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In-situ gain calibration based on single byte PMT signals

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Bouke Jung[1], Maarten de Jong[2], Paolo Fermani[3]
on behalf of the KM3NeT collaboration

[1]) University of Amsterdam, Nikhef
bjung@nikhef.nl
[2]) Leiden University, Nikhef
mjg@nikhef.nl
[3]) Sapienza Università di Roma
paolo.fermani@roma1.infn.it

Present and foreseen neutrino observatories, such as IceCube, P-ONE, GVD, Antares and KM3NeT have to operate in challenging environments, where high count rates go hand in hand with limited bandwidths.
To keep the data rates in these experiments within the allowed range, rigorous data reduction is essential.
At the same time, sufficient information needs to be recorded to accurately measure the neutrino properties.
The KM3NeT collaboration has developed a novel data acquisition procedure, in which each PMT signal is reduced to a datapacket of 6 Bytes, containing the PMT identifier (1 B), the hit time (4 B) and the duration over which the associated PMT pulse exceeded the threshold (1B).
This talk highlights an analytical pulse-shape model which is used to perform in-situ calibrations of the gain and its spread, using only the time-over-threshold statistics associated with single photon hits.

Keywords

PMT; gain; calibration; in-situ; KM3NeT; neutrino telescope; neutrino; neutrino physics; neutrino astronomy; deep sea detector; neutrino observatory;

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Subcategory

Experimental Methods & Instrumentation

Primary author: JUNG, Bouke (Nikhef and University of Amsterdam)

Co-authors: Prof. DE JONG, Maarten (Nikhef and Leiden University); Dr FERMANI, Paolo (Sapienza Università di Roma)

Presenter: JUNG, Bouke (Nikhef and University of Amsterdam)

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