Contribution ID: **50** Type: **talk**

Determining the neutrino mass hierarchy with PINGU

Tuesday, 17 September 2013 15:30 (25 minutes)

The determination of the neutrino mass hierarchy is among the most fundamental questions in particle physics. The recent measurement of a large mixing angle theta_13 and the first observation of atmospheric neutrino oscillations at tens of GeV with neutrino telescopes opens the intriguing new possibility to exploit matter effects in neutrino oscillation to determine the mass hierarchy in the neutrino sector. The IceCube Neutrino Observatory, located at the geographic South Pole, is currently the world's largest neutrino telescope with an instrumented volume of 1 kmˆ3. Completed in December 2010, the detector's high energy neutrino program was augmented with the low-energy DeepCore extension that provides a neutrino energy threshold near 10 GeV and enabled first promising measurements of oscillation parameters with IceCube. Currently under consideration is a new in-fill array, the Precision IceCube Next Generation Upgrade (PINGU), that aims at further lowering this threshold to a few GeV, thereby gaining access to an energy range with high sensitivity to the neutrino mass hierarchy. In this talk I will report on the current status of PINGU and its prospects to determine the mass hierarchy.

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Session Classification: Working Group 4

Track Classification: Working Group 4