Contribution ID: **202** Type: **Oral**

A multi-purpose digital acoustic sensor and its application in the deep-sea environment

Thursday, 5 June 2014 17:10 (20 minutes)

The KM3NeT project is a deep-sea research infrastructure that will host a neutrino telescope with a volume of several cubic kilometres as well as Earth and Sea science instrumentation for monitoring the deep Mediterranean Sea.
Within the project, a variety of acoustic topics are pursued: from acoustic position calibration of the flexible detector structures of the neutrino telescope over acoustic marine life monitoring to acoustic detection of ultra-high energy neutrinos. For these tasks - with a focus on position calibration - a multi-purpose digital acoustic sensor was developed that is integrated into the active elements of the detector: glass spheres holding photomultipliers, readout electronics and additional instrumentation.
The sensor directly provides high-bandwidth digital data in standard audio format, its firmware is exchangeable. The data is sampled at about 200 kHz with 24-bit accuracy. The acoustically sensitive piezo-electric ceramic together with circuitry for pre-amplification, filtering, digitization and data formatting (using an FPGA) are implemented in a very compact design (2cm diameter and 3cm length). The sensor is flexible in application: it is shielded from electromagnetic interference, can be attached to the inside of containers, and can be coated for direct usage in water. The design and characteristics of the acoustic sensor are described and possible applications are discussed.

Summary

A multi-purpose digital acoustic sensor has been developed primarily for acoustic position calibration of the KM3NeT detector. Its small size and its flexible firmware allow for a wide range of applications.

Primary author: GRAF, Kay (University of Erlangen)

Presenter: GRAF, Kay (University of Erlangen)

Session Classification: I.e Novel Technologies

Track Classification: Sensors: 1e) Novel technologies