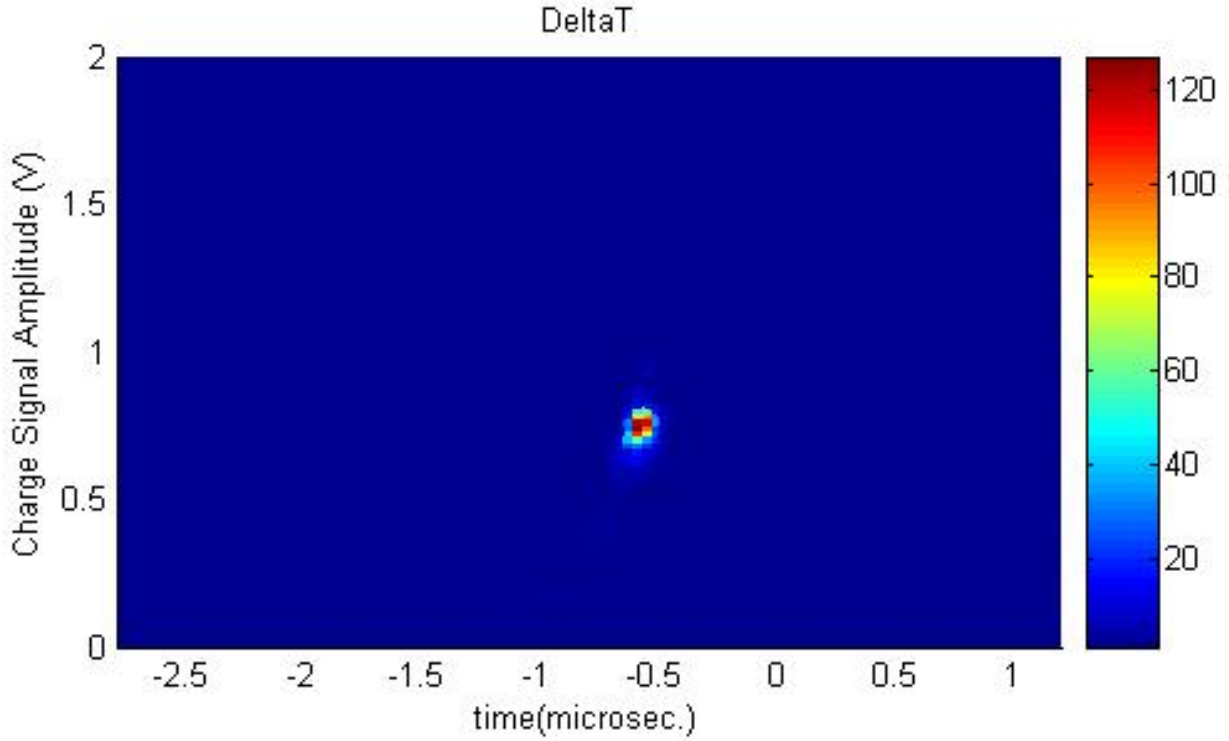
Light and Charge Signals – Data Analysis

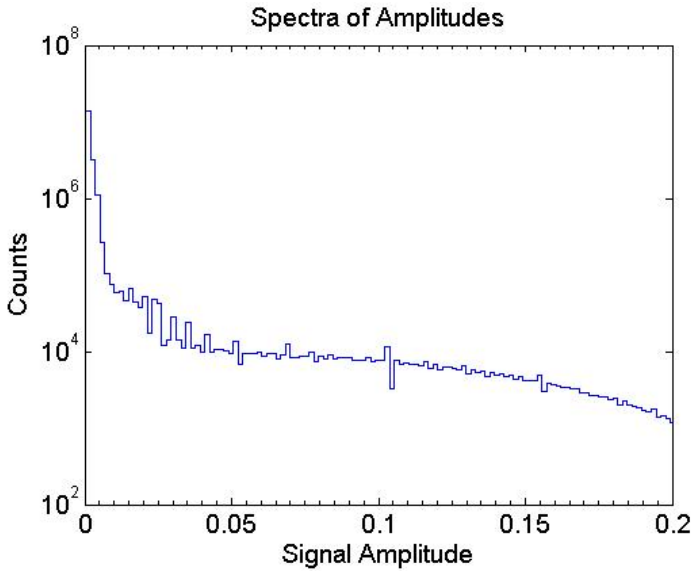
Amplitude of the charge signals *versus* Time between the maximum of PMT signal and the trigger point (trigger by cherge signals)

