

Camera Calibration for the IceCube Upgrade and Gen2

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What is this contribution about?

- A new camera based calibration device that aims to characterise the optical properties of the IceCube detector medium, the ice surrounding the IceCube DOMs and the positioning of the DOMs in the ice.
- Three cameras and associated illumination systems are installed in each optical module on all 7 strings of the IceCube Upgrade.
- Major objectives on the refrozen hole ice measurement utilising two vertically separated optical modules along the same string and the bulk ice measurement utilising two optical modules on the neighbouring strings. (see Fig. 1)
- A similar system is planned for IceCube-Gen2

Why is it relevant / interesting?

- More accurate Ice models yield a more accurate neutrino event reconstruction with better angular and energy resolution.
- More than 15 years of IceCube data can be retroactively analysed with this better model improving the sensitivity of existing analyses.

What has been done?

- The camera and illumination system has been designed and is being installed into the new optical modules of the IceCube Upgrade.
- Over 2000 cameras are being tested and a series of simulations have been run to determine the systems capabilities.

What is the result?

- A significant fraction of cameras have been tested and integrated into the DOMs for the IceCube Upgrade.
- The evaluated test data demonstrates the quality of the system and its capabilities.

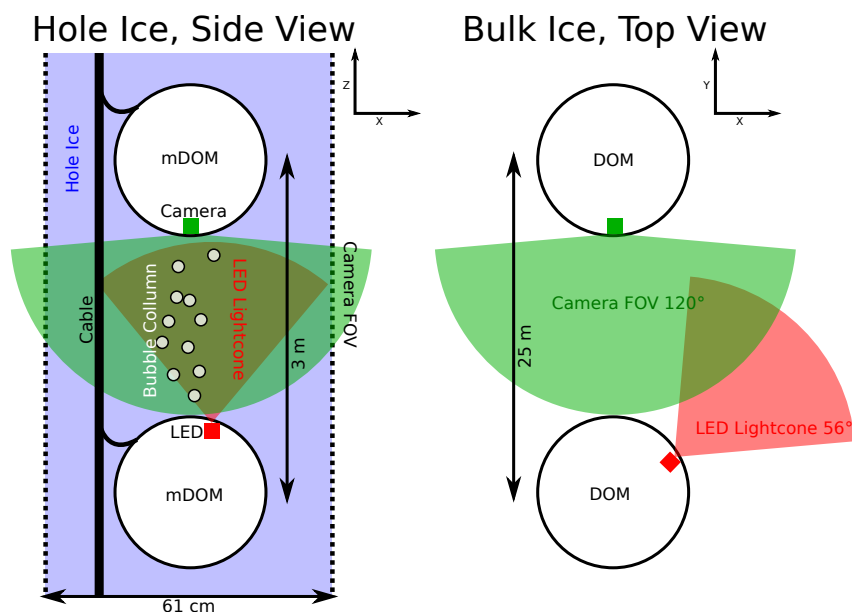


Figure 1: The schematic diagrams for the planned calibration measurements with the IceCube Upgrade Camera System. Left: Refrozen hole ice survey. Right: Inter-strings bulk ice measurement.