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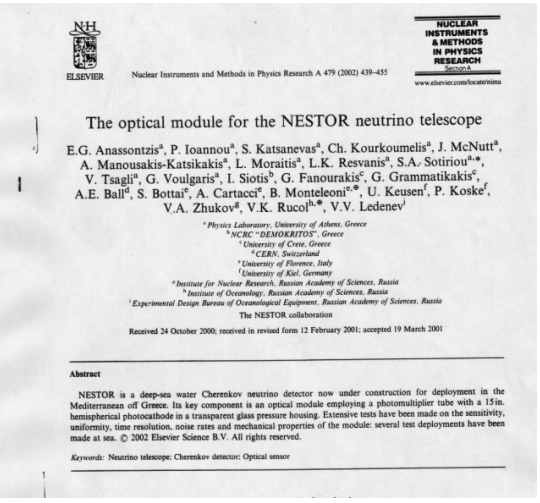
Hellenic Open University

NESTOR

Neutrino Extended Submarine Telescope with Oceanographic Research

The NESTOR O.M.

The Detector



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The optical module for the NESTOR neutrino telescope

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The NESTOR collaboration

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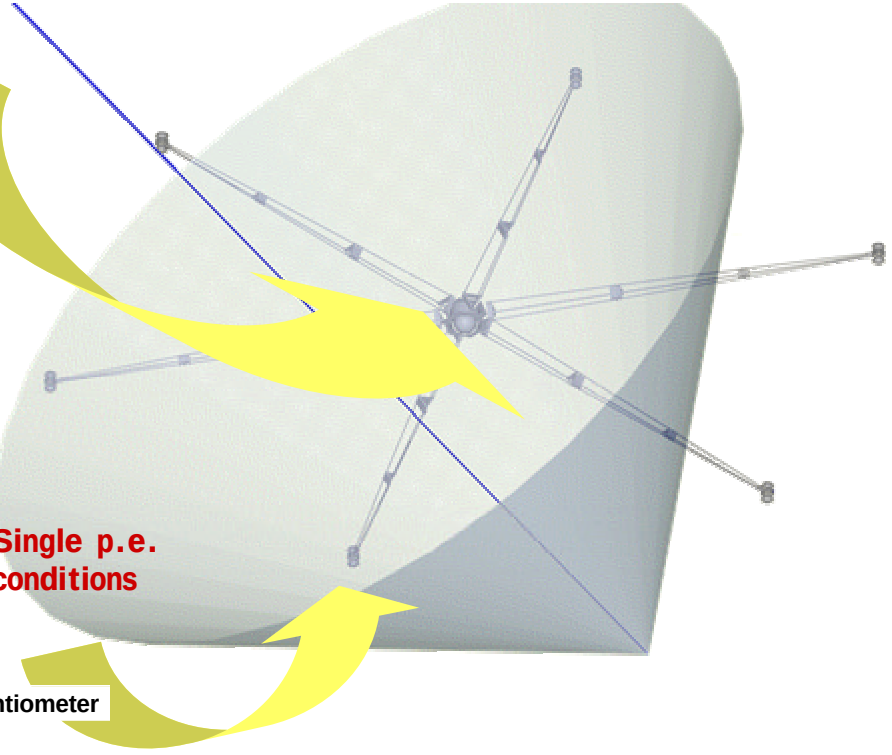
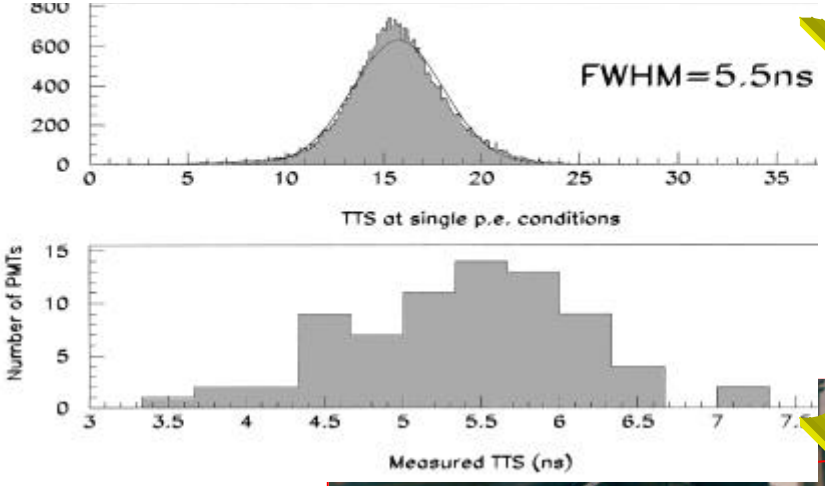
Abstract

NESTOR is a deep-sea water Cherenkov neutrino detector now under construction for deployment in the Mediterranean off Greece. Its key component is an optical module employing a photomultiplier tube with a 15 in. hemispherical photocathode in a transparent glass pressure housing. Extensive tests have been made on the sensitivity, uniformity, time resolution, noise rates and mechanical properties of the module: several test deployments have been made at sea. © 2002 Elsevier Science B.V. All rights reserved.