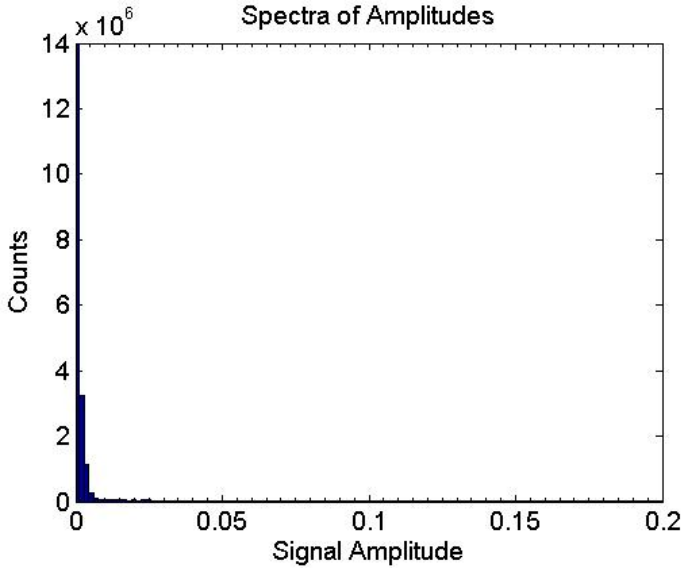


The maximum of the PMT signal is confined to a time window between -0.75μs and -0.25μs from the trigger

Light and Charge Signals – Data Analysis

Spectra of the amplitudes of the signal samples considering all the events (10e4)

