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The comparison of calculated atmospheric neutrino spectra with measurement data of IceCube and ANTARES experiments

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The processing of the IceCube experiment data obtained during 988 days (2010–2014) revealed 54 neutrino-induced events with deposited energies 20 TeV - 2 PeV [1]. The hypothesis of an astrophysical origin of these neutrinos is confirmed at 5.7σ CL. To identify reliably the neutrino events a thorough calculation of the atmospheric neutrino background should be performed. We calculate the atmospheric neutrino spectra in the energy range of 100 GeV - 10 PeV using the set of the hadronic models and several parametrizations of cosmic ray spectra supported by experimental data. It is shown that rare decays of short-lived neutral kaons contribute close to one third of the atmospheric conventional electron neutrinos at the energies above 100 TeV. The account for kaons production in pion-nucleus collisions gives rise to increase the ν_e flux by 5–7% in the energy range of 100 GeV – 100 TeV. The detailed comparison of our calculations performed with use of $Z(E,h)$ -functions approach [2], with those of MCEq method by A.Fedynitch et al. [3], shows the consistency on the whole at least in the energy range 100 GeV – 1 PeV. Calculated neutrino spectra agree rather well with the measurement data of the experiments IceCube [4,5] and ANTARES [6]. Uncertainties of the measurement data above 400 TeV leave a window for the the QGSM prompt neutrino component [2].

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