MSGC-GSPC
Scintillation Light and Charge measurements
Primary and Secondary Light Analysis

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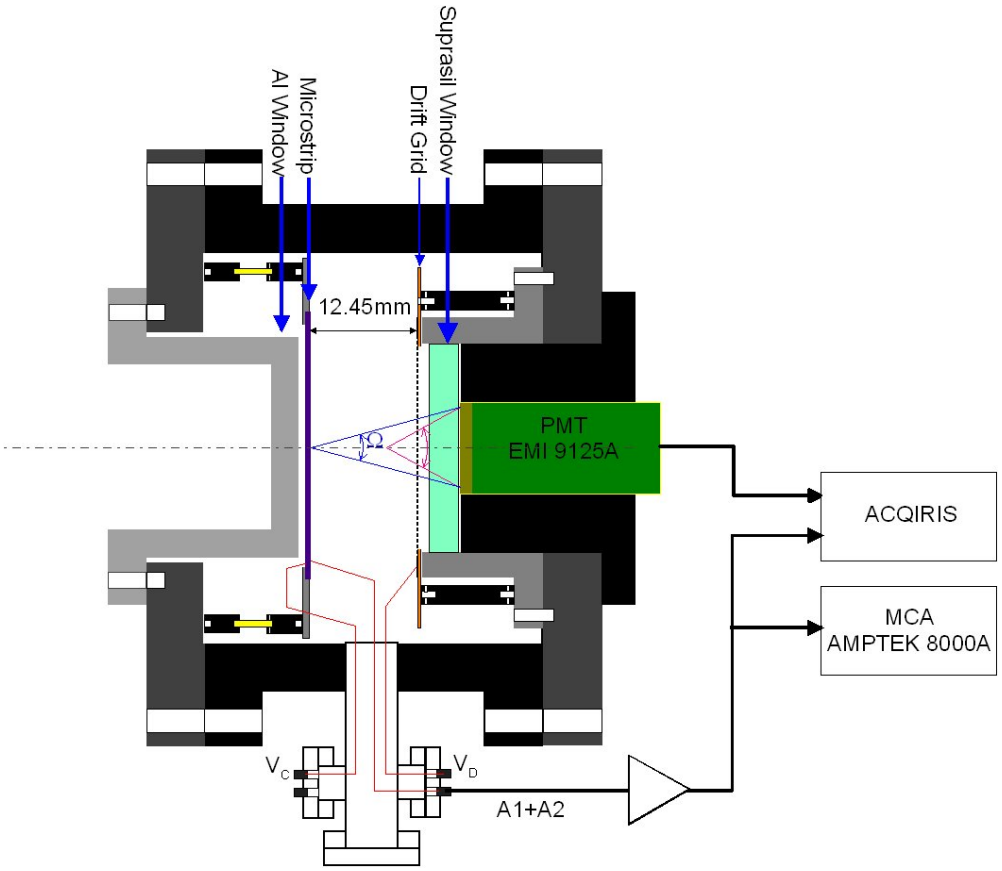
Experimental set-up



Microstrip plate: BIDIM BIS (virtual cathode)

- Active area – 80 x 80 mm^2
- Substrate – Shott glass (SH8900)
- Anodes – 10 μm, Cr
- Cathodes – 980 μm, Cr
- Pitch – 1mm
- Thickness – 0.5mm

Conversion Gap: 12,45mm

Gas mixture: ^3He (2bar) + CF_4 (3bar)

Detention efficiency ~30% @ 1,8 Å

PMT: EMI 9125A

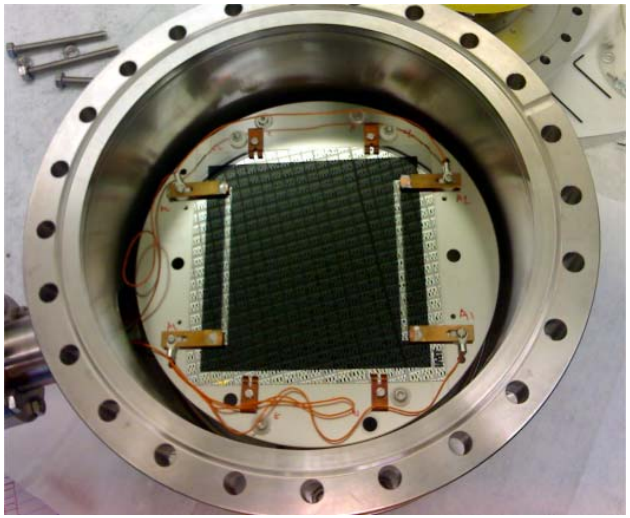
- 28mm diameter (25mm active diameter)
- 300 – 650 nm (bialkali)

