



Contribution ID: 50

Type: **not specified**

High-Energy Neutrino Astronomy with the ANTARES Deep-Sea Cherenkov detector and with the future KM3NeT Telescope.

Thursday, 22 May 2014 17:50 (25 minutes)

In 2008 the ANTARES collaboration completed the construction of an underwater neutrino telescope in the Mediterranean Sea, located 40 km off the French coast at a depth of 2475 m. With an effective area for upward muon detection of about 0.05 km², depending on neutrino energy, ANTARES is the largest neutrino detector currently operating in the Northern hemisphere.

The experiment aims to detect high-energy neutrinos up to 104 TeV using a 3-dimensional array of 885 photomultipliers distributed in 25 storeys along 12 vertical lines. The detection is based on the measurement of Cherenkov light, induced by the path, in sea-water, of charged leptons resulting from charged-current neutrino interactions in the matter surrounding the telescope. The accurate measurements of the photon arrival times and of the deposited charge together with a precise knowledge of the actual positions and orientations of the photo sensors allow the reconstruction of the direction of neutrinos with good angular resolution (better than 0.3° for muon neutrinos above a few TeV) and of their energy. The goal of the experiment is to unravel the production and acceleration mechanisms of very energetic cosmic particles, to search for neutrino point sources as well as for dark matter and exotic particles like monopoles and nuclearites.

Recent ANTARES results will be presented. KM3NeT Collaboration has started to build in the Mediterranean Sea a neutrino telescope with a volume of several cubic kilometres. Using the experience gained by the precursor projects, this telescope will complement IceCube, ensuring full coverage of the sky. Due to its location, it will have a privileged access to the Galactic centre and to a large fraction of the Galactic plane. In this contribution, I will describe the technical and scientific aspects of KM3NeT, recently achieved milestones and the construction plans.

Summary

ANTARES results will be discussed, KM3NeT physics goals and construction status will be presented.

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Session Classification: Neutrino