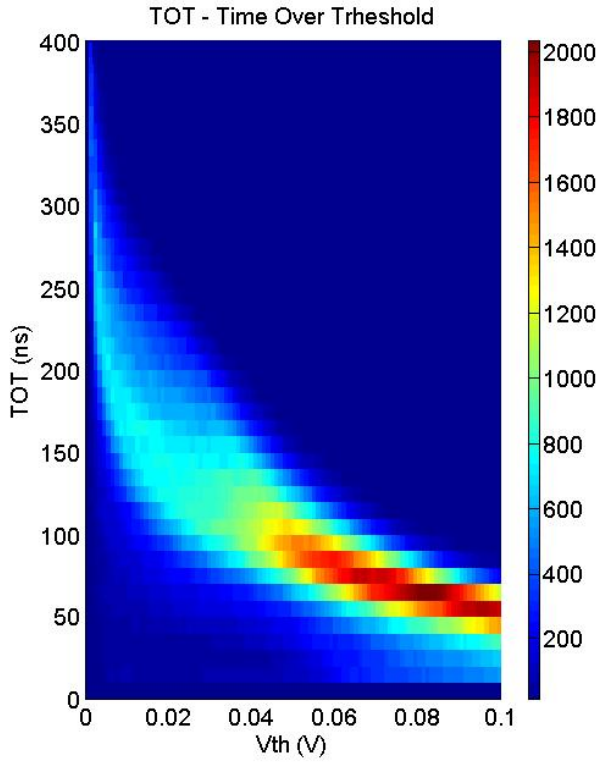




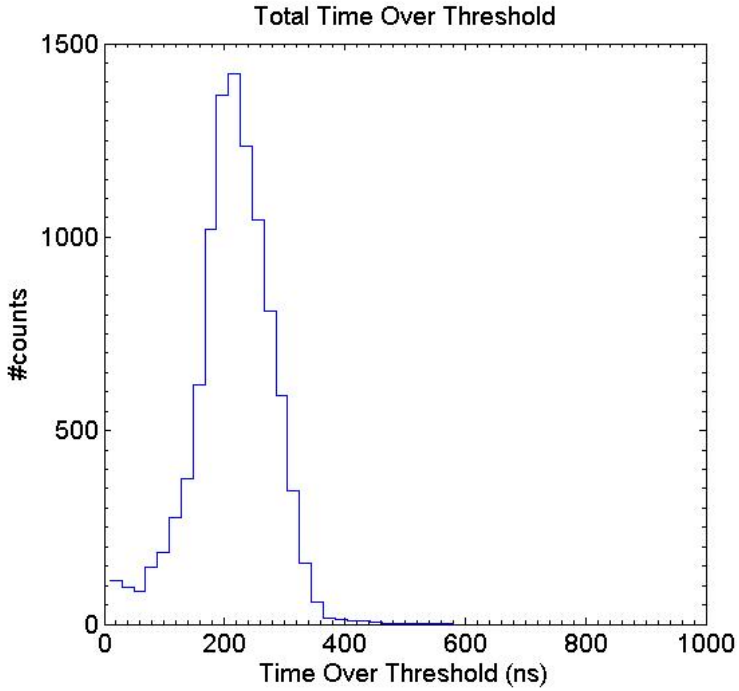
Noise level bellow 5mV → Threshold=5mV

Light and Charge Signals – Data Analysis

Total time over threshold for the PMT signals versus Threshold amplitude

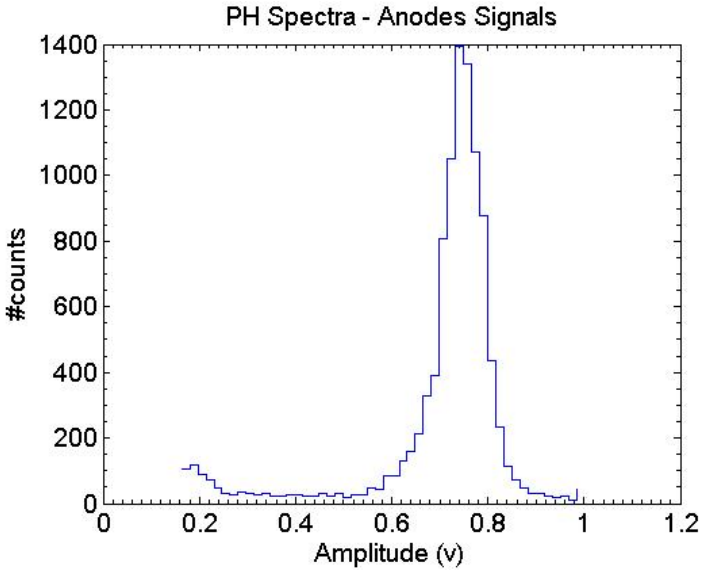


Total time over threshold for the PMT signals for a Threshold of Vth=5mV

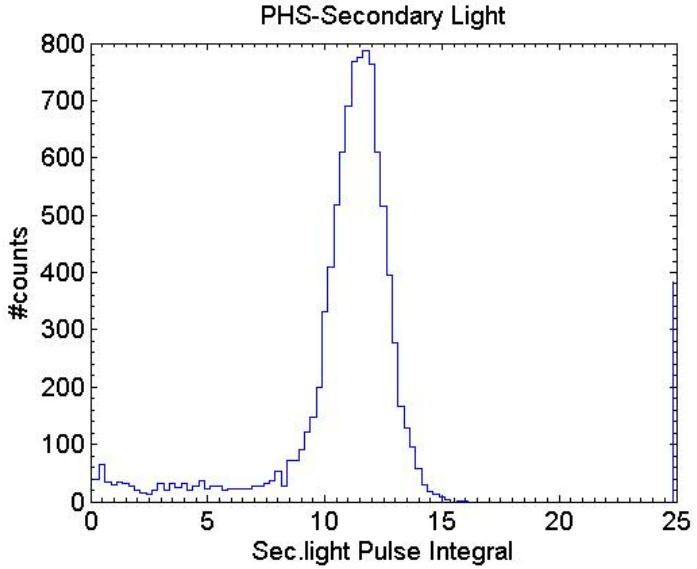


Light and Charge Signals – Data Analysis

PHS obtained from the anodes signals

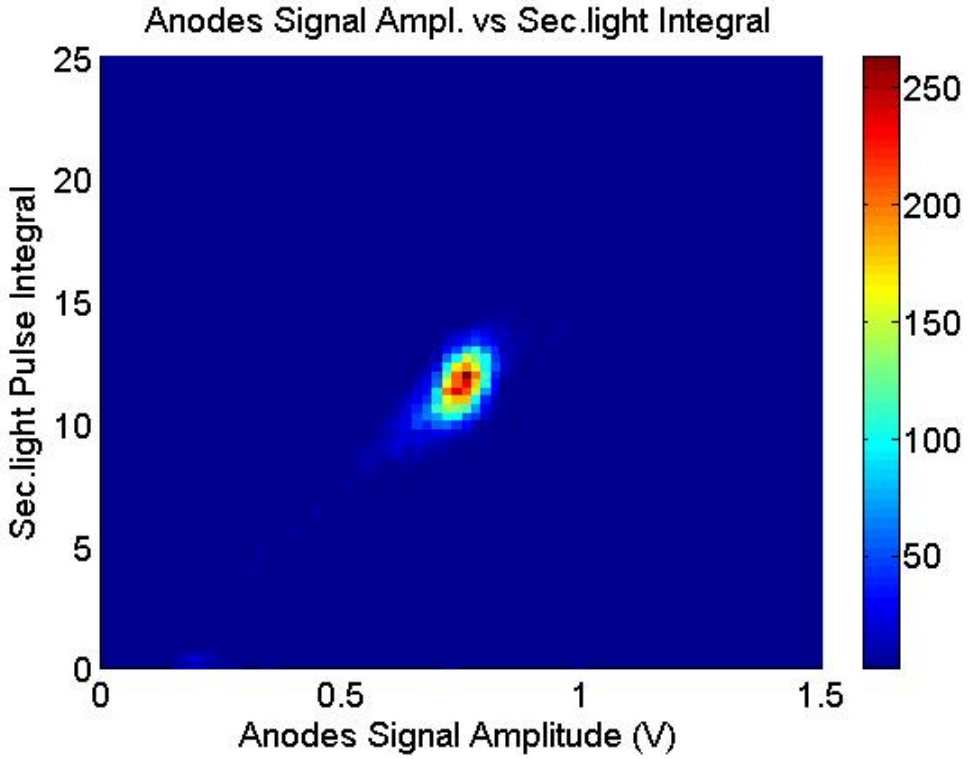