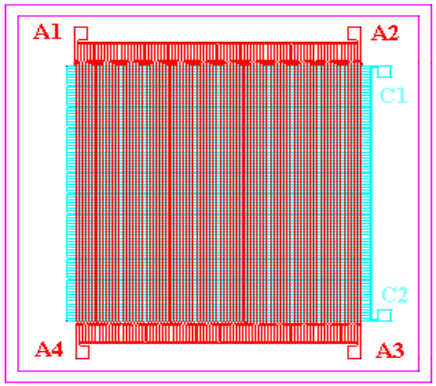
MS plate - PMT distance: 28mm

Grid - Suprasil Window distance: 4.5mm

Suprasil Window thickness: 6mm

Experimental set-up

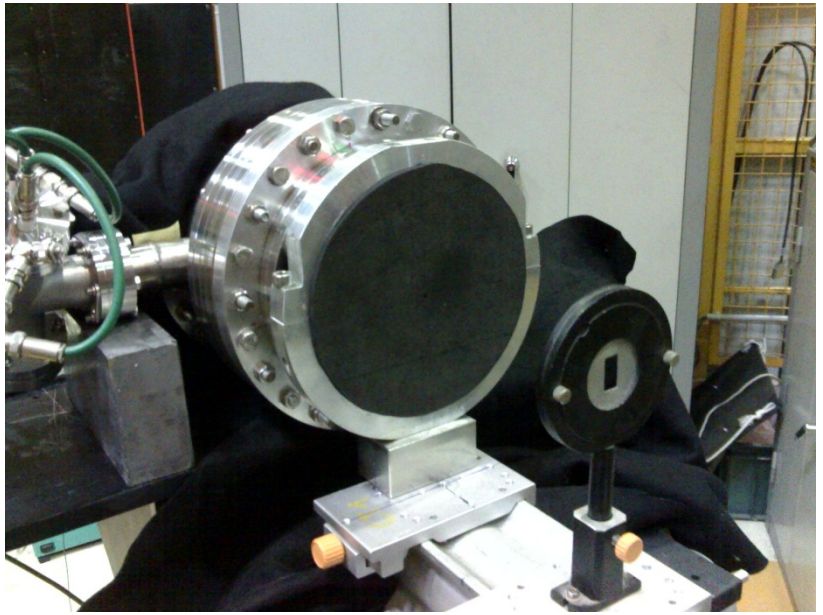




11 days of Vacuum (9 days @ T=70ºC)

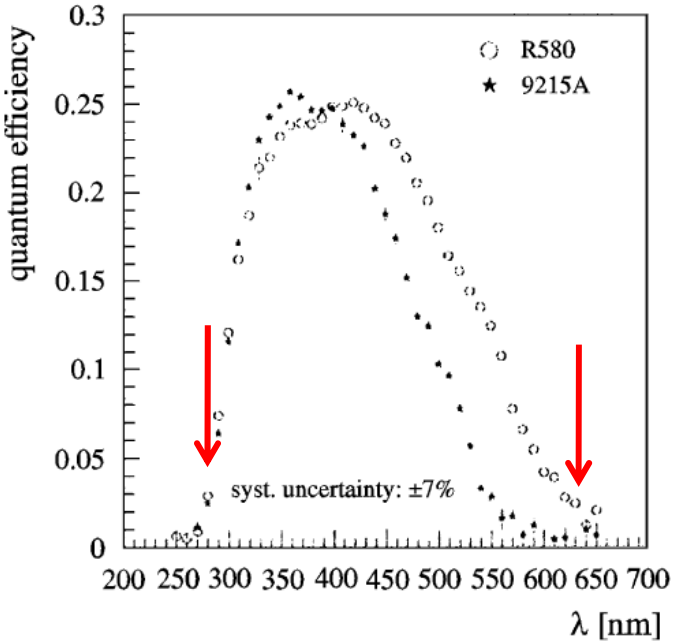
Final pressure: 5 x 10^{-8} mbar @ 25ºC

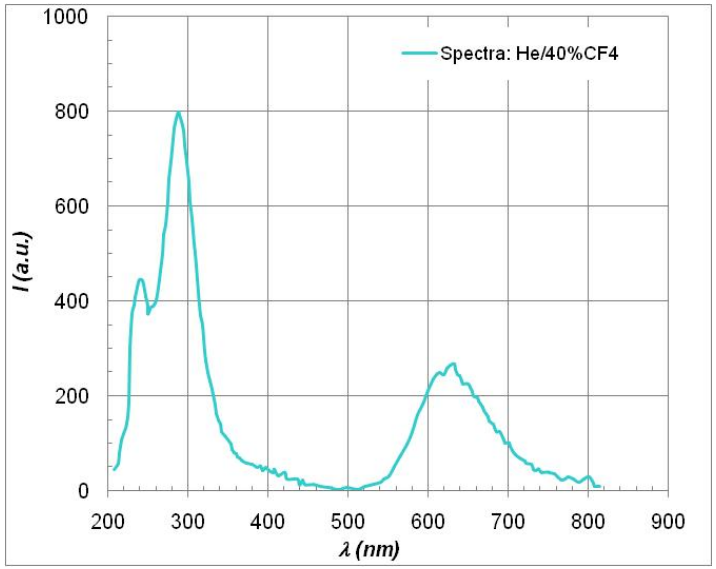
Detector Filled with: 3He (2bar) + CF4 (3bar)



Neutron Beam collimated by a 3mm diameter hole on 10mm thick B4C (2xsheets, each 5mm thick)

Experimental set-up





PMT EMI 9125A QE from:

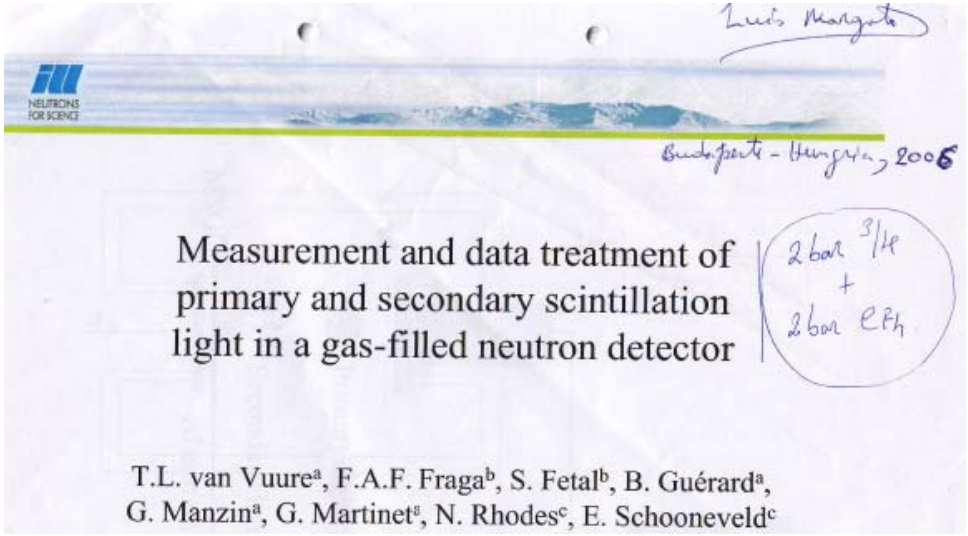
Photodetectors for HESS, Kohnle, et. al. Nuclear Instruments and Methods in Physics Research A 442 (2000) 322-326

