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Calibration facility for detector strings for the KM3NeT/ARCA neutrino telescope at the CACEAP laboratory (Caserta)

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KM3NeT is a network of submarine Cherenkov neutrino telescopes under construction in two different sites of the Mediterranean Sea. ARCA, near Sicily in Italy, is optimized for the detection of cosmic neutrinos while ORCA, near Toulon in France, for atmospheric neutrinos.
ARCA and ORCA are both arrays of thousands of optical sensors (Digital Optical Modules - DOMs), each made of 31 small photomultipliers (PMTs) housed inside a glass sphere, which detect the Cherenkov light produced by the secondary particles generated in the neutrino interactions. 18 DOMs are arranged on flexible strings, namely vertical Detection Units (DUs), anchored to the sea floor. Once completed, ARCA and ORCA will consist of 230 and 115 DUs respectively. Each DOM of a string communicates at a dedicated wavelength to the shore station via a network of optical fibers transmitting optical and acoustic signal information as well as orientation information.
Before the deployment, each DU is tested and calibrated in a dark room. The test bench is equipped with a full data acquisition system for communication, data processing and time synchronization. Several steps are needed to accomplish the DU calibration, including the HV tuning of the PMTs, checking of the acoustic receivers and calibration light sources in the DOM and time calibration using laser signals distributed to all DOMs.
Here we describe the DU test and calibration facility at the CACEAP Laboratory in Caserta, focusing on the functional tests and calibrations performed at the end of the DU integration.

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