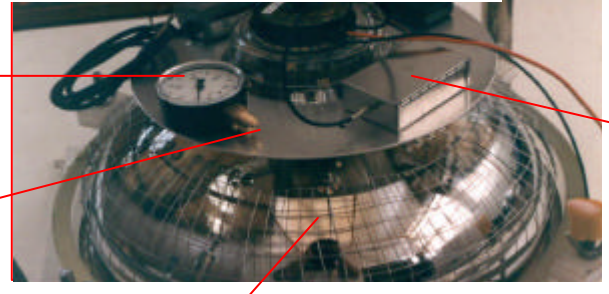
Keywords: Neutrino telescope; Cherenkov detector; Optical sensor





Single p.e. conditions

Potentiometer



Pressure gauges

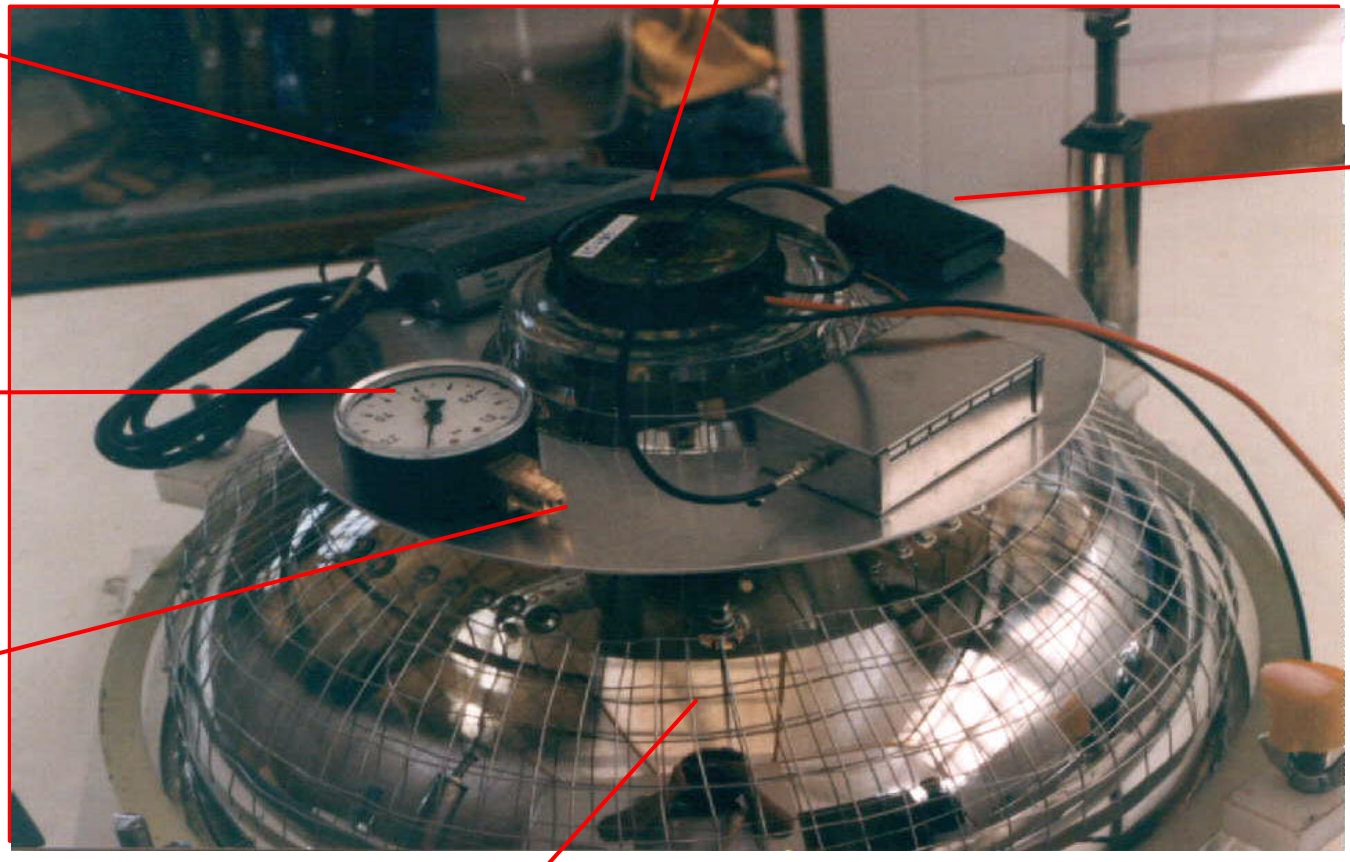
Filter

Al disk

Hamamatsu PMT inside the BENTHOS sphere

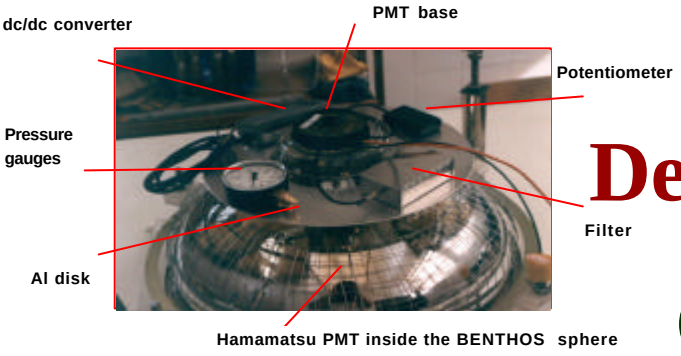
- Hamamatsu PMT R2018-03 (15”)
- Benthos spheres
- μ-metal cage
- power supply