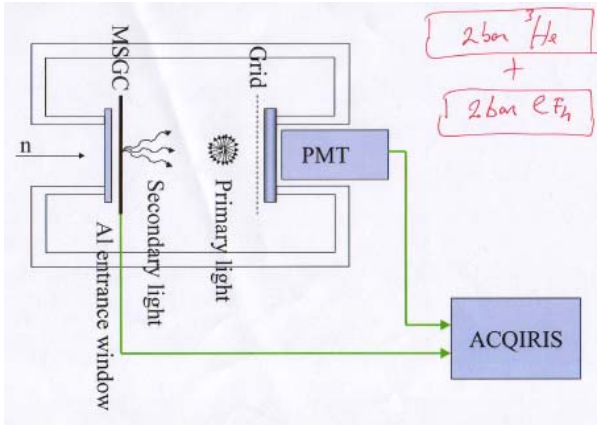
Obs.: * 9215A → ET 9125A

Spectral emission in He/40%CF4

Ineffective overlap between the PMT 9125A QE and emission spectra

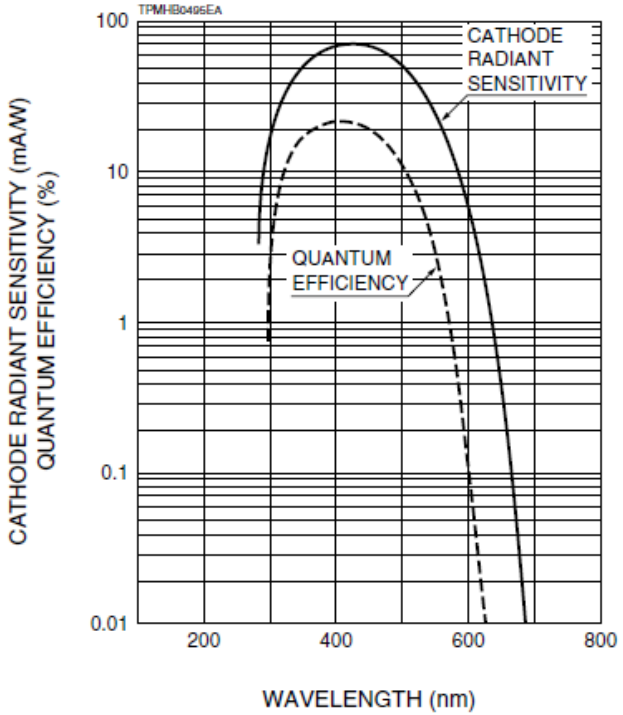
Previous work





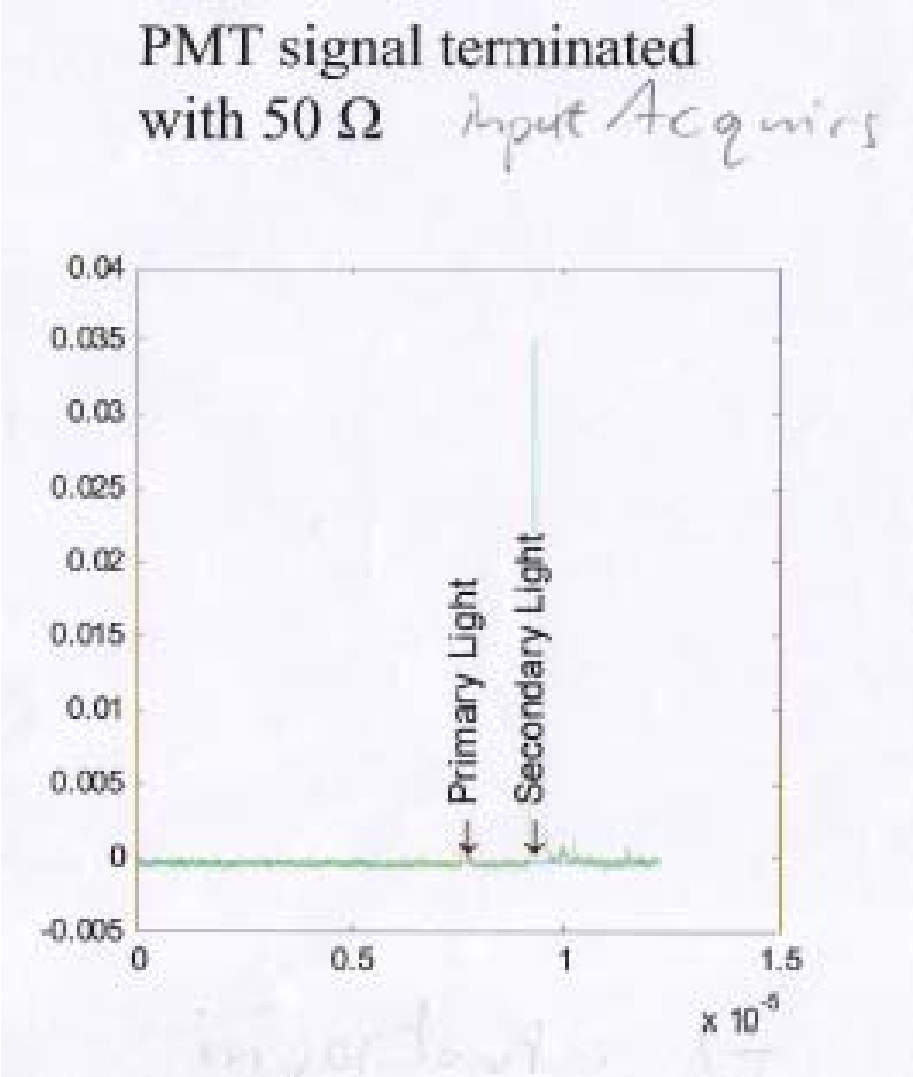
PS-PMT Hamamatsu 2486

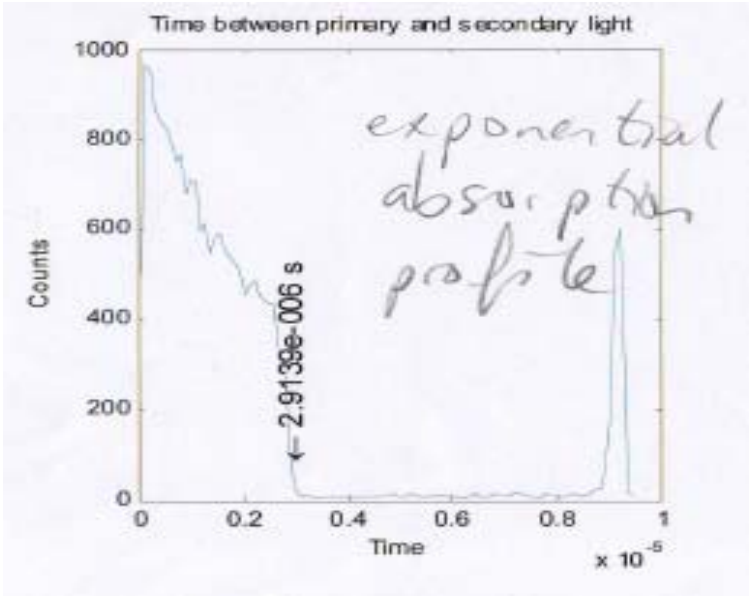
Figure 1: Typical Spectral Response



