

# LArGe@MPI-K:

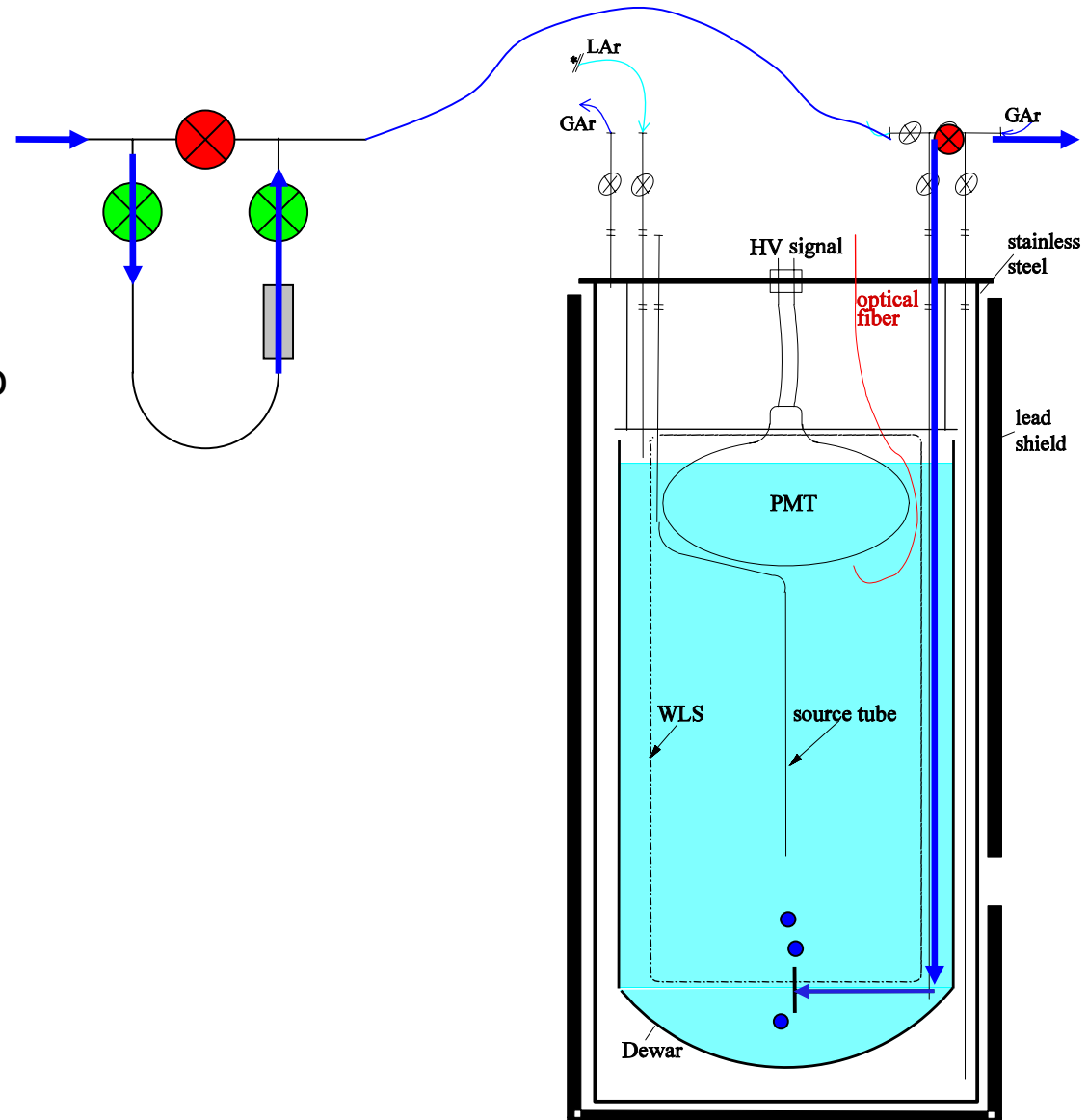
Latest results of Lar scintillation investigations