The NESTOR Optical Module



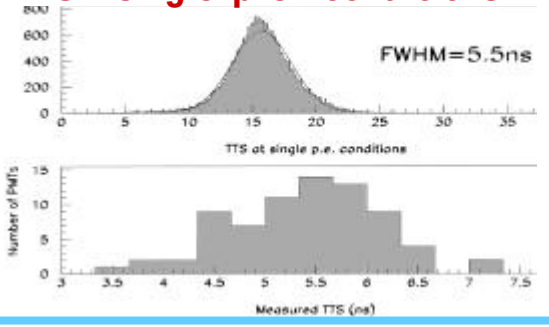
Detector Preparation

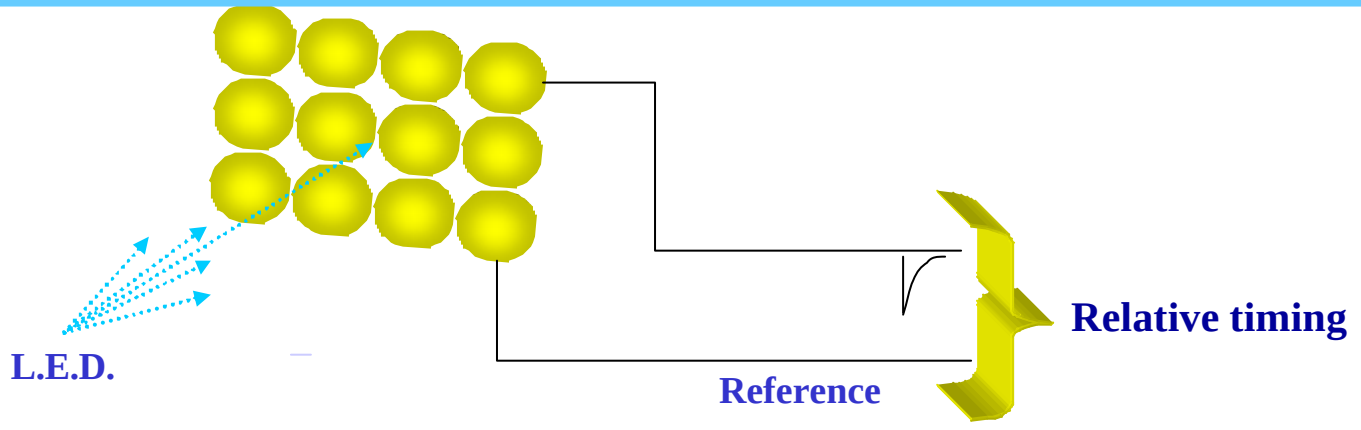
Optical Modules

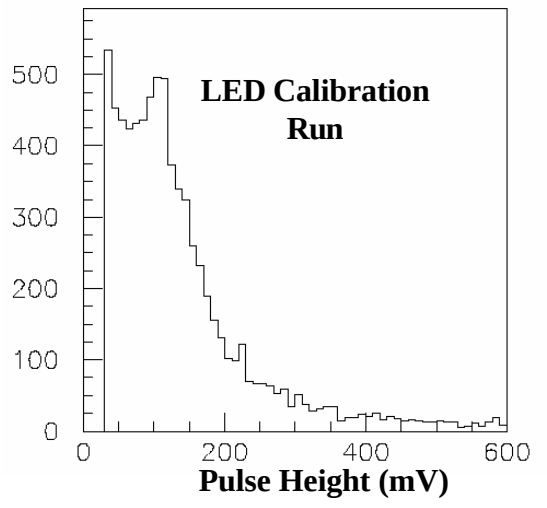


Extensive Lab tests

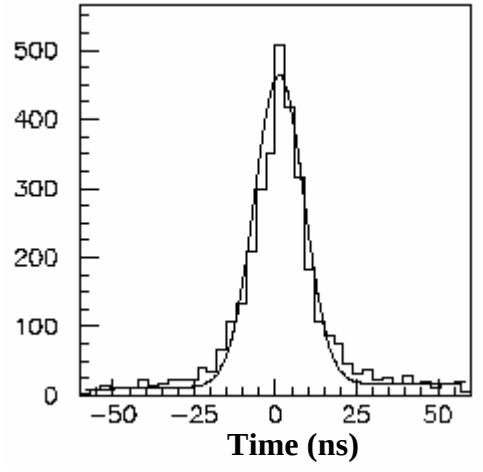
On single p.e. conditions







