

A NEXT-GENERATION OPTICAL SENSOR FOR ICECUBE-GEN2

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EXECUTIVE SUMMARY

ABOUT

The design of a new in-ice sensor module for the next generation South Pole neutrino observatory, **IceCube-Gen2**, is presented. Known as the **Long Optical Module (LOM)**, this design is an evolution of the D-Egg and mDOM sensors developed for the IceCube Upgrade, a first step towards Gen2. Prototype modules are scheduled to be installed in the IceCube Upgrade.

RELEVANCE

Some advancements of the LOM over preceding designs include:

- Upto 18 new 4" PMTs used to match the effective area of the Upgrade modules.
- Use of pre-cured optical gel 'pads' to enhance photon capture rates.
- Waveform processing shifted from the central board to PMT bases.
- Dynamic range extended by digitizing both the anode and a preceding dynode, retaining linearity for brighter events.

STATUS

The current development status for the LOM can be summarized as follows

- Solution found for close packing of PMTs within narrow (12" diameter) vessel, while maintaining necessary clearances.
- Multiple avenues for installing gel pads explored; work underway to refine the PMT support structure, closely linked to gel pad design.
- Design and verification of electronics systems proceeding apace.
- Orders placed with manufacturers for first component prototypes, expected soon for testing.