P.Peiffer, S.Schönert, A.Smolnikov, S.Vasiliev

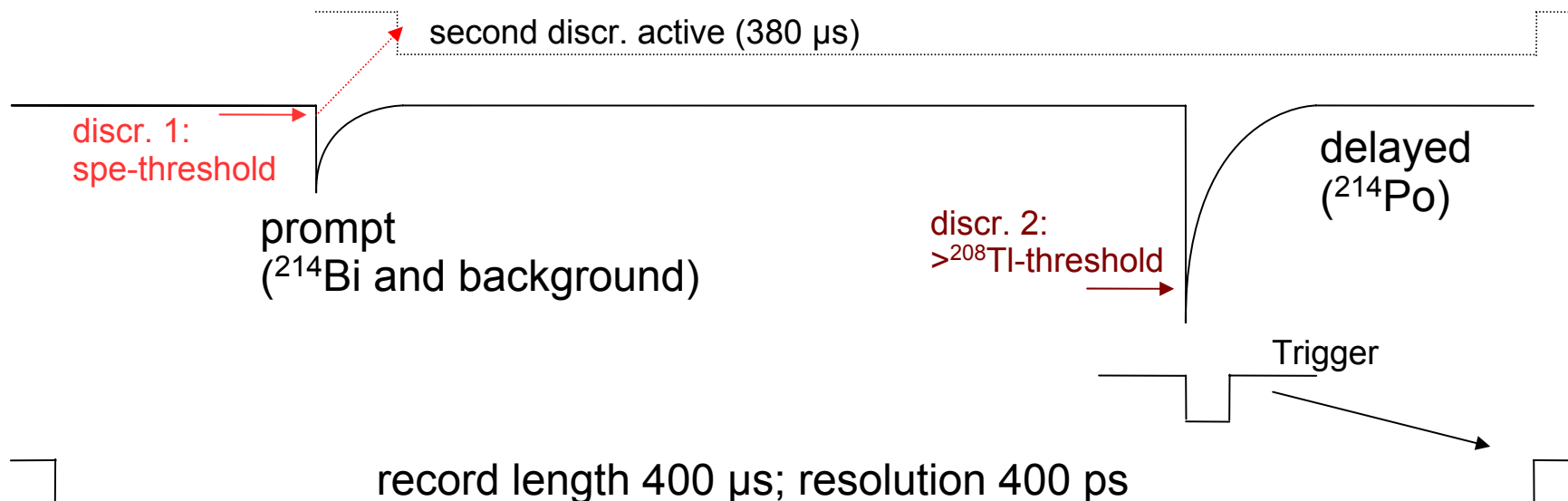
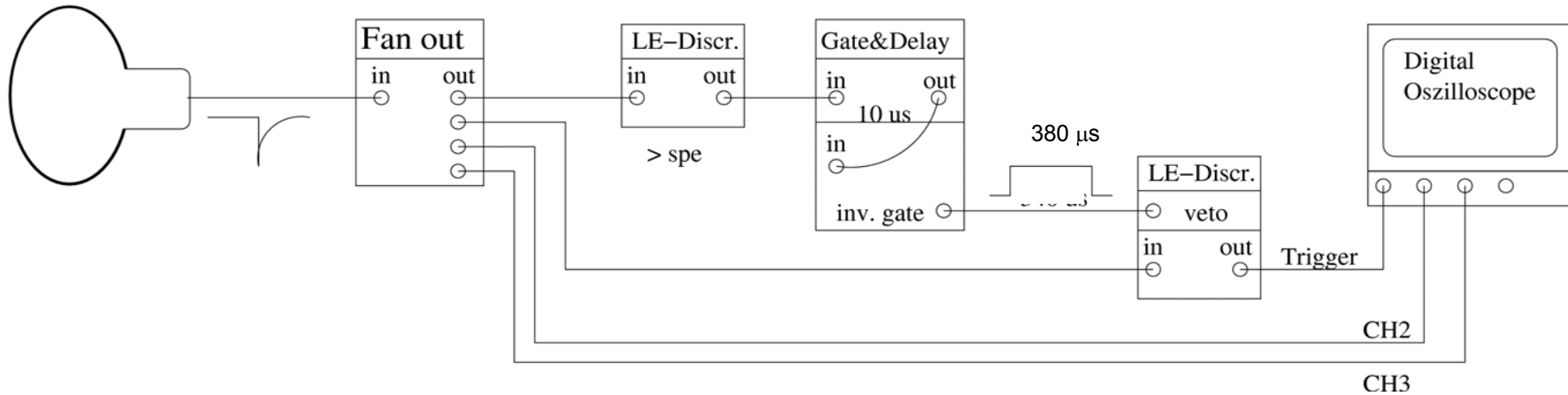
Gerda general meeting, Milano 13.-15. Nov 2006