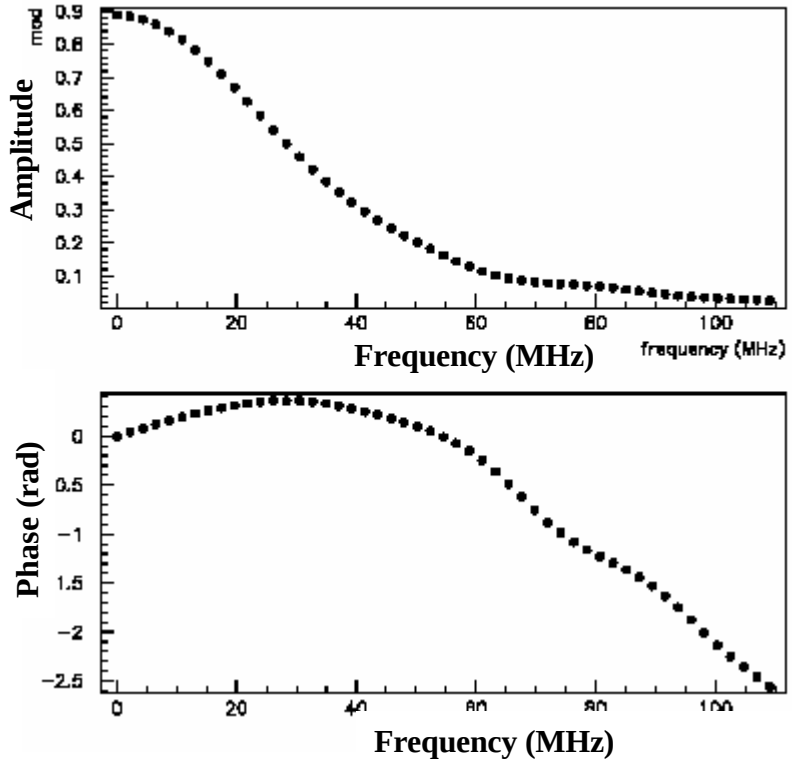
Time Difference in PMTs Response

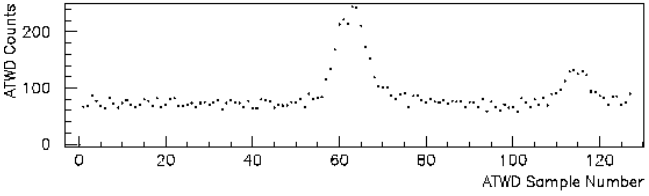


Detector Preparation

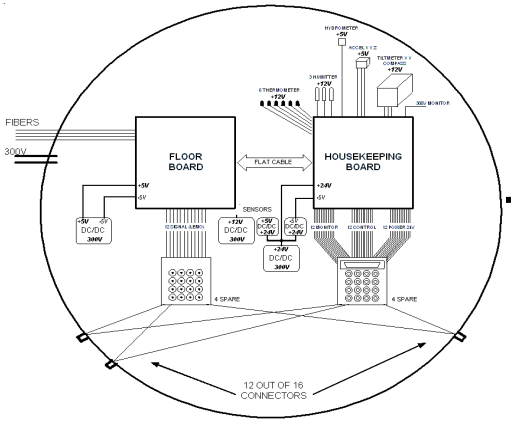
Attenuation Correction

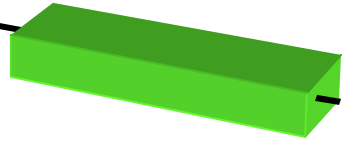
Fourier Transform-Comparison



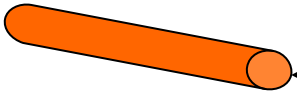


