Detection of Cosmic Muons using CosMO – Airshowers and Zenith Angle

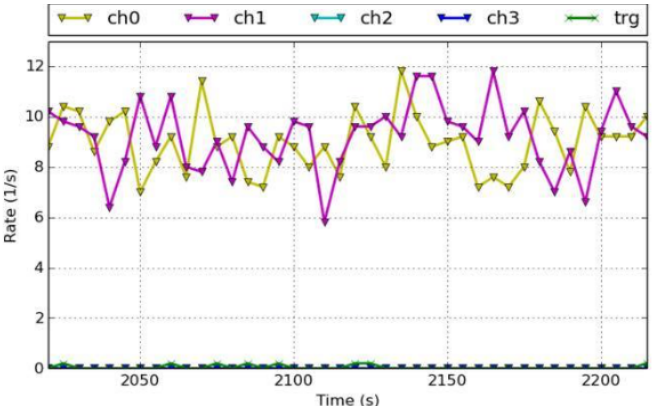
Steven Brinkmann, Felix Busch, Robert Dürschmied, Timm Eggert, Max Hentschel, Gustav Lemke, Patrick Loth, Paul Prax, Gregor Lück, Erik Mittelstaedt, Nikita Tischenko, Pascal Pfütze, Paul Rose, Lilli Rudolph, Christoph Sander, Katharina Schmidt, Fabienne Seide, Paul Voigt, Roman Kobosil, N. Dolos, St. Bläß. Gymnasium Villa Elisabeth, Wildau, Germany

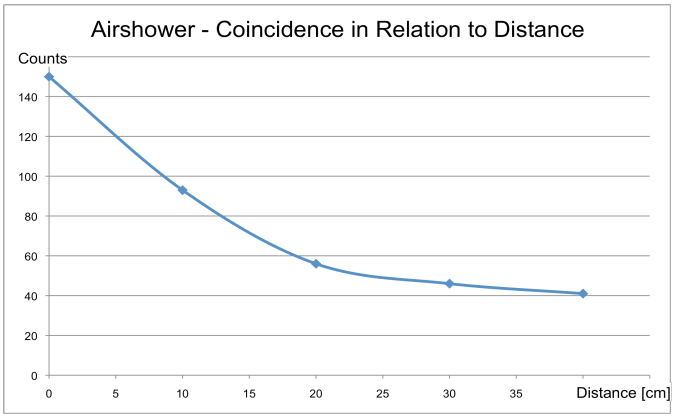
Materials and Methods

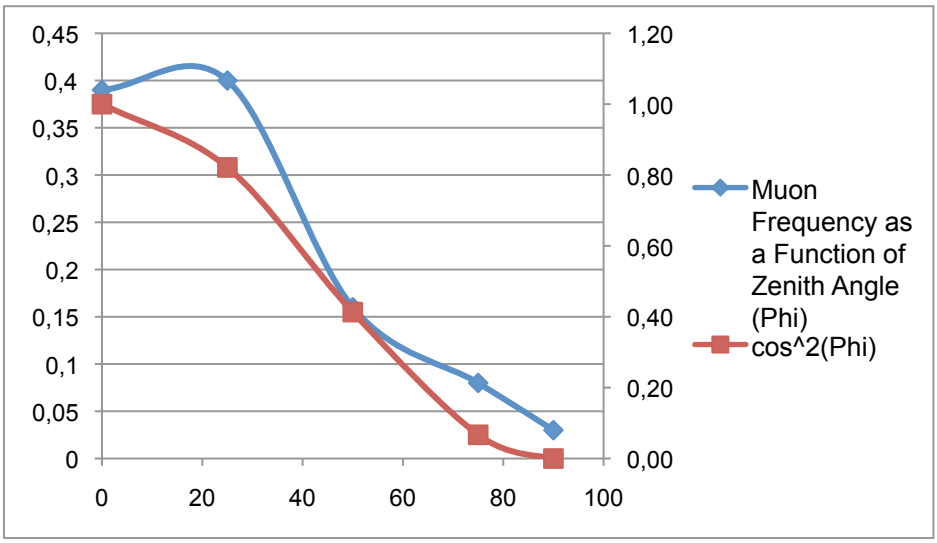
PC + Muonic software, 1 DAQ card, 2 muon detectors (scintillator plates), power supply (5 V), cable connections.

The two detectors were arranged in different positions in relation to each other, calibrated, varying thresholds were set and frequencies of coinciding events were measured. At optimum thresholds for each detector, varying angles against a horizontal support of the detectors aligned in parallel and a distance of 0,5 m (fig. lower left) coincidence measurements were performed (fig. lower left).

Results and Discussion







Muon detection expectedly decreased with higher thresholds (set in mV) and also with increasing distance (fig. upper left and right). Further, the frequency of coinciding muon detection events was highest with both detector plates arranged in parallel to the horizontal support (table surface) and lowest with both detector plates arranged perpendicularly to the table surface (fig. lower left and right).

With lower thresholds particles able to trigger an event require less energy than at higher thresholds. Thus, high thresholds bias for high-energy particles. – The majority of muons originate from particle collisions in the higher atmosphere – predicted to shower in a $\cos^2(\Theta)$ dependency – which could roughly be demonstrated (fig. lower right).