PHS obtained from the integral of the secondary light signals



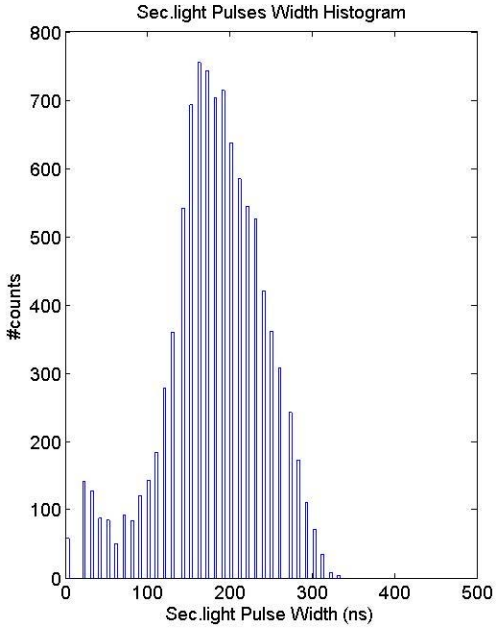
PMT and Charge Signals – Data Analysis

Correlation between the amplitude of the charge signals and the integral of the secondary light signals

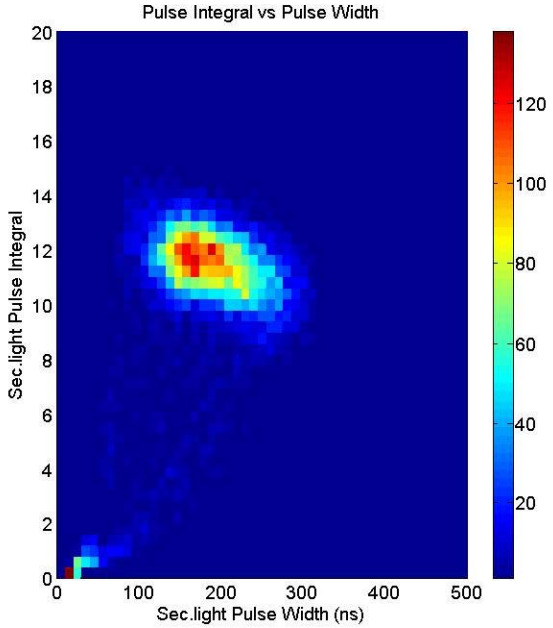


PMT and Charge Signals – Data Analysis

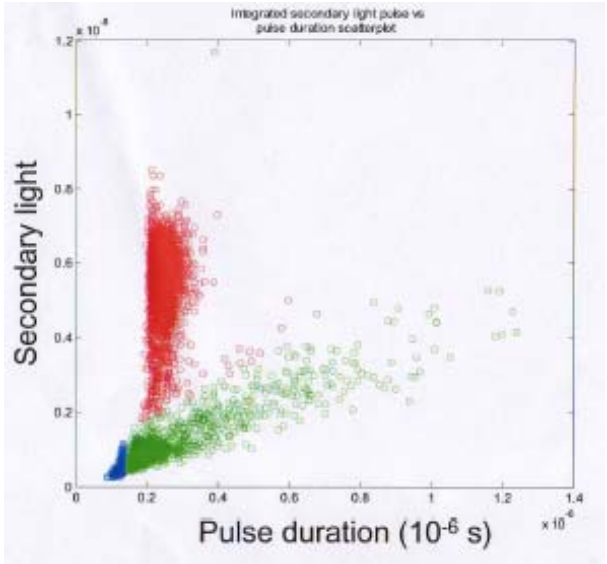
Pulse width distribution for the secondary light signals (Vth=5mV)



Correlation between the secondary light integral and the secondary light pulse width



