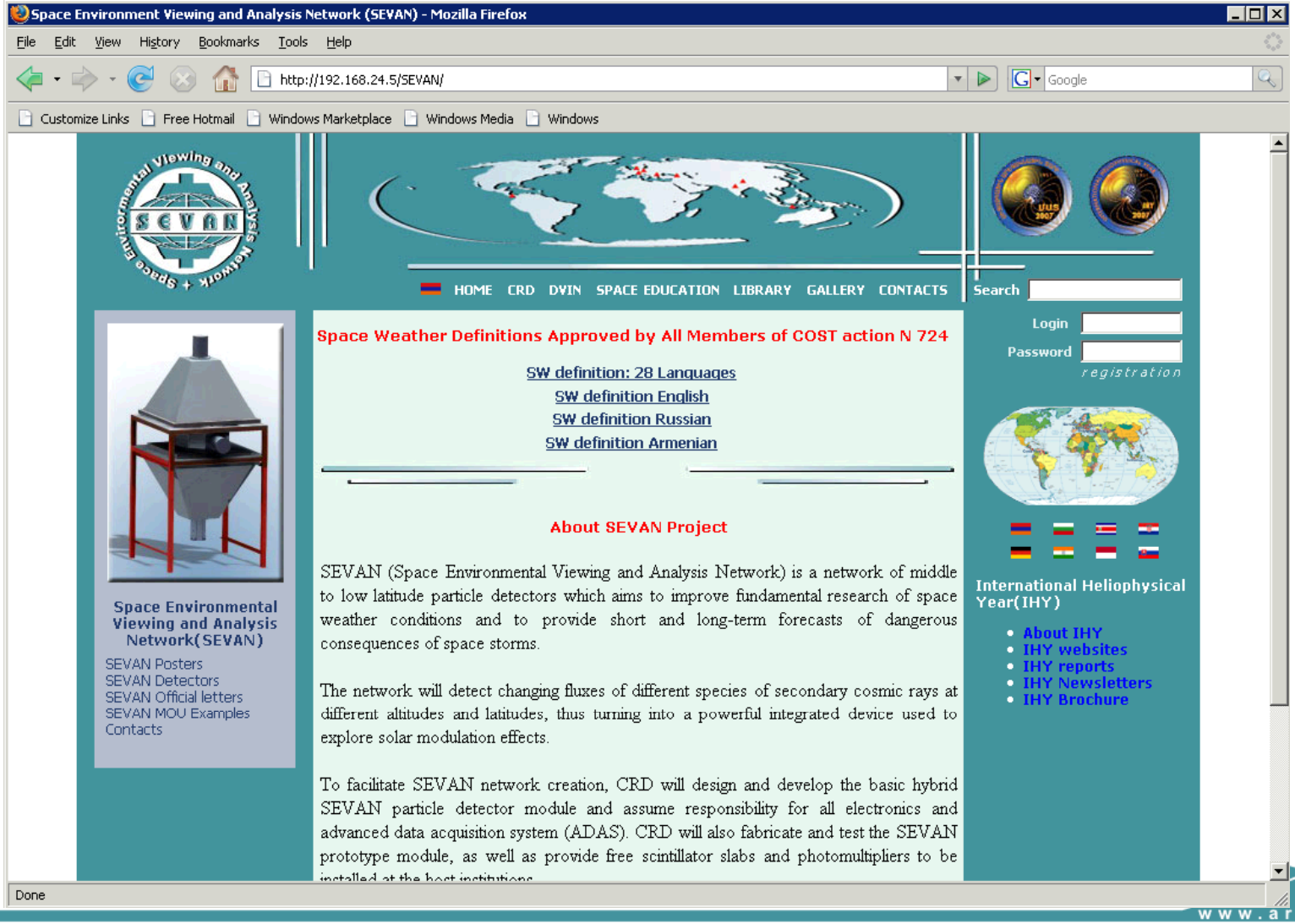
SEVAN home page



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Partners of the SEVAN

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SEVAN basic unit located at Yerevan and NorAmberd, Armenia.

