The Niels Bohr International Academy

Contribution ID: **1** Type: **not specified**

Detection of prompt atmospheric neutrinos with IceCube

Tuesday, 24 June 2014 16:20 (20 minutes)

The IceCube neutrino telescope instruments a cubic kilometre of the Antarctic ice at the South Pole with a three-dimensional array of light sensors. It is the largest neutrino telescope and is accumulating an unprecendented number of atmospheric neutrino events. Atmospheric neutrinos are produced in air showers, when cosmic rays hit the Earth's atmosphere and interact hadronically. The conventional neutrino flux, which dominates the neutrino data measured in the GeV to TeV range, is produced by the decay of charged pions and kaons. Prompt atmospheric neutrinos are produced by the decay of heavier mesons typically containing a charm quark. Their production is strongly suppressed, but they are expected to exhibit a harder energy spectrum. Hence, they could dominate the atmospheric neutrino flux at energies above ~ 100 TeV. Such a prompt atmospheric flux component has not yet been observed. In this talk I will describe my research project which has the goal of observing prompt atmospheric neutrinos.

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Session Classification: Problems Class/Student Talks