

The Camera System for the IceCube Upgrade: Introduction to Its Purpose and Production.

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The IceCube Neutrino Observatory is the largest neutrino telescope located deep within the South Pole ice. Currently, an upgrade with denser spaced sensors is being built and one of the goals of the IceCube Upgrade is a precise characterization of the optical properties of the Antarctic ice, which is the source of the largest systematic uncertainty for most IceCube analysis. Calibration devices relying on LED flashers and lasers were used to calibrate the detector's geometry, infer ice properties and determine the stratigraphy of the ice at the IceCube detector site. For the IceCube Upgrade, uniform light sources, and a novel camera-based calibration system will be added for even more precise calibration. The IceCube Upgrade Camera system, developed with the goal of measuring ice properties and observing the refrozen ice in the drill holes, will be integrated into every newly designed Digital Optical Modules (DOMs).

In parallel to the production and integration of these cameras, detailed measurement plans are being developed and simulation studies are being conducted. In this presentation, the objectives and plans for studying the detector medium using the IceCube Upgrade Camera system will be introduced. In addition, details on the device's hardware specifications and performance tests will be included. This novel calibration system will provide a better understanding of the properties of glacier ice and enable more accurate measurements of neutrino events in the IceCube Upgrade.

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