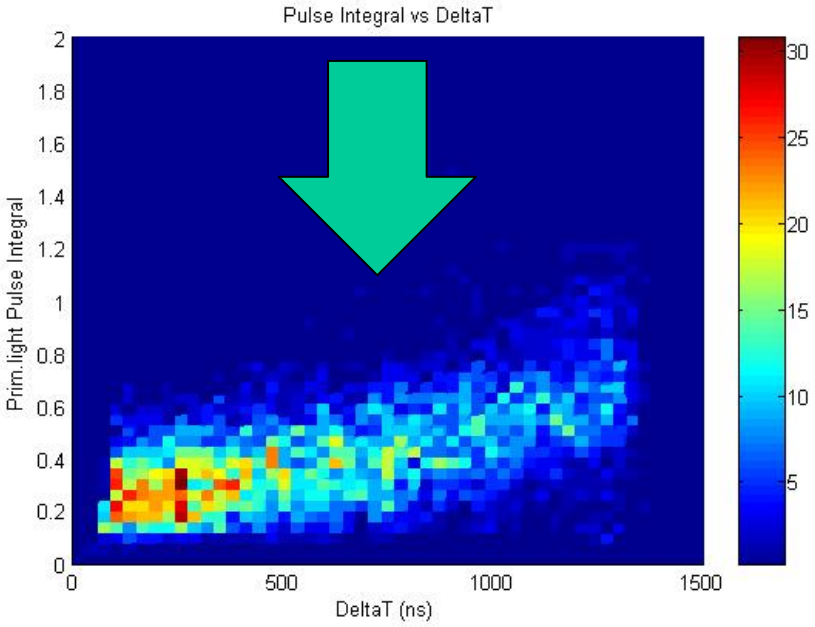
Previous work



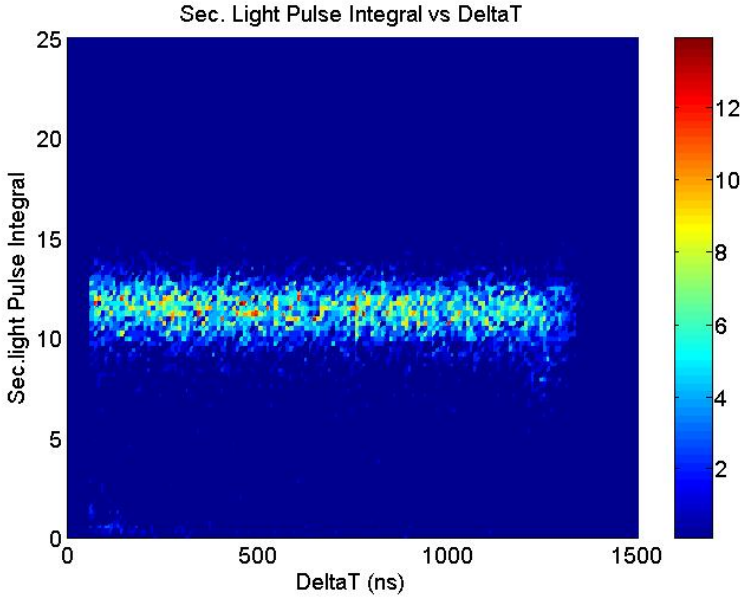
Classification of events in three categories based on their position in the scatterplot of **secondary light intensity** vs. pulse duration

Light and Charge Signals – Data Analysis

Time between the primary and the secondary light pulses (DeltaT) versus the primary light pulse integral



DeltaT versus Secondary light pulse integral

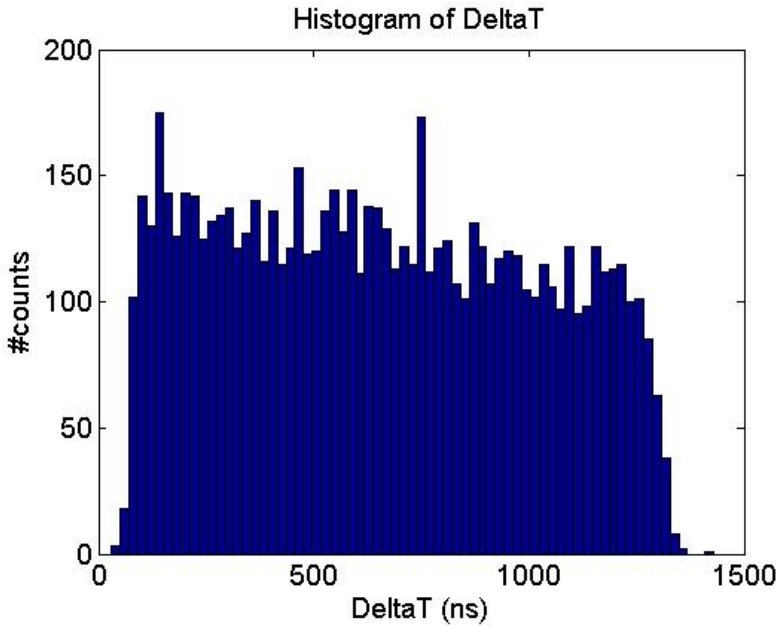


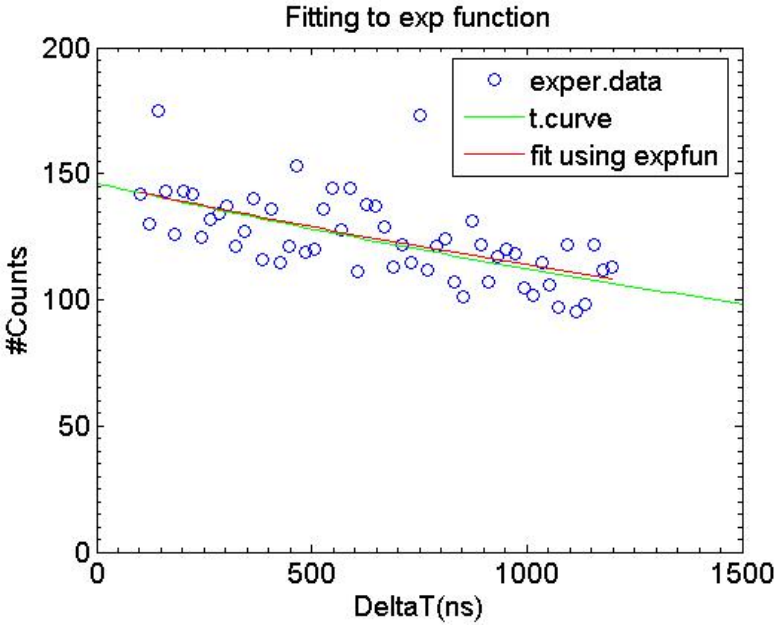
The amplitude of the primary light pulses varies with the depth of the interaction - Solid Angle effect

