

The Camera System for the IceCube Upgrade: Simulation Studies of the Antarctic Ice Properties

The IceCube Neutrino Observatory, located at the geographic South Pole, has currently the largest volume among neutrino detectors. IceCube detects neutrinos using Cherenkov light emissions from charged particles produced in neutrino interactions. The optical properties of the ice in the detector is one of the major systematic uncertainties for analyses using IceCube data. One of the major goals of IceCube upgrade, where 7 new strings with novel optical modules and calibration devices are added to the center of the IceCube volume, is to improve the knowledge of these optical properties.

A novel camera-based calibration system will be installed into the photodetection modules to be used in the calibration of the IceCube Upgrade detector. The mass production of these camera systems has completed and integration is in process. There is an ongoing effort to simulate images that are expected from the camera system in the Antarctic ice to develop a method to analyze the image data. This simulation study will allow us to estimate the performance of the camera-based calibration process of the IceCube Upgrade such as the measurement of the optical properties of the Antarctic ice, characterisation of the ice in the new drill holes into which the new strings are installed and measuring the relative geometry of deployed modules. We will provide the status of the ongoing simulation studies processed in this presentation.

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