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## Assembly and Design of the Optical Modules for the NEMO Phase-2

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The NEMO collaboration has undertaken a Phase-2 project, which aims at the realization and installation of a new infrastructure at the deep-sea site of Capo Passero at 3500 m depth. To this aim, a fully equipped 8-storey tower hosting two Optical Modules (OMs) at each end (four OMs per storey) is under construction. Following a well established procedure, the assembly of the 32 OMs is under completion. The designed OM consists of a large area photomultiplier tube (PMT) enclosed in a 13 in. pressure resistant glass sphere. The PMT is a R7081 sel, produced by Hamamatsu, with a 10 in. photocathode and 10 dynodes. Measurements carried out from a batch of 72 PMTs have shown high gain, low dark count rate, good resolution for timing and charge. Mechanical and optical contact between PMT and the glass surface is ensured by an optical bi-component silicone gel. Tests were done to choose the best composition considering optical and mechanical properties. A mu-metal cage is used to shield the PMT against the Earth's magnetic field. The influence of the Earth's magnetic field on the PMT performances, and the effects of the magnetic shield were measured accurately. The PMT base card circuit is produced by ISEG, based on the NEMO specifications. Inside the OM there are also a front-end board and an optical pulser for timing calibration.

### Summary

The NEMO collaboration has undertaken a Phase-2 project, which aims at the realization and installation of a new infrastructure at the deep-sea site of Capo Passero at 3500 m depth. Following a well established procedure, the assembly of the 32 OMs is under completion. The designed OM consists of a large area photomultiplier tube (PMT) enclosed in a 13 in. pressure resistant glass sphere. The PMT is a 10 in. 10 stages R7081 sel, produced by Hamamatsu. Tests were done on a batch of 72 PMTs. Mechanical and optical contact between PMT and the glass surface is ensured by an optical bi-component silicone gel. Tests were done to choose the best composition of the gel. A mu-metal cage is used to shield the PMT against the Earth's magnetic field. The influence of the Earth's magnetic field on the PMT performances was measured accurately. The PMT base card circuit is produced by ISEG. Inside the OM there are also a front-end board and an optical pulser for timing calibration.

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