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Calculating PINGU's Sensitivity to the Neutrino Mass Hierarchy

The Precision IceCube Next Generation Upgrade (PINGU) is planned as an infill to the IceCube array at the geographic South Pole. Every year, PINGU will record several ten thousands of atmospheric neutrinos with energies above 3 GeV. With these unprecedented statistics, PINGU will have sensitivity to the neutrino mass hierarchy (NMH).

To calculate the physics potential of PINGU, we have set up an effective detector simulation using parametrizations of the detector response. A multitude of systematic parameters is incorporated in the simulation.

We predict a median NMH significance of 3 sigma after three years of lifetime including systematics. Using our toolbox, we (can also) add constraints from other experiments and thus explore a variety of scenarios. Expected precisions for other measurements, such as the atmospheric mixing parameters, and the impact of systematics are evaluated as well.

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