

# THE NEMO PROJECT STATUS

**Mario Sedita, Rosanna Cocimano, for the NeMO collaboration**  
INFN-LNS Via S. Sofia 62, 95123 Catania, Italy  
Tel. +39 095 542267 email: [sedita@lns.infn.it](mailto:sedita@lns.infn.it).

## I. INTRODUCTION

Starting from 1998 the NEMO collaboration has carried out R&D activities aimed at developing and validating key technologies for a cubic-kilometre scale underwater neutrino telescope [1]. A first phase focussed on site investigation and characterisation studies as well as the development of a suitable detector concept.

The NEMO detector concept is based on semi-rigid vertical structures (towers) composed of a sequence of 10 m long horizontal structures in marine grade aluminium (bars). Each of these has six optical modules and contains instrumentation for positioning and monitoring of environmental parameters. A tower, which consists of 20 such structures interlinked by a system of ropes is anchored to the seabed and kept vertical by appropriate buoyancy on the top. The spacing between storeys is 40 m, while an additional spacing of 150 m is added between the anchor and the lowermost storey.

The power and readout is provided by a light-weight electro-optical cable that is kept separated from the system of tensioning ropes in order to reduce interference with the mechanical structure. Fibre optic technology is used for data transfer.

The towers are connected through a network of undersea cables and junction boxes and a single main electro-optical cable to shore. The towers are connected to the junction boxes through underwater wet-mateable electro-optical connectors operated by a remotely operated vehicle (ROV).

The R&D activities of the NEMO collaboration consist of two successive phases. During Phase-1 a junction box and a demonstrator tower was installed at a test site close to Catania at a depth of 2000 m to verify the technologies.

The Phase-2 project, which is currently under construction, aims at installing an infrastructure, comprising a 100 km electro-optical cable already deployed, a shore station and a full scale tower, at the Capo Passero site at a depth of 3500 m. For more than a decade, the feasibility of neutrino astronomy with a detector in the deep sea has been investigated in three pilot projects, ANTARES, NEMO and NESTOR. In each of these, different configurations and techniques have been

explored.

These projects have provided a wealth of information on the technologies required for a large deep-sea neutrino telescope and constitute the KM3NeT consortium.

## II. RESULTS AND DISCUSSION

Technical aspects under realisation on Phase-2 will be presented with particular attention to:

- Junction Boxes and Tower Prototype
- Power and Data Transmission [3]
- Connection System
- The KM3NeT Status

## III. CONCLUSIONS

An underwater infrastructure is under realization on the deep sea site selected by the NeMO collaboration as a candidate for the installation of the km<sup>3</sup> neutrino telescope.

All the activities carried out up to now by the NeMO collaboration will converge to the KM3NeT technical design of the European telescope detector in the Mediterranean sea.

## IV. REFERENCES

- [1] P. Piattelli, *P. Nucl. Phys. B (Proc. Suppl.)* 165 (2007) 172.
- [2] E. Migneco et al., *Status of NEMO, Nucl. Instr. And Methods in Physics Research, Proceed. of the 2nd Intern. Workshop on Very Large Volume Neutrino Telescope. Catania, Italy, Nov. 8-11, 2005.*
- [3] M. Sedita, *Electro-optical cable and power feeding system for the NEMO Phase-2 project. Nucl. Instr. And Methods in Physics Research, Proceed. of the 2nd Intern. Workshop on Very Large Volume Neutrino Telescope. Catania, Italy, Nov. 8-11, 2005.*

# ESONET NOE : STATUS OF THE PROJECT

**Roland Person**  
Ifremer, centre de Brest, BP 70 29280 Pouzane  
[roland.person@ifremer.fr](mailto:roland.person@ifremer.fr)

The ESONET NoE project is now running for more than two years and will be continued at least until February 2011. We will present the first results. 6 demonstrations were funded and are running: LIDO, Marmara DM, Momar DM, MODOO, LOOME and AOME on seven of the proposed sites. They will allow to demonstrate the interest of permanent observatories and contribute to the definition of the implementation plan for these sites. Standardisation efforts are progressing well. A guide for underwater interven-

tion was published. Groups are working on "smart sensors" in Spain, France and Germany. All these results will be discussed during the second "best practices meeting" on October 8-9th.

A first draft of the "ESONET label" was established. It has to circulate between partners for approval.