Reference waveform





Electronic delay lines and amplifier

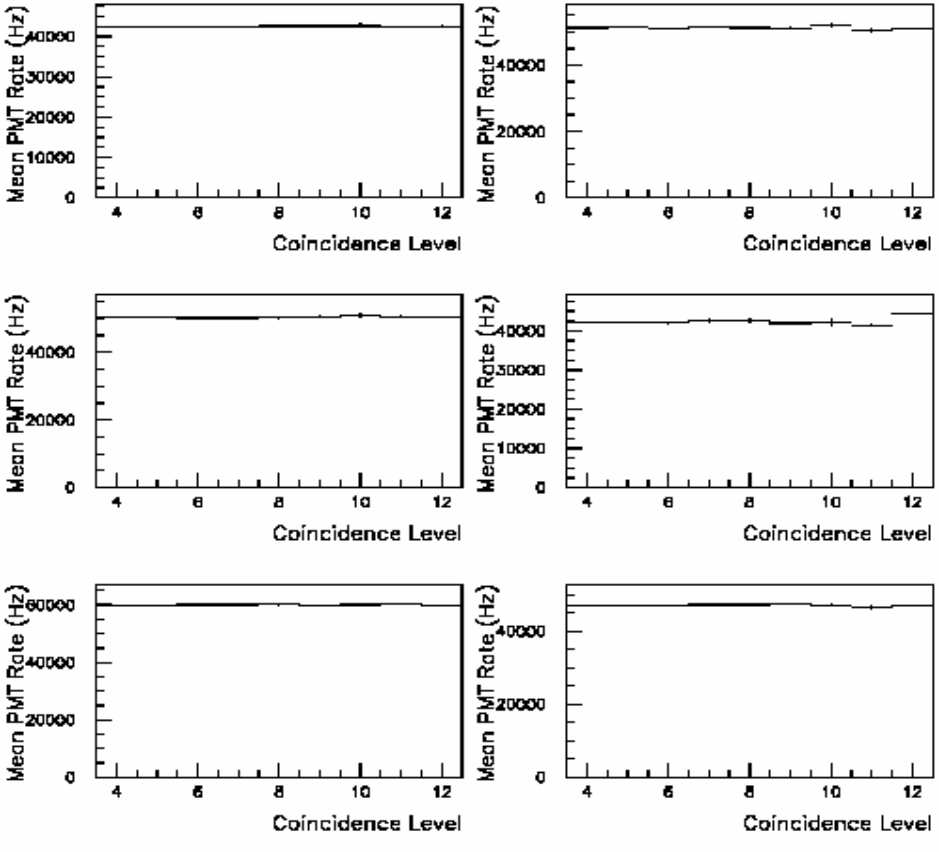


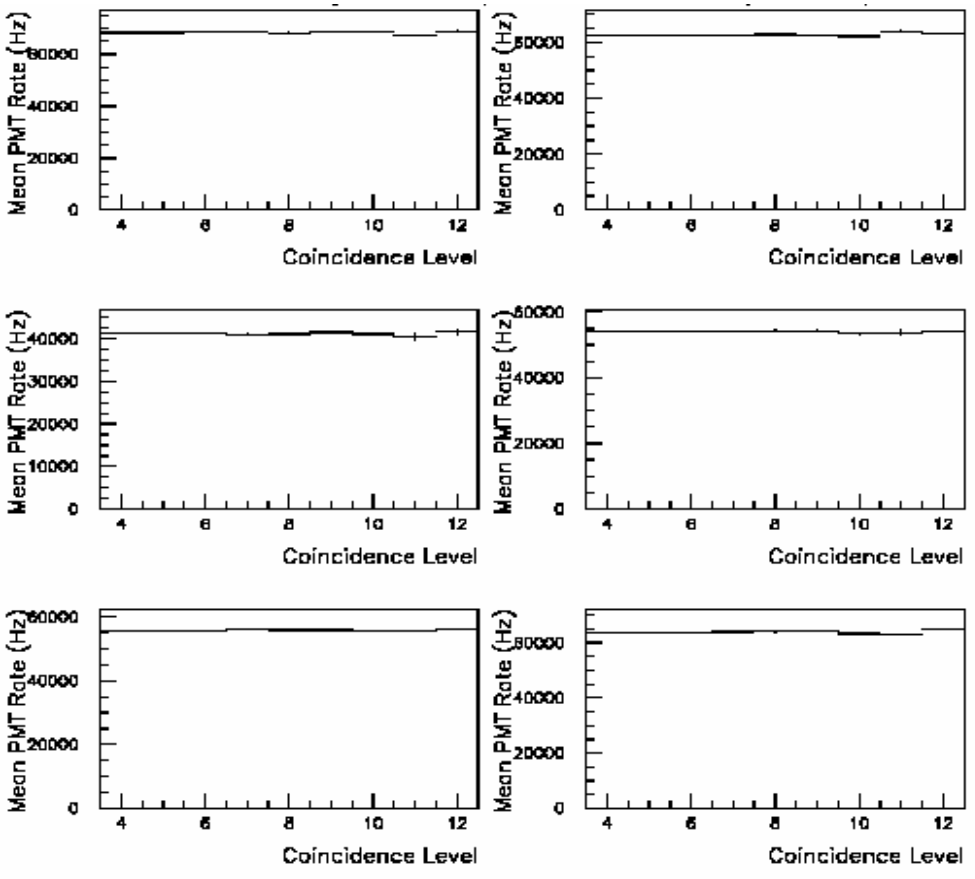
Coaxial cable

Data from a depth of 4000 m

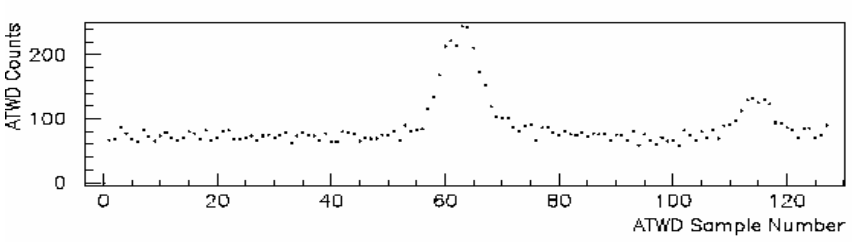
Single PMT Rates

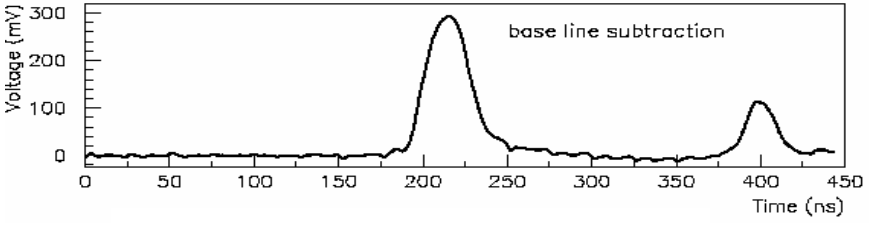