Parameter	Description/Value	Unit
Spectral Response	300 to 600	nm
Wavelength of Maximum Response	420	nm
Photocathode Material	Bialkali	—
Effective Area	ϕ50	mm

Previous work



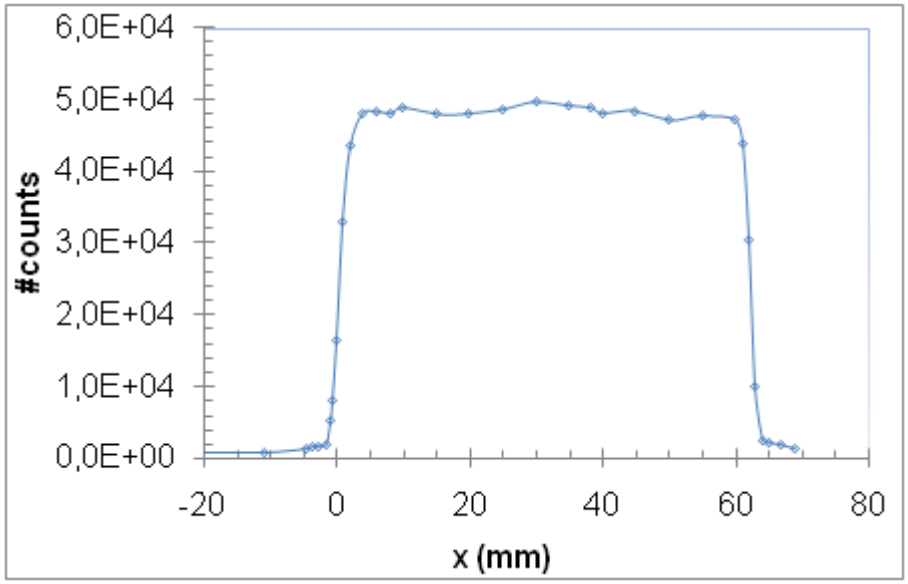


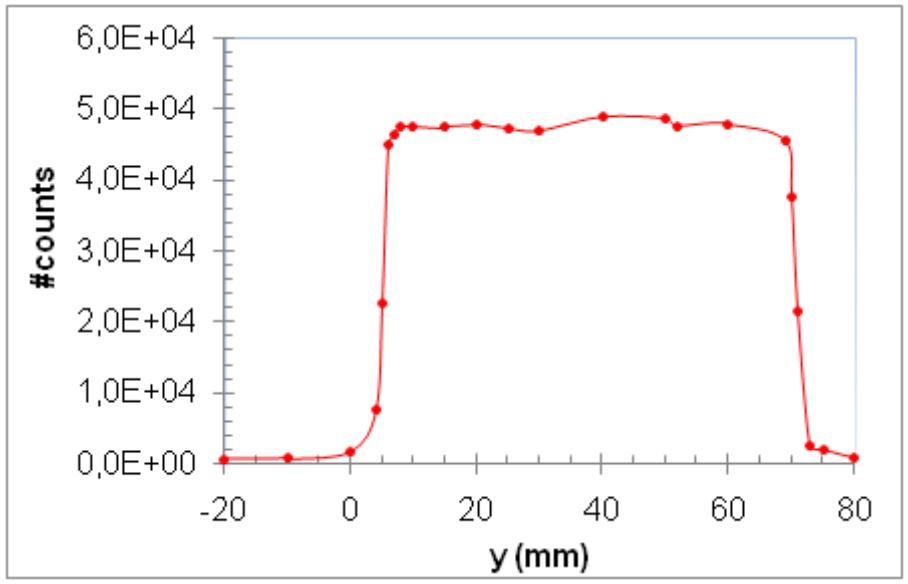
Distribution of the Time between primary and secondary pulses – DeltaT

