Abstract

Measurements of the atmospheric muon flux in the region of highest geomagnetic rigidity cut-off

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The VATLY is a laboratory installed at the Institute for Nuclear sciences and techniques (INST) in Ha Noi and is dedicated to research and studies in the field of cosmic ray physics. The members of the Laboratory take part in a large international experiment, Pierre Auger, searching for extremely high energy cosmic rays, aimed at a deeper understanding of the behavior of the cosmic ray spectrum, in a region where the GKZ cut-off should make the universe opaque. The Laboratory is equipped with detectors of various kinds including an exact replica of a standard Auger water Cherenkov local stations that allow for the training of the staff with experimental techniques and methods in use at Auger as well as for performing measurements of the cosmic muon flux at home. Ha Noi being located in the region of the planet where the geomagnetic rigidity cut-off is highest makes such measurements of particular interest for those who study atmospheric neutrino oscillations, requiring very accurate air shower models. The various activities of the Laboratory in these domains will be briefly reviewed.

The results of measurements performed in Ha Noi of the cosmic muon flux using a fixed scintillator hodoscope and an orientable scintillator telescope will be presented. They include an absolute measurement of the vertical muon flux (*P.N.Dinh et al., Nuclear Physics B 627(2002)29-42*) that has been compared with the predictions of the air shower model used by the Super Kamiokande Collaboration to analyze their neutrino oscillation data. In addition, they also include angular distribution measurements of the muon flux, both in zenith angle, a measurement sensitive to the shape of the longitudinal shower profile, and in azimuth, a measurement sensitive to the east-west asymmetry of geomagnetic origin.