

High Energy and Prompt Neutrino Production in the atmosphere

P. Berghaus, R. Birdsall, P. Desiati, T. Montaruli and J. Ranft

University of Wisconsin - Madison, WI 53706, USA

E-mail: berghaus, rbirdsall, desiati, tmontaruli@icecube.wisc.edu

The AMANDA neutrino telescope has measured the spectrum of atmospheric neutrinos up to 100 TeV and IceCube, which has about 100 times higher acceptance, is expected to collect unprecedented statistics at even higher energies in the near future. IceCube, with 22 strings, has measured about 1.4 kHz of muon rate at trigger level and about 20 neutrino events per day at cut levels suitable for reducing the atmospheric muon content at the level of less than 10%. At energies of about 100 TeV we expect about 1 event per day for atmospheric muons with zenith angle larger than 70 degrees. With these numbers an amount of interesting physics items can be covered, such as investigations of hadronic models in region not covered by colliders, with particular attention to kaon and charm meson and baryon physics. In the poster we have shown some of the MC tests we have been performing. As a summary here we show 2 preliminary plots: the one on the left shows what we obtain for CORSIKA using two different hadronic models (SIBYLL and 2 versions of QGSJET) as the fraction of pions and kaons contributing to the production of muons and neutrinos as a function of energy (integrated over all angles); the other shows how these models compare to the muon charge ratio measured by MINOS (P. Adamson et al., Phys. Rev D 76 (2007) 052003) and L3 COSMIC (M. Aglietta et al., Phys. Rev. D 58 (1998) 092005). Other results concerning the introduction of DPMJET with charm production in CORSIKA have been published in Berghaus et al., JCAP06 (2008) 003.

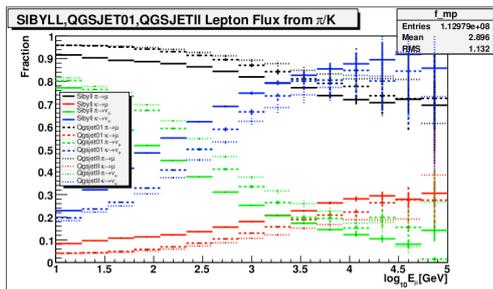


Figure 1.

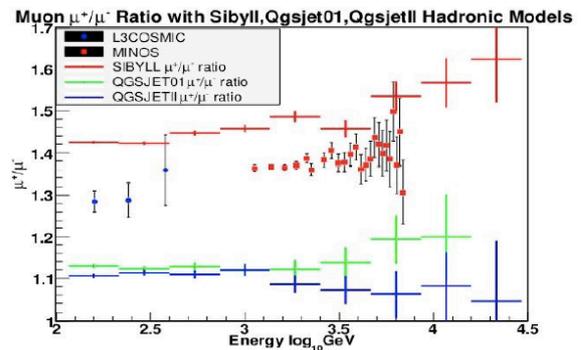


Figure 2.