Measuerements

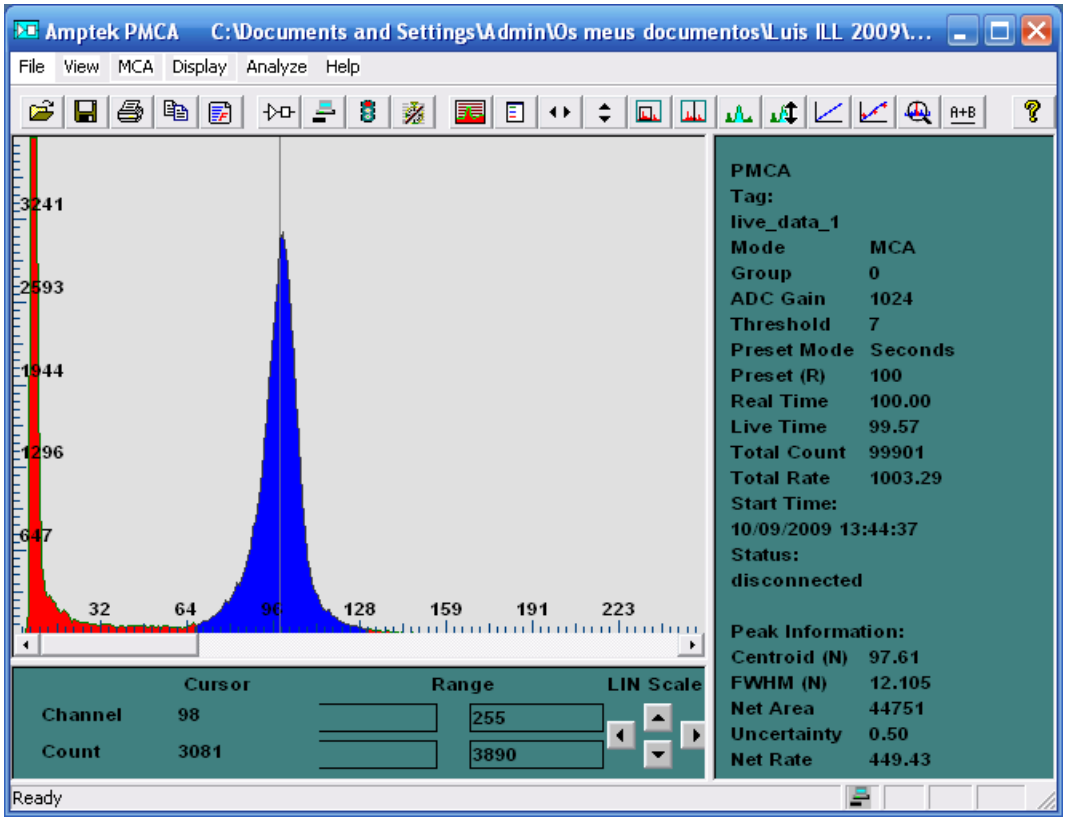
Aligning the Detector with the beam - Plateau measurement in vertical and horizontal direction:

- Anodes Signals + Amplifier + counter
- Table displacement by step motors





PHS – Anodes Signals (A1+A2)



AMP (15V/pC; 4µs)
MCA (0 – 10V)

^{3}He (2bar) + CF_4 (3bar)

VD=0;
VC=0
HV=1750V (Va~1338 V; gain ~18)

Full energy peak (764keV) (N): 98
Fwhm (N): 12

Charge and Light Signals Acquisition with the ACQIRIS System

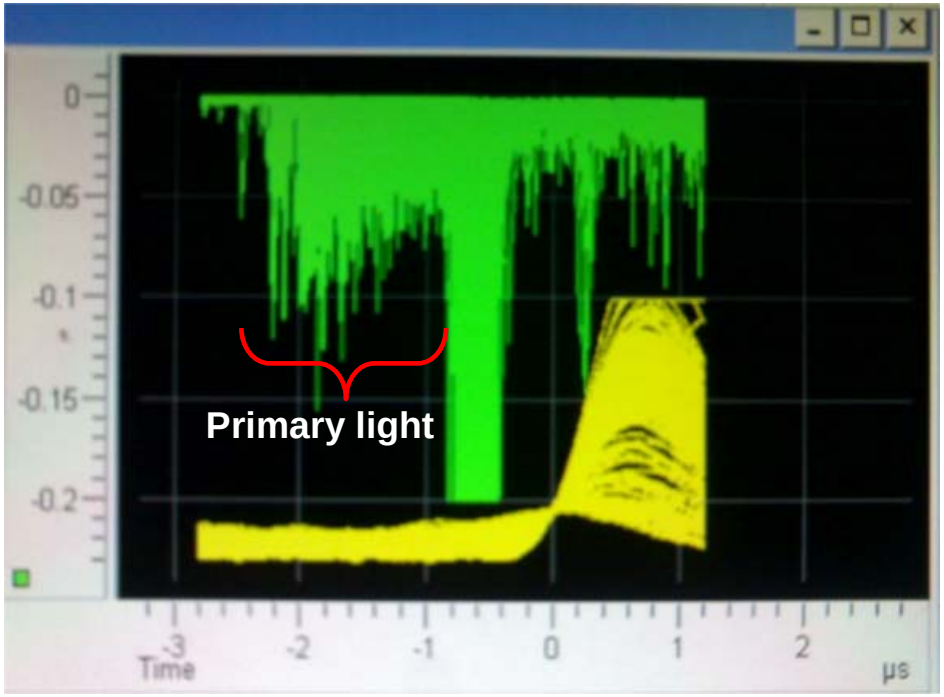
Detector settings

VC=0V; VD=0V; HV=1700V
VPMT=-950V

ACQIRIS settings

Ch1- PMT signals (Zin=50Ω)
Ch2 – Anodes Signals (Zin=1M)

Time window=4μs
Trigger Delay=-2.8 μs
Trigger Level (Ch2)=150mV
Sampling Rate=500MS/s