Dispersive effects related with lose of primary electrons during its drift (attachment) in principle must be reveal by the secondary light pulse integral as a function of DeltaT

Light and Charge Signals – Data Analysis

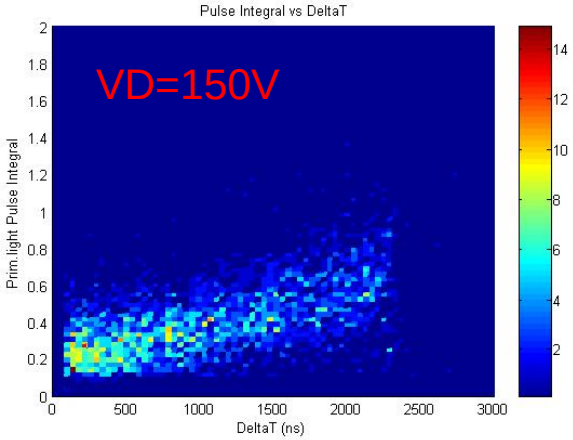
Depth of the interaction given by DeltaT
Show the exponential behaviour of the thermal neutrons attenuation in the 3He

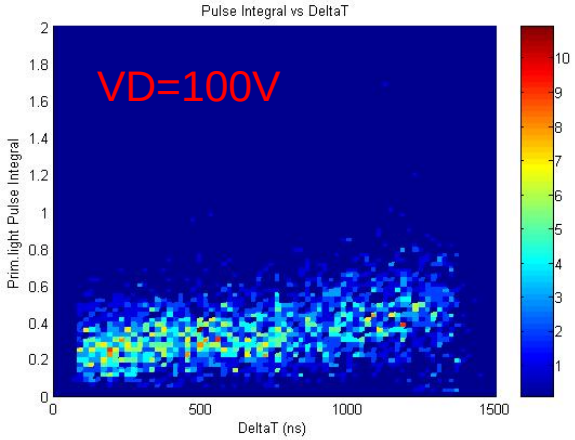


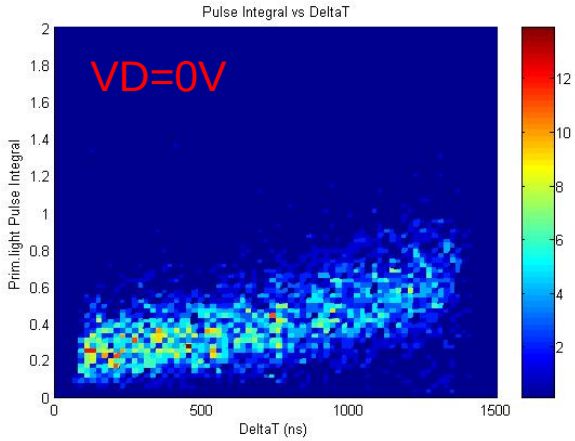


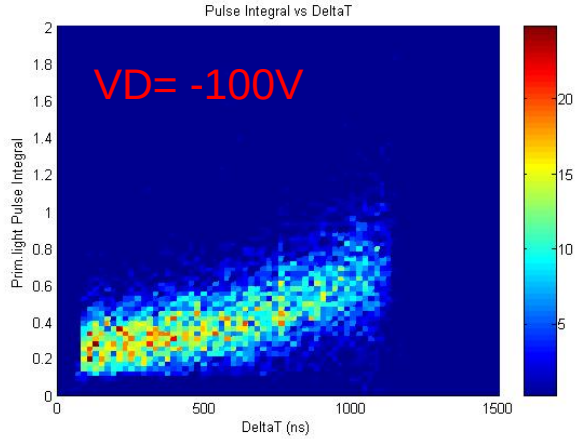
Light and Charge Signals – Data Analysis