Trigger: =4fold Coincidence

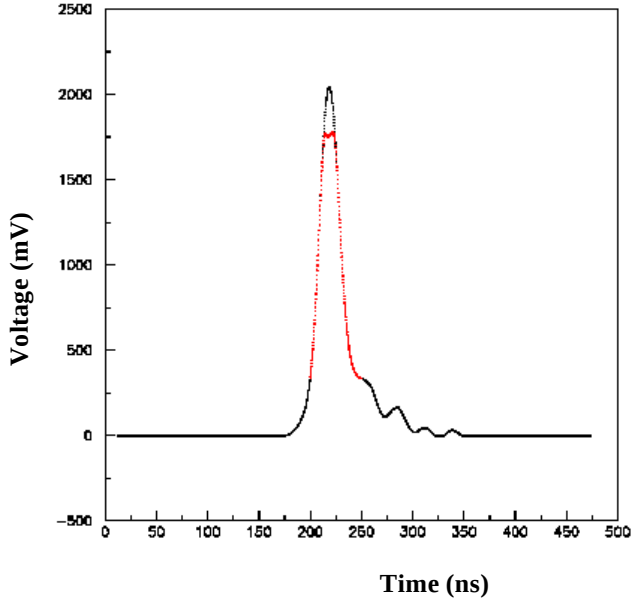


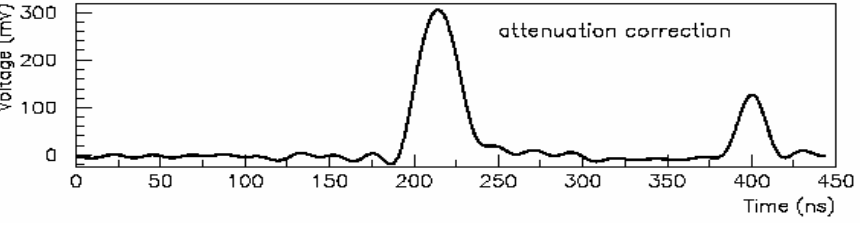


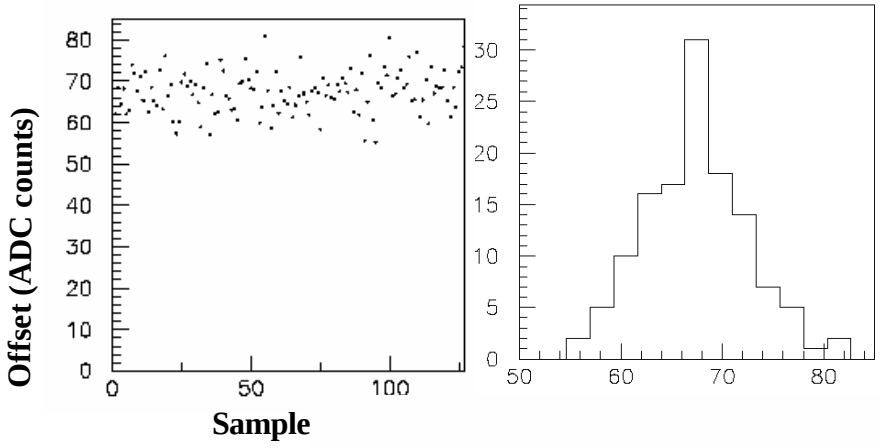
Waveform Reconstruction

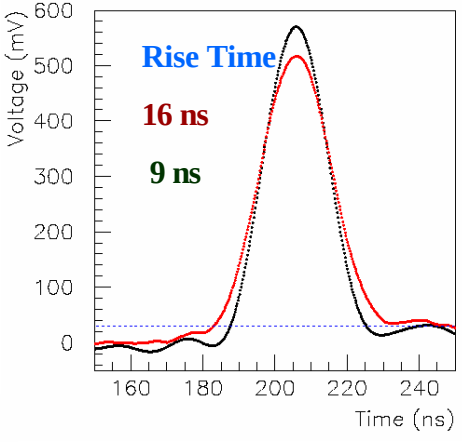


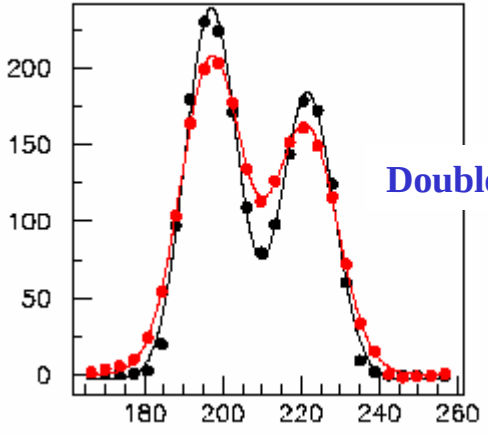












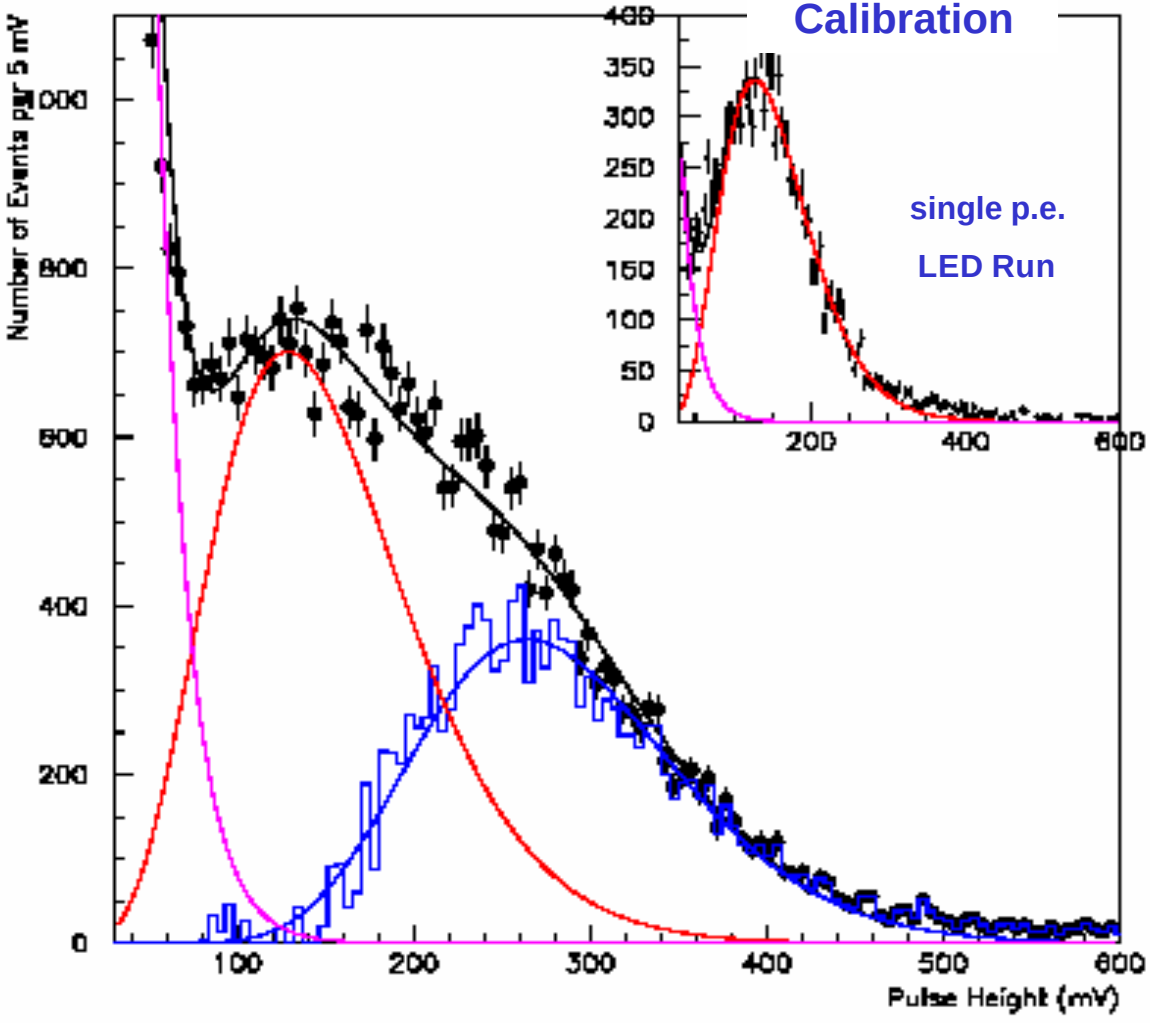
