

NuInt12 : Eighth International Workshop on Neutrino-Nucleus Interactions in the Few-GeV Region



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Simulation of atmospheric temperature effects on cosmic ray muon flux

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The collision between a cosmic ray and an atmosphere nucleus produces a set of secondary particles, which will decay or interact with other atmosphere elements. This set of events produced by a primary particle is known as an extensive air shower (EAS) and is composed by a muonic, a hadronic and an electromagnetic component. The muonic flux, produced mainly by pion and kaon decays, has a dependency with the atmosphere's effective temperature: an increase in the temperature results in a lower density profile, which decreases the probability of pions and kaons to interact with the atmosphere and, consequently, resulting in a major number of meson decays. Such correlation between the muon flux and the atmosphere's effective temperature was measured by a set of experiments such as AMANDA, Borexino, MACRO and MINOS. This phenomena can be investigated by simulating the final muon flux produced by two different parameterizations of the isothermal atmospheric model in CORSIKA, where each parameterization is described by a depth function which can be related to the muon flux in the same way that the muon flux is related to the temperature. This research checks the agreement among different high energy hadronic interaction models and the physical expected behavior of the atmosphere temperature effect by analysing a set of variables, such as the height of the primary interaction and the difference in the muon flux.

Summary

The study presented in this poster, which is the result of a Master dissertation, is not directly related to the physics discussed in NuINT, however the student is going to do his PhD on MINOS / MINOS+ experiment which justifies the importance of this workshop for his formation. Nevertheless, to obtain the necessary financial support for the present workshop the student is asked to present a poster.

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