Work under way – Analysis of data obtained varying the drift field





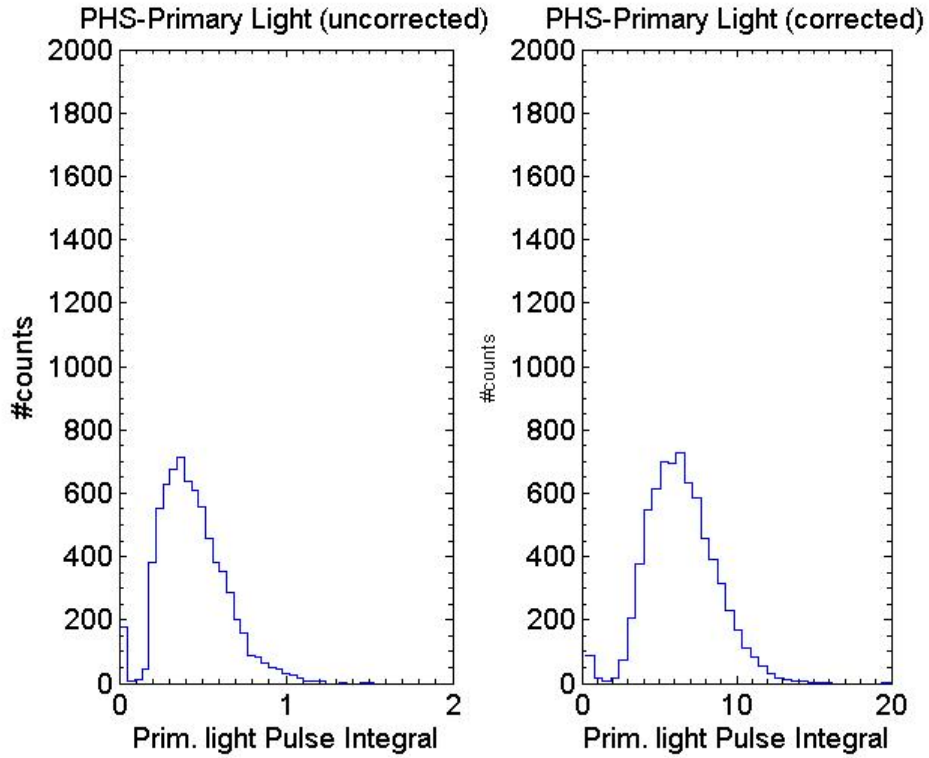




Light and Charge Signals – Data Analysis

PHS of the primary light

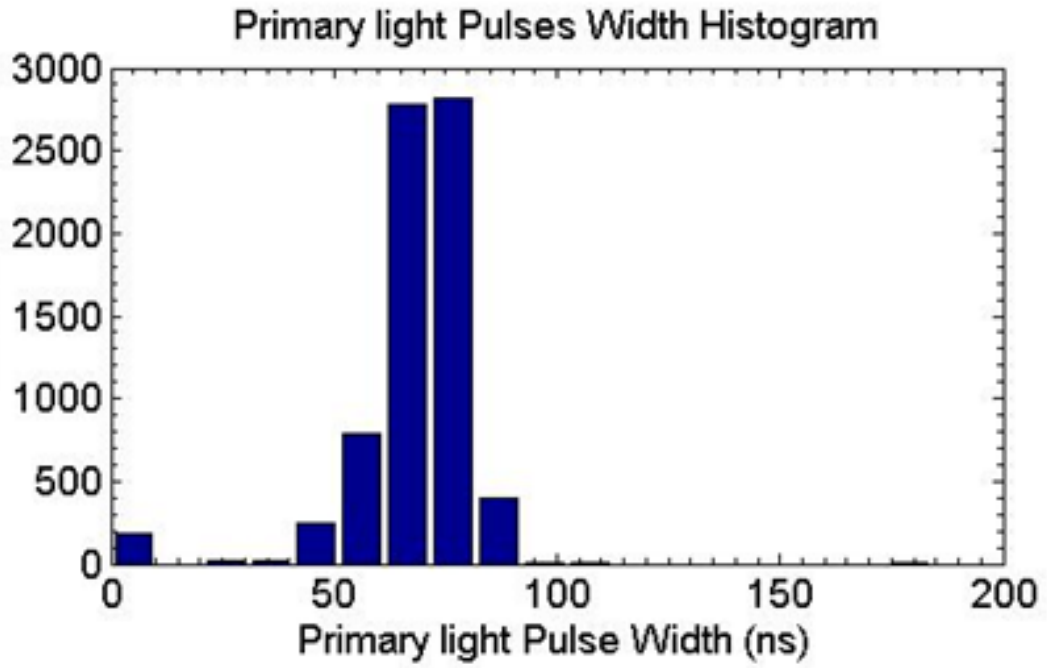
The PHS on the right side have been corrected from the solid angel effect – This was done using the DeltaT information.



- dmax=28mm (distance Microstrip-PMT photocathode)
- lgap=12.45mm
- d=28mm-vd*DeltaT
- Vd=lgap/DeltaT(maximum)
  - Vd=1.245cm/1.350μs
  - Vd ~0.922(cm/μs)
- dΩ=1/2[1-d/(d^2+R^2)^0.5]
- (Pulse Integral)'=(Pulse Integral)/dΩ

