

PROBLEM OF THE KNEE AND VERY HIGH ENERGY MUONS

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There are two possibilities of explanation of the knee of cosmic ray energy spectrum in the atmosphere: a change of primary spectrum slope or changes in hadron interaction. Now this knee is interpreted mainly as the change of primary cosmic ray energy spectrum and composition. But the knee energy range in the laboratory frame (about 5 PeV) corresponds to TeV energy region in the centre-of-mass system where new physics (new particles, new state of matter, etc.) is expected. If to suppose that the slope of the primary energy spectrum is not changed, and the appearance of the knee is connected with new physical phenomena, the problem of missing energy appears. This missing energy can be taken away by high energy neutrinos and muons (!), since all existing EAS arrays detect the number of muons only, but not their energy. In order to check this possibility, simultaneous measurements of spatial distributions of high energy muons and their energies are required. The comparison of these distributions for EAS with energies below and above the knee can give a key for the search of new physical phenomena. The change of these distributions would give a very serious evidence for contribution of new physical processes. In the present talk, results of calculations of the energy spectrum of VHE muons are considered, and some possibilities of their experimental investigation are discussed.