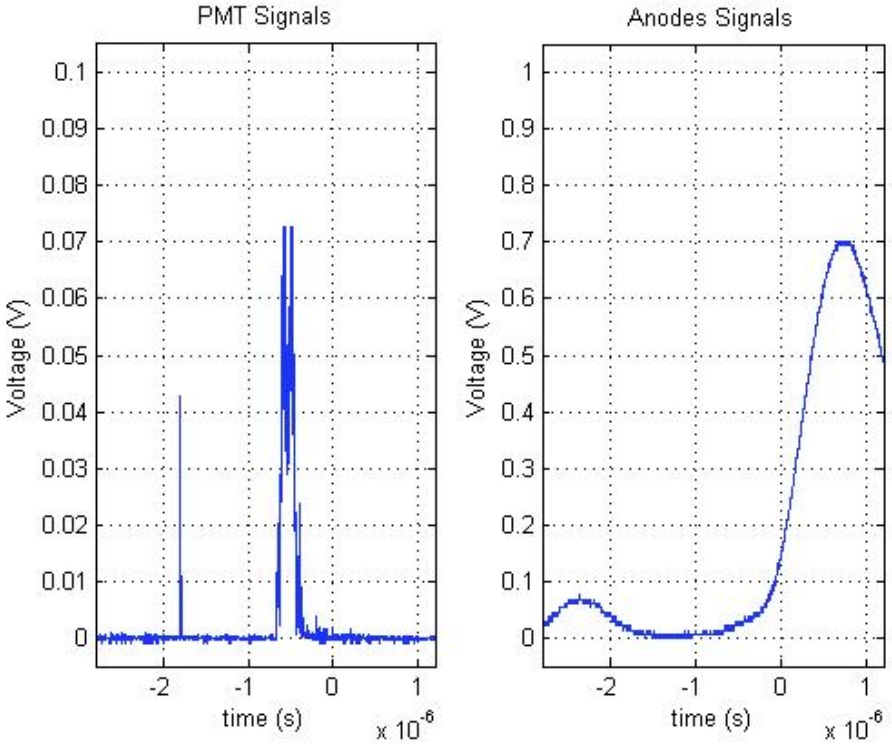
Green – PMT signals; Yellow – Charge signals
(Time scale in μs and Amplitude in Volt)

PMT Signals: 200mV Full scale; saturation on the secondary light
Anodes signals: Full scale 2 V; Trigger level=150mV

Light and Charge Signals

Signal topologies

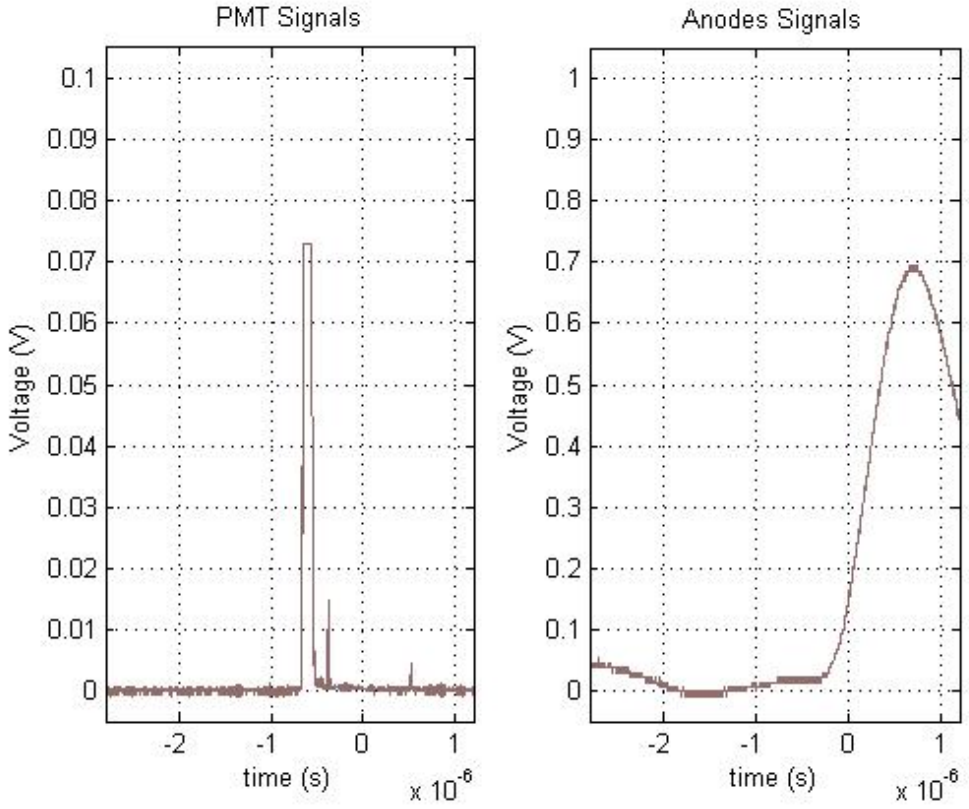
Events type 01 - Neutron Conversion away from the microstrip



Light and Charge Signals

Signal topologies

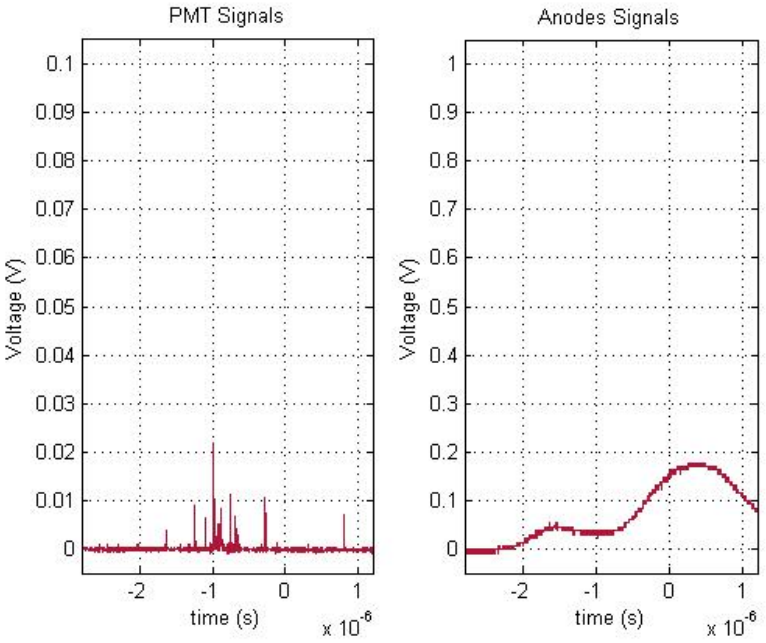
Events type 02 - Neutron Conversion in the vicinity of the microstrip (primary light signal superimposed to the secondary light signal) !?

