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NEMO-SMO acoustic array: a deep-sea test of a novel acoustic positioning system for a km3-scale underwater neutrino telescope

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Within the activities of the NEMO project, the installation of a demonstrator 8-floors tower (NEMO-Phase II) at a depth of 3500m is foreseen in the next months. On board the NEMO tower, an array of 18 acoustic sensors will be installed permitting acoustic positioning of the tower (detecting acoustic signals emitted by a long baseline of five acoustic beacons anchored on the sea-floor), acoustic detection of biological sources and studies for acoustic neutrino detection.
Fourteen high sensitivity and broadband (10 Hz –70 kHz) hydrophones, provided by INFN, will be managed by the SMO (Submarine Multidisciplinary Observatory) project; two free flooded rings hydrophones -suggested for possible use in the KM3NeT long-baseline- are provided by UPV in collaboration with CPPM-CNRS; two acoustic sensors will be installed on special Opto-Acoustic Modules, equipped with piezo-sensors developed by ECAP. The sensors' data acquisition system -fully integrated with the detector data transport system- is based on "all data to shore"philosophy. Signals coming from hydrophones are continuously sampled underwater at 192kHz/24 bit and transmitted to shore through an electro-optical cable for real-time analysis. A novel technology for underwater GPS time-stamp of data offshore has been implemented and tested.
The operation of the acoustic array will permit long term test of sensor and electronics technologies that are proposed for the acoustic positioning system of KM3NeT.

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