Double pulse separation

Before the F.F.T. and the attenuation corrections

After the F.F.T. and the attenuation corrections

Data from a depth of 4000 m

PMT Pulse Height Distribution



single p.e. pulse height distribution

two p.e.s pulse height distribution

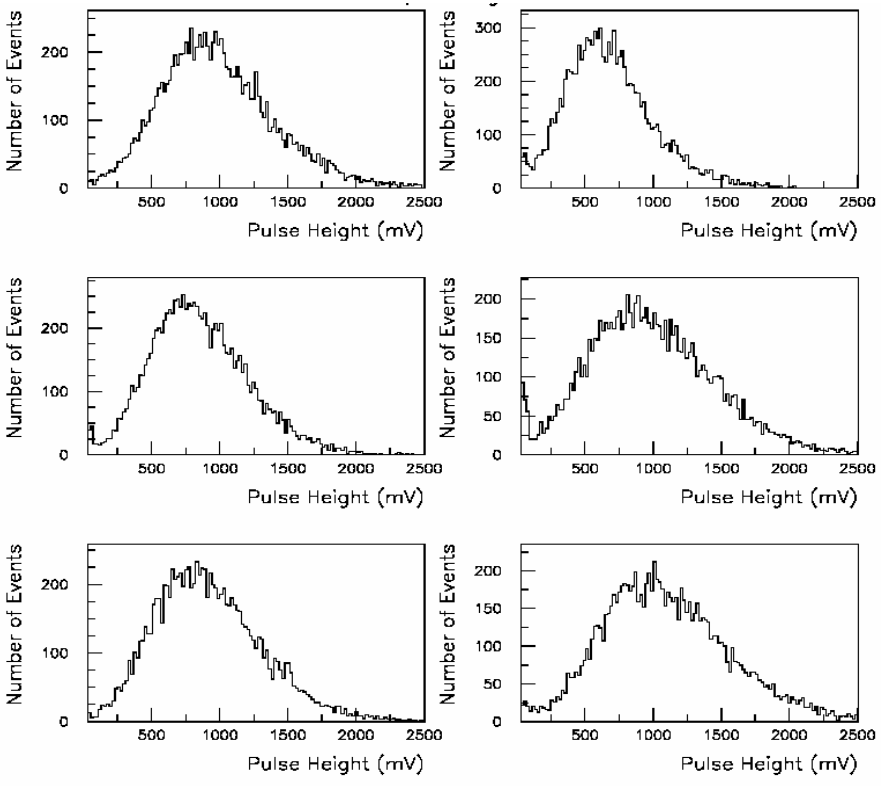
