

DeepCore upgrades: A phased approach toward precision megaton neutrino detectors

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The DeepCore detector, the low-energy extension to the IceCube Neutrino Observatory, instruments a fiducial volume of up to 35MT with an energy threshold as low as about 10 GeV. Much of the success of the achieving a pure neutrino sample in the detector is the use of the IceCube array as the world's largest active veto for cosmic ray muons. It is possible to further infill the DeepCore array to achieve lower detector energy thresholds and higher precision measurements in the deep ice. We discuss here a two phase approach to such an infill array. The first phase detector we consider is similar in design to DeepCore, has goals of 10MT with sub-GeV energy sensitivity, providing improved sensitivity for indirect WIMP searches, atmospheric neutrinos, Galactic Center point sources and a first step towards proton decay searches. The potential second phase would seek to achieve a few MT fiducial volume with an approximate 10 MeV energy threshold for a large-scale physics program that includes proton decay, supernova neutrinos and potential future long baseline efforts. Presented will be the current status of the ongoing physics feasibility studies for these new arrays buried in the ice.

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