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Design Study of an Air Cherenkov Telescope for Efficient Air-Shower Detection at 100 TeV at the South Pole on Top of IceCube

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Air-Cherenkov Telescopes with SIPM based cameras have the potential to detect cosmic rays with a high duty cycle and efficiency in harsh environments.
For IceCube, the world's largest high-energy neutrino observatory presents unique opportunities to detect cosmic-ray air showers in coincidence with the deep-ice detector and an extended air-Cherenkov telescope array.
For neutrino astronomy, the main purpose of IceCube, a large background-free sample of well-reconstructed astrophysical neutrinos in the 1.5 km deep light detector is essential. The main backgrounds for this signal are muons and neutrinos produced in cosmic-ray air showers detected in the deep ice detector.
The coincident detection of air showers with an air-Cherenkov telescope could be used to reduce the cosmic background in IceCube and significantly strengthen the sensitivity of the detector to neutrinos from the Southern Hemisphere.
Here we present an air-Cherenkov prototype telescope. It is designed to withstand the harsh environment at the South Pole. We describe the design and physics potential of this instrument.

Collaboration

– not specified –

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