dark current pulse height distribution

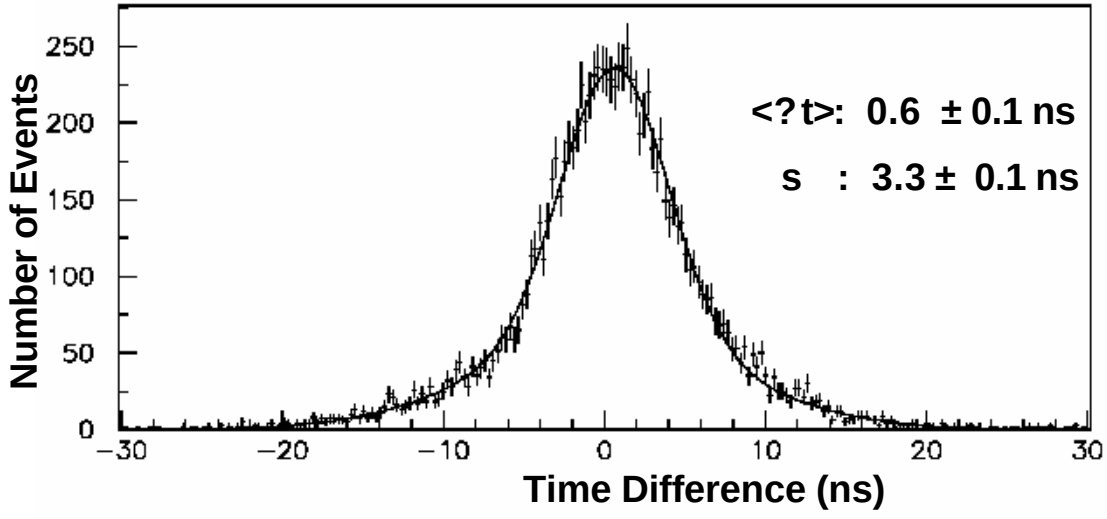
sum of the above

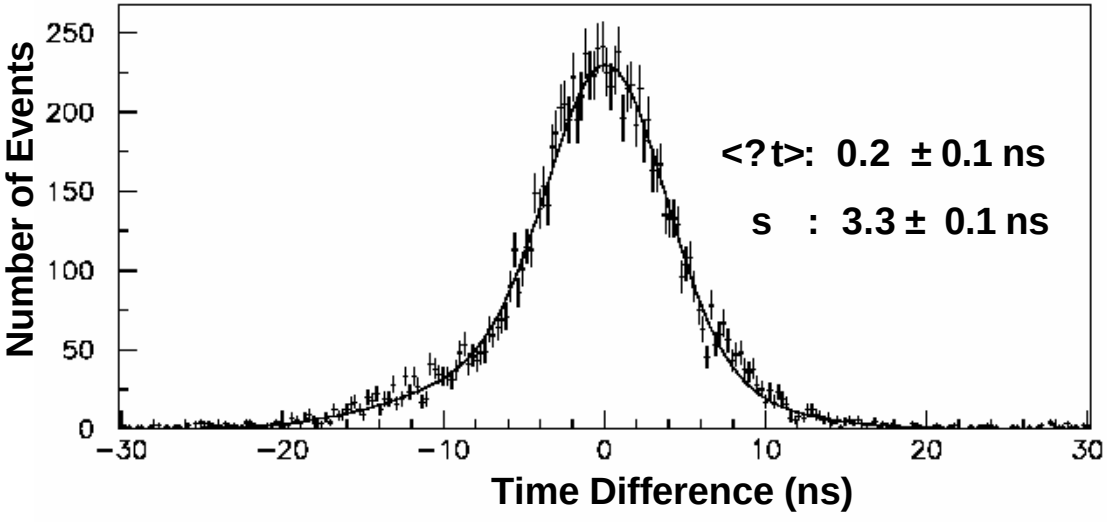
Calibration Data Analysis

Calibration Database
Quality Histograms

Data from a depth of 4000 m
Calibration Run







Data from a depth of 4000 m
Calibration Run