Light and Charge Signals – Data Analysis

Pulse with distribution for the primary light pulses



Conclusions

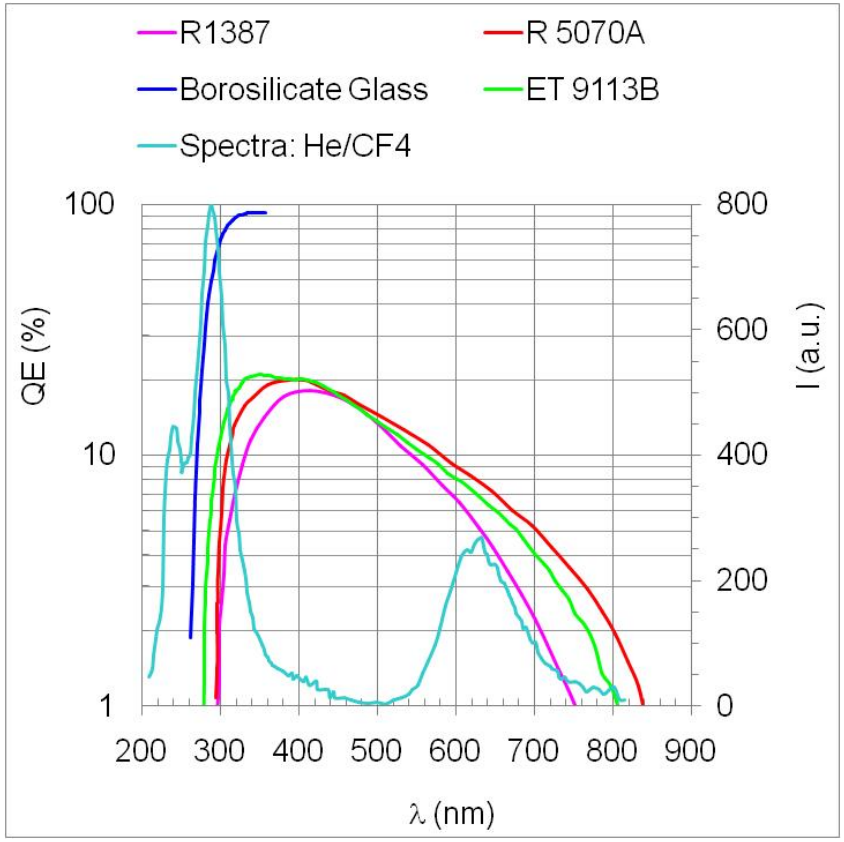
- Secondary light pulses exhibit a mean pulse with around 200ns (3 bar CF4)

- Integral of Secondary light pulses is very well correlated with the amplitude of the charge signals

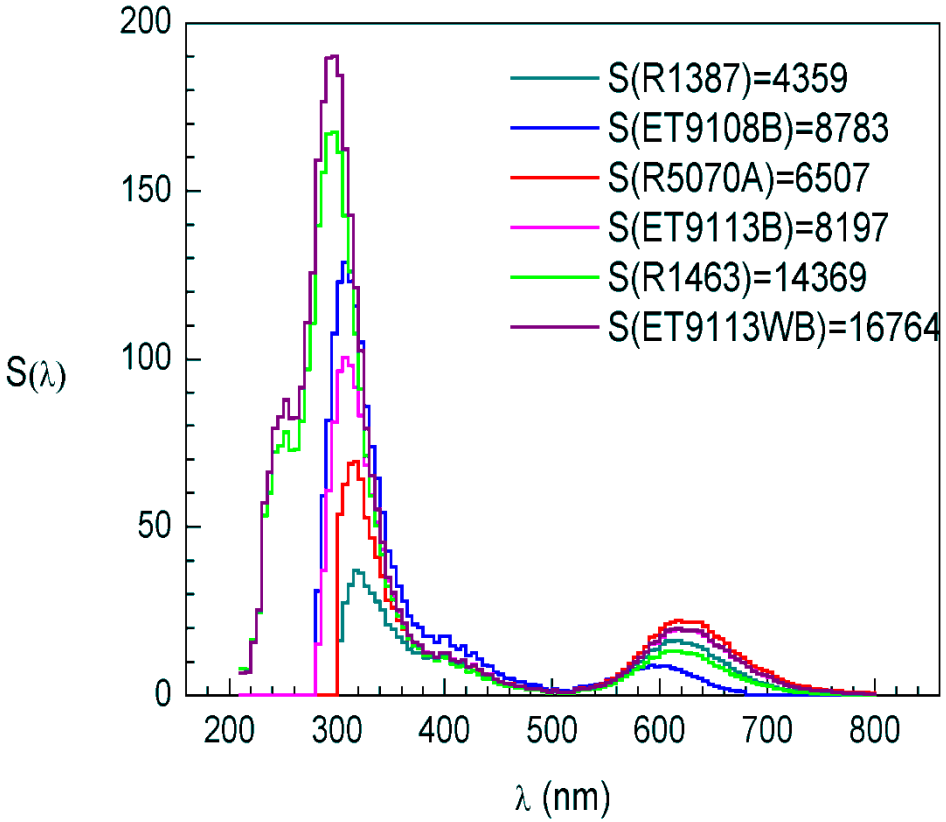
- Primary light was observed and correlated with the depth of the interaction

- Primary light pulses are faster than secondary light pulses, showing a mean pulse width in the order of 70 ns.

Quantum efficiency



$$S = \int_{\lambda_{min}}^{\lambda_{max}} I(\lambda) \cdot QE(\lambda) d\lambda$$



In the wavelength region of interest, Hamamatsu and ET Enterprises can supply PMTs with similar quantum efficiency