# Adding Radon

1. Freezing  $^{222}\text{Rn}$  onto a charcoal trap.
2. Connecting the trap to the system
3. Flushing the tubes
4. Flushing GAr through the trap into the LAr
5. Warming the trap to release  $^{222}\text{Rn}$
6. 35% - 40% of the Rn in the trap end up in the active volume

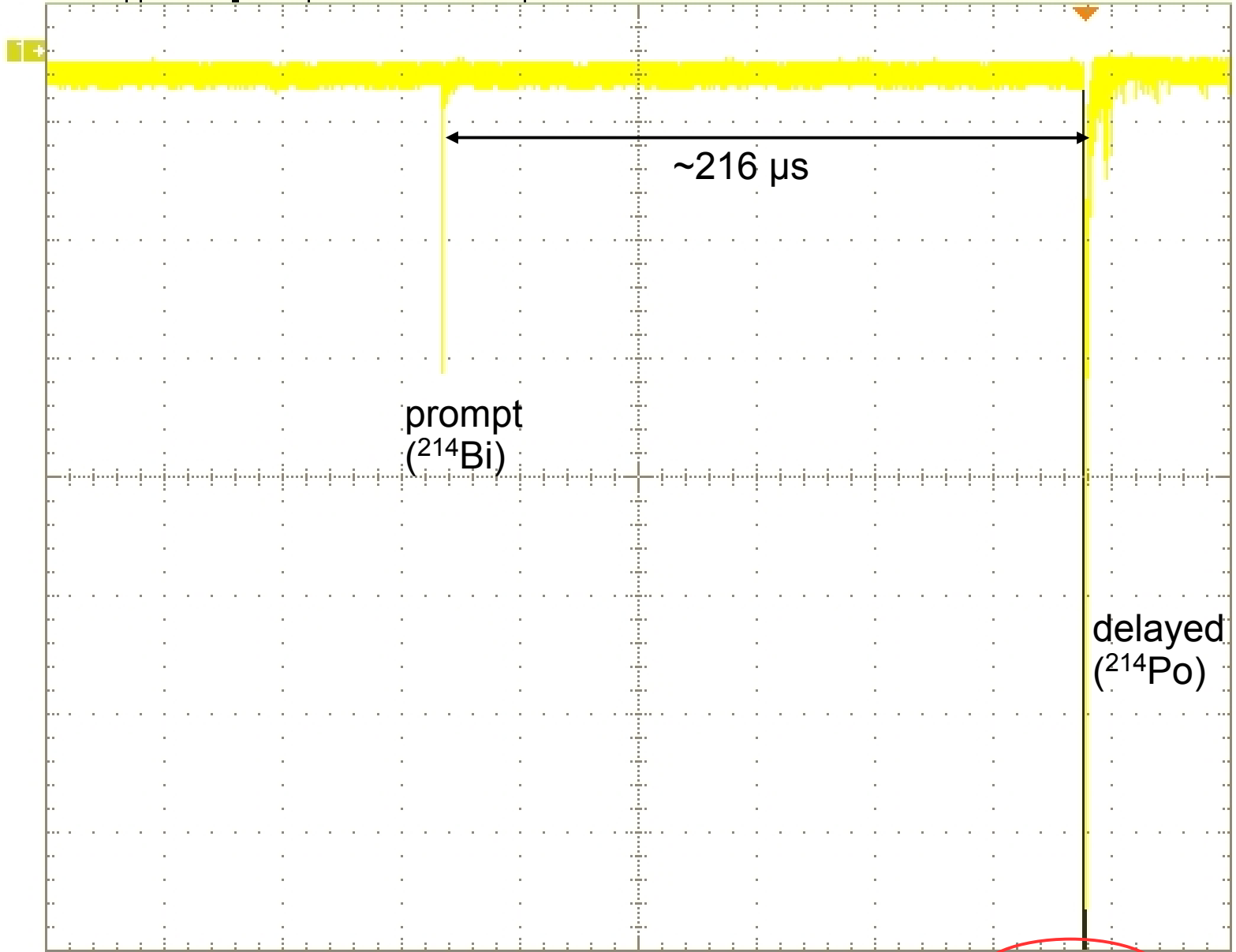


# Electronic layout Bi-Po tagging



Buttons

Rec Length  
1000000  
Scale  
40.0ps

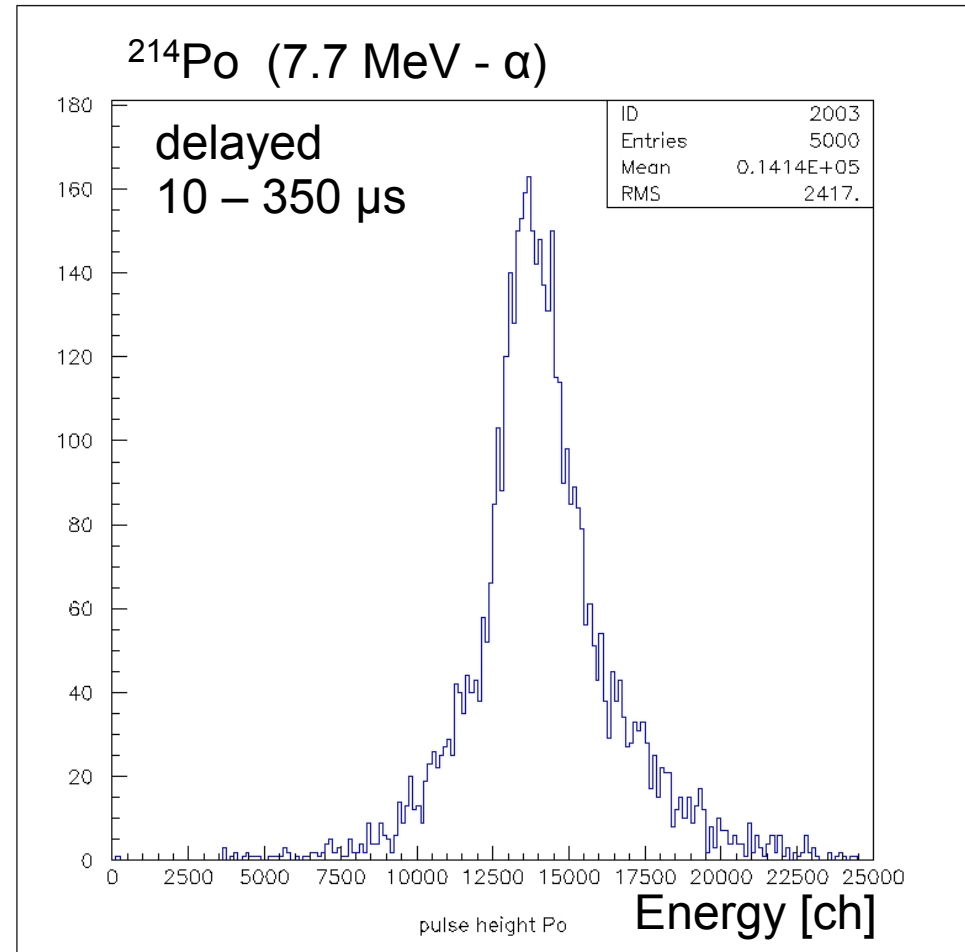
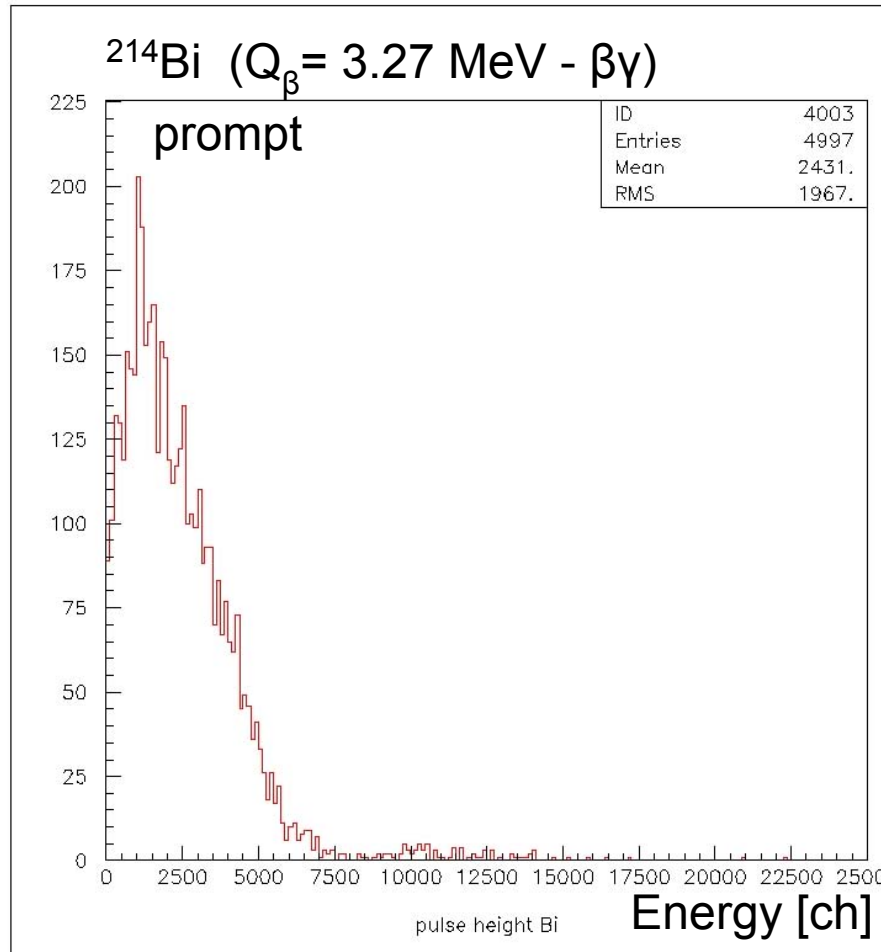


