Measurement of Muon Intensity

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We have built 9 Scintillation detectors on the roof of our school， which are shown in Fig.1. The sensitive area of each detector is 0.5 square meter, and they spaced 10 meters as a 3×3 matrix. Its location is: latitude 39.933°N, longitude 116.417°E, altitude 46.4m. The electronics digitize the signal of detectors, and a computer continuously acquires data and controls all equipment on line. Our detectors can recognize all noise and only record counter of μ,therefor we don't need overlap them. We measured the intensity of Muon and analyzed the data from Feb.13th to 24th in 2023.

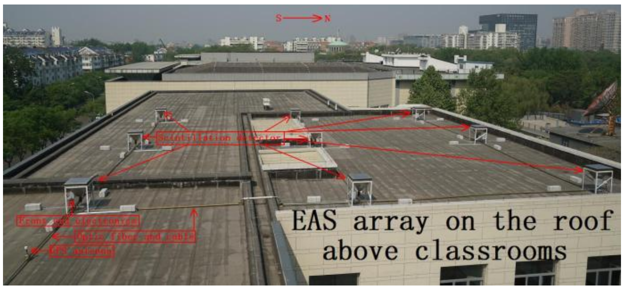

Fig. 1 The EAS array on the roof of our school

Date in 2023	N	n=N/4.5 No. μ/(m^2 •d)	Atmos 10^2Pa
13th Feb.	69423017	15427337	1034
14th Feb.	69543729	15454162	1034
15th Feb.	69437259	15430502	1033
16th Feb.	70244712	15609936	1027
17th Feb.	70324146	15627588	1023
18th Feb.	70510008	15668891	1025
19th Feb.	70359191	15635376	1028
20th Feb.	69008407	15335202	1035
21st Feb.	68086348	15130300	1036
22nd Feb.	69282239	15396053	1028
23rd Feb.	69838799	15519733	1025
24th Feb.	69055088	15345575	1033

Tab.1 Date of measured intensity of muon

The data are shown in Tab.1. All counts of 9 detectors named N. Since total 9 detectors have effective area 4.5square meter, so that we measured the intensity of muon n=N/4.5 No.μ/(m^2 • d).

We analyzed the data from Feb.13th to 24th in 2023. As shown in Fig.2, the intensity of muon in 12 days is between 15130300 and 15668891 No. μ/(m^2 • d). The mean of the intensity of muon is 15465054 No. μ/(m^2 • d), we also draw the red line in Fig 2 to show their average value.

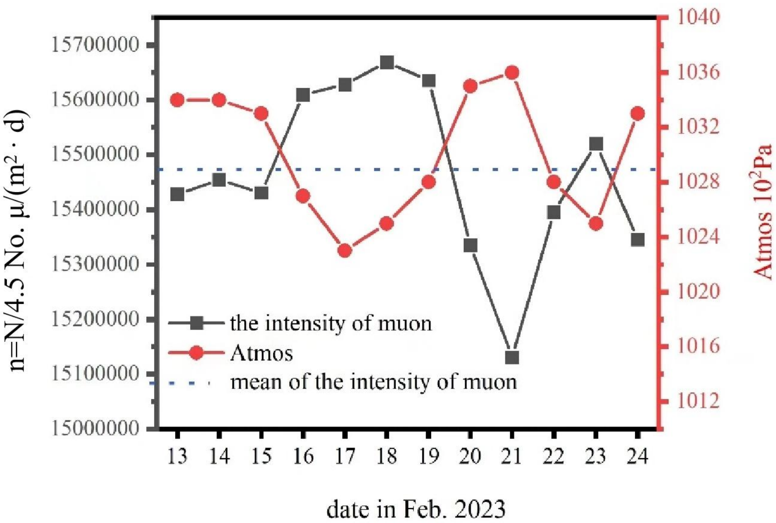

Fig.2The intensity of muon

The standard deviation of N is $\sigma_N=N^{1/2}$, so that the standard deviation of n is $\sigma_n=\sigma_N/4.5$. The deviation of 12days is more than σ_n, so that we add the atmospheric local pressure atmosphere on these days in our table. When the atmospheric pressure increases, the depth of the atmosphere increases too. With the atmosphere getting thicker, the greater the probability of cosmic rays be absorbed when they through the atmosphere. Which means higher energy of cosmic rays can reach the ground, and lower the intensity of the cosmic rays and muon.