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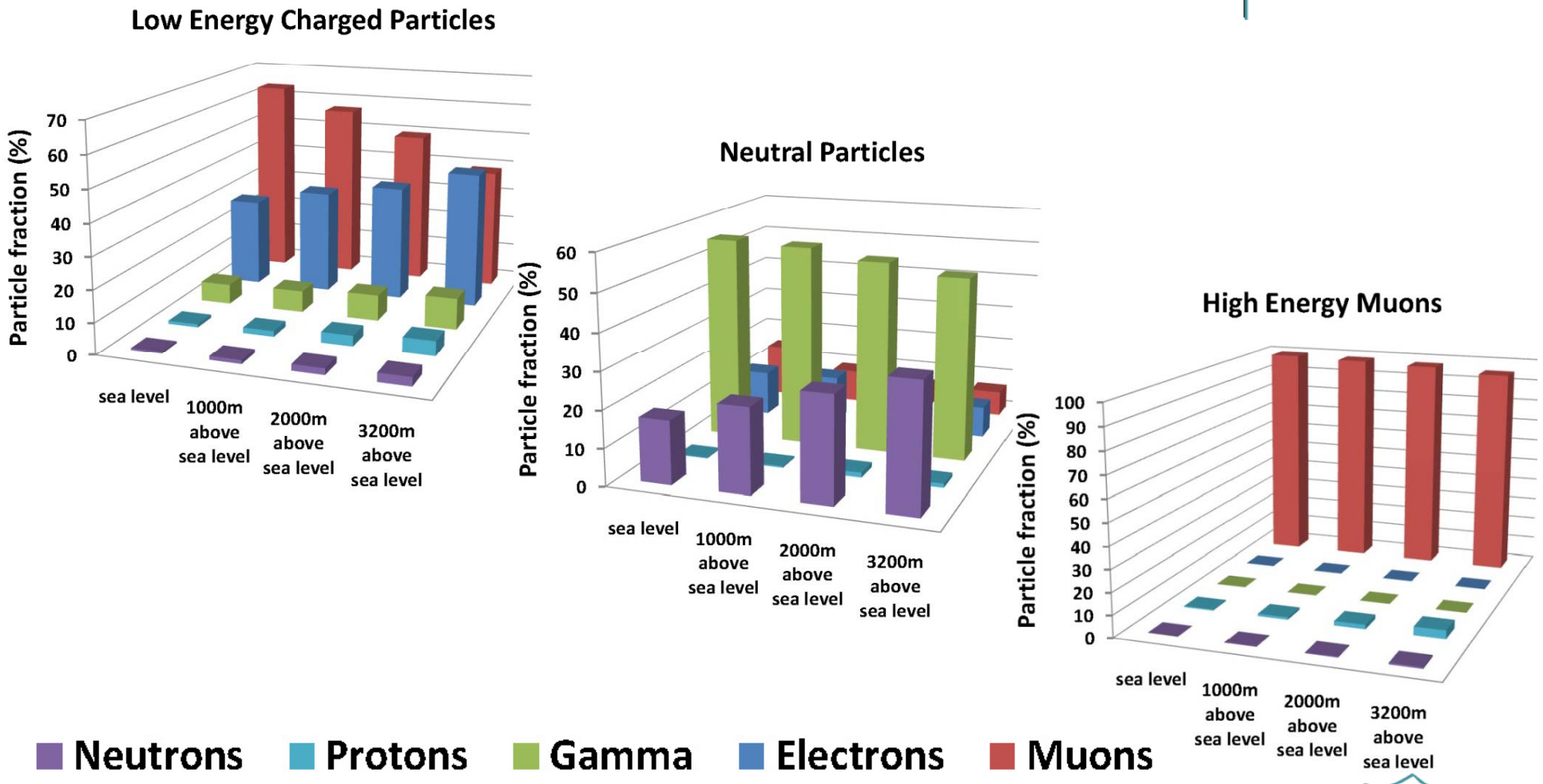
Fraction of the particles detected by the SEVAN basic unit



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Simulated enhancements detected by the SEVAN basic unit

5min simulated enhancements in the Upper and Middle layers of the SEVAN basic unit.

Detector Layer	Solar Protons	Solar Neutrons
Upper 5cm scintillator	4.8σ	2.6σ
Middle 25 cm scintillator	1.7σ	6.4σ

Characteristics of the particle detectors of the Space Environmental Viewing and Analysis Network (SEVAN)

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Experimental and simulated count rates of the SEVAN basic unit

Experimental and simulated one-minute count rates in the different layers of the SEVAN basic unit.

Location	Yerevan (1000m)		NorAmberd(2000m)	
	Measured count rate	simulated count rate	Measured count rate	simulated count rate
Upper Detector	13788±134	13109	17109±186	17374
Middle Detector	3116±58	3546	3979±62	4591
Lower Detector	9239±98	9852	9356±132	11755

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Experimental and simulated count rates of the SEVAN basic unit

One Minute Count rates of the secondary fluxes detected by SEVAN module.

	Yerevan (1000m)		NorAmberd(2000m)	
Type of Secondary particle	**Measured count rate**	**simulated count rate**	**Measured count rate**	**simulated count rate**
Low energy charged particles	8862±108	7202	11593±161	10220
Neutral particles	363±19	359	690±27	795
High energy muon	4337±67	5477	4473±99	5548

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Conclusion

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.

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