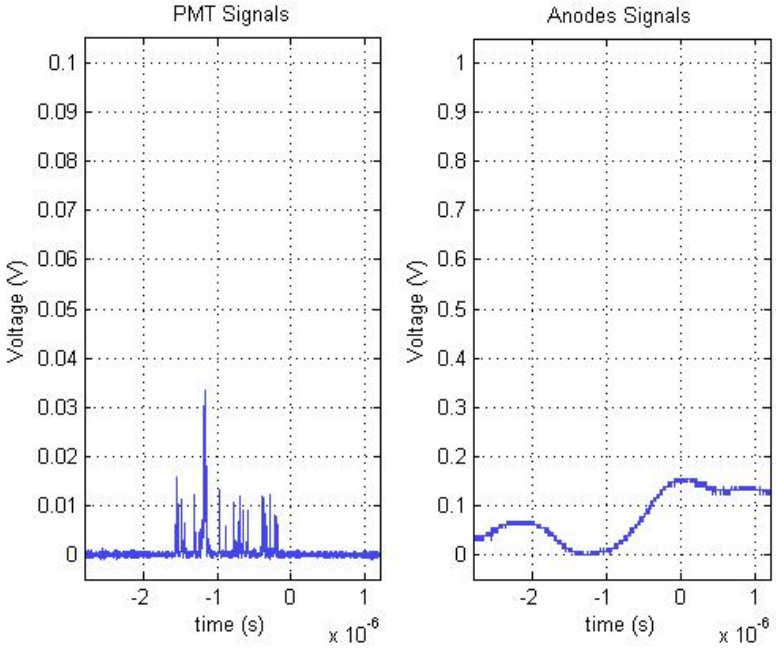


Light and Charge Signals

Signal topologies

Events type 03 - Only secondary light; Lower amplitude charge signal - Spread in the time; Gamma events!?

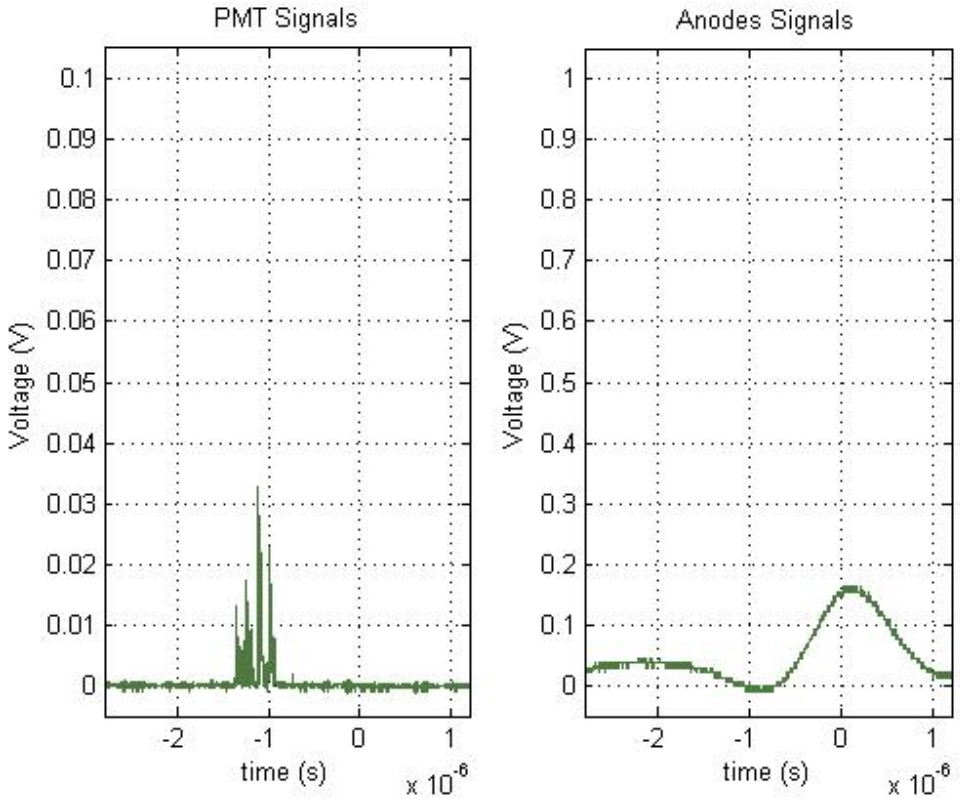




Light and Charge Signals

Signal topologies

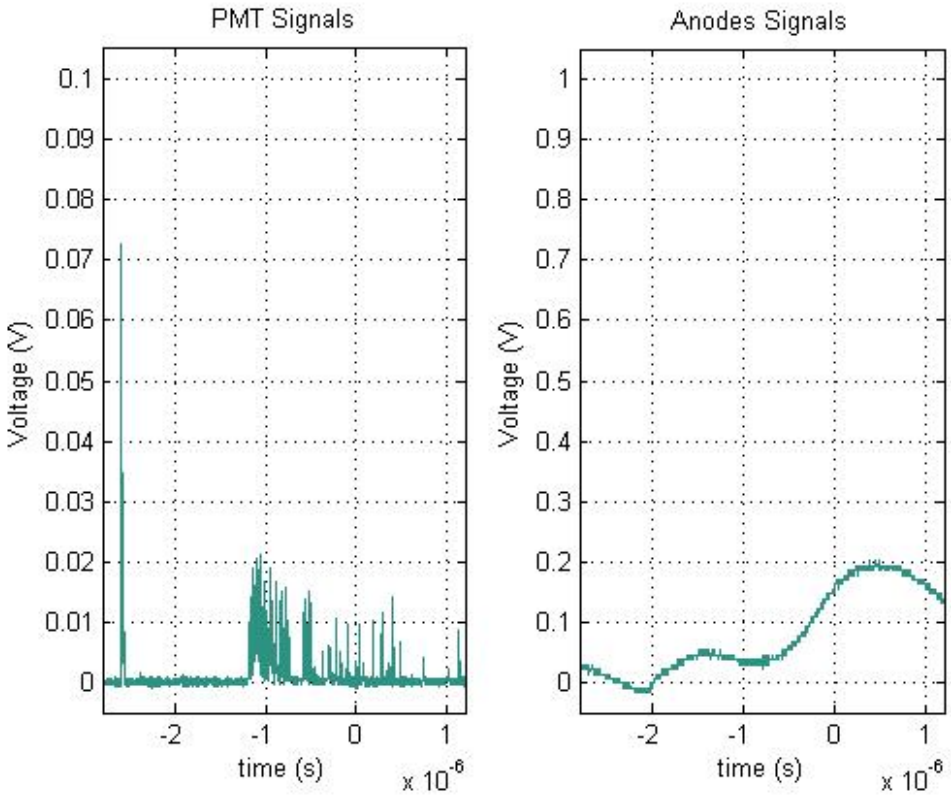
Events type 04 - Only secondary light; Light signal farther from the trigger (t=0) and Lower amplitude charge signal;



