

Neutrino mass hierarchy determination via atmospheric neutrinos with future detectors

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Abhijit Samanta

Title: Neutrino Mass Hierarchy Determination via Atmospheric Neutrinos with Future Detectors

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Abstract: The issue of determining the neutrino mass hierarchy is one of the outstanding questions in neutrino physics. We consider the potential of hierarchy determination using atmospheric neutrinos as the source in three different proposed future detectors: A large Iron Calorimeter detector, a megaton Water Cerenkov detector and a large-mass Liquid Argon detector.

If the mixing angle θ_{13} is about 10° (close to CHOOZ upper bound), the hierarchy sensitivity is essentially determined by resonant matter effects. To maximize the potential of these effects in atmospheric neutrinos, charge discrimination capability in the detector is desirable. Hence, detectors with this capability have an advantage in hierarchy determination. We compare and contrast the performance of the above three detectors in this respect. We perform a realistic analysis of the above future detectors for atmospheric neutrinos and show that it is possible to achieve a significant hierarchy sensitivity if the detector characteristics are favourable.

Note: *The abstract has been modified from its original form to incorporate suggestions received during the conference. The poster is being submitted in its original form.*