**Detection of high energy electromagnetic and hadron components of the air-shower core in the new hybrid experiments "Pamir XXI" and "HADRON-55"**

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Abstract

In the Chacaltaya hybrid experiment we have studied in detail high-energy air-shower core by observing three components in the air-showers, i.e., air-shower size, burst-size (hadron-component) and accompanied family energy (high energy e, g -component). We have shown that the observed characteristics of each component itself are seemingly well described by the simulations, but if the events are divided into two groups, with family and without family, the simulation fails to describe characteristics of both groups of data. Thus the information on the families is a key ingredient for understanding the characteristics of the cosmic-ray interactions in the energy range of 1015 ~ 1017 eV.

The atmospheric families are detected so far by the emulsion chambers (sandwiches of X-ray films and lead plates), but the measurement and analysis of the family data using emulsion chambers are very time-consuming work. Furthermore there are some difficulties in connecting the air-shower to the accompanied family, because the latter has no time information. So the number of observed events with atmospheric family is still very small and it is necessary to get at least ten times more family events to make the argument clear.

It is preferable to use scintillation counters instead of X-ray films at the suitable depth of the lead plates to detect high-energy atmospheric families in the future large-scale hybrid experiment. Here we study a possibility to analyze high energy air-shower cores by using scintillation detectors instead of using emulsion chamber for detecting high energy atmospheric families in the new comprehensive EAS experiments "Pamir XXI" at the Pamir and "HADRON-55" at Tien-Shan.