Light and Charge Signals

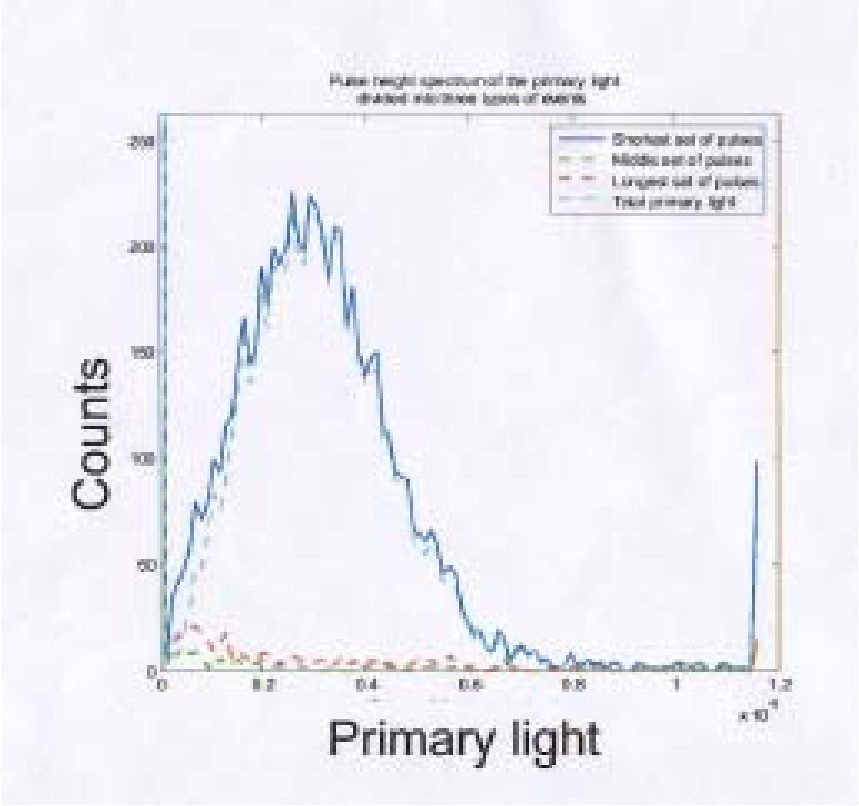
Signal topologies

Events type 05 - Primary light far away from trigger point; Secondary light spread during a long time interval; Lower amplitude for the charge signal;

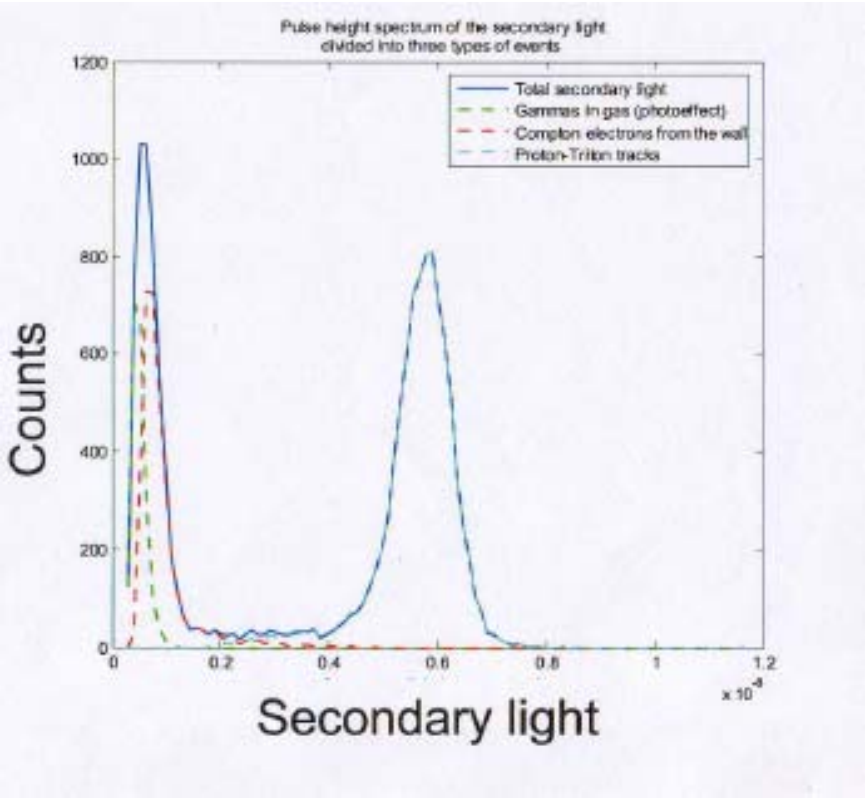


Obs.: The list is not restricted to the examples given here

Early work



Primary light pulse height spectra



Secondary light pulse height spectra
(events classified in three categories)