Ch1 20.0mV

M 40.0ps 2.5GS/s  
A Ch2 ~ -580mV

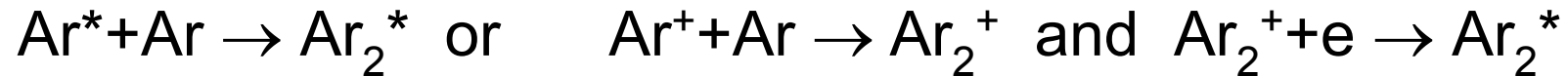
400ps/pt

# Bi-Po spectra

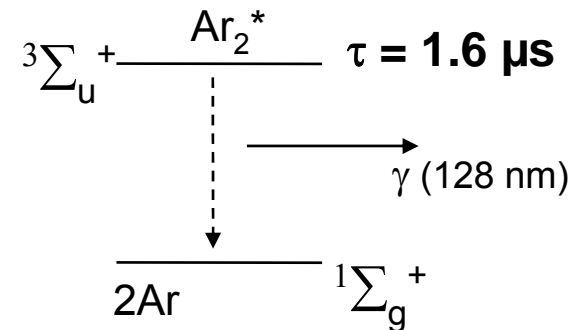
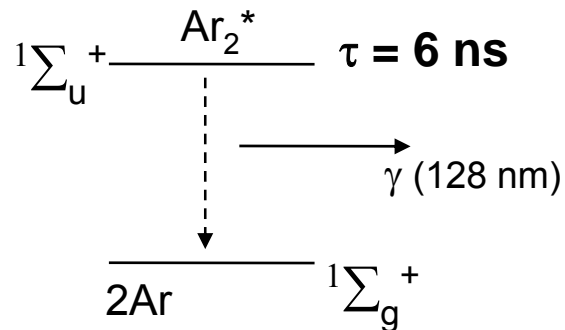


# LAr scintillation pulse shape discrimination principle

Excimer creation:



De-excitation:



*Population depends on ionisation density*

Ratio singlet/triplet emission (I1/I2)\*:

electrons /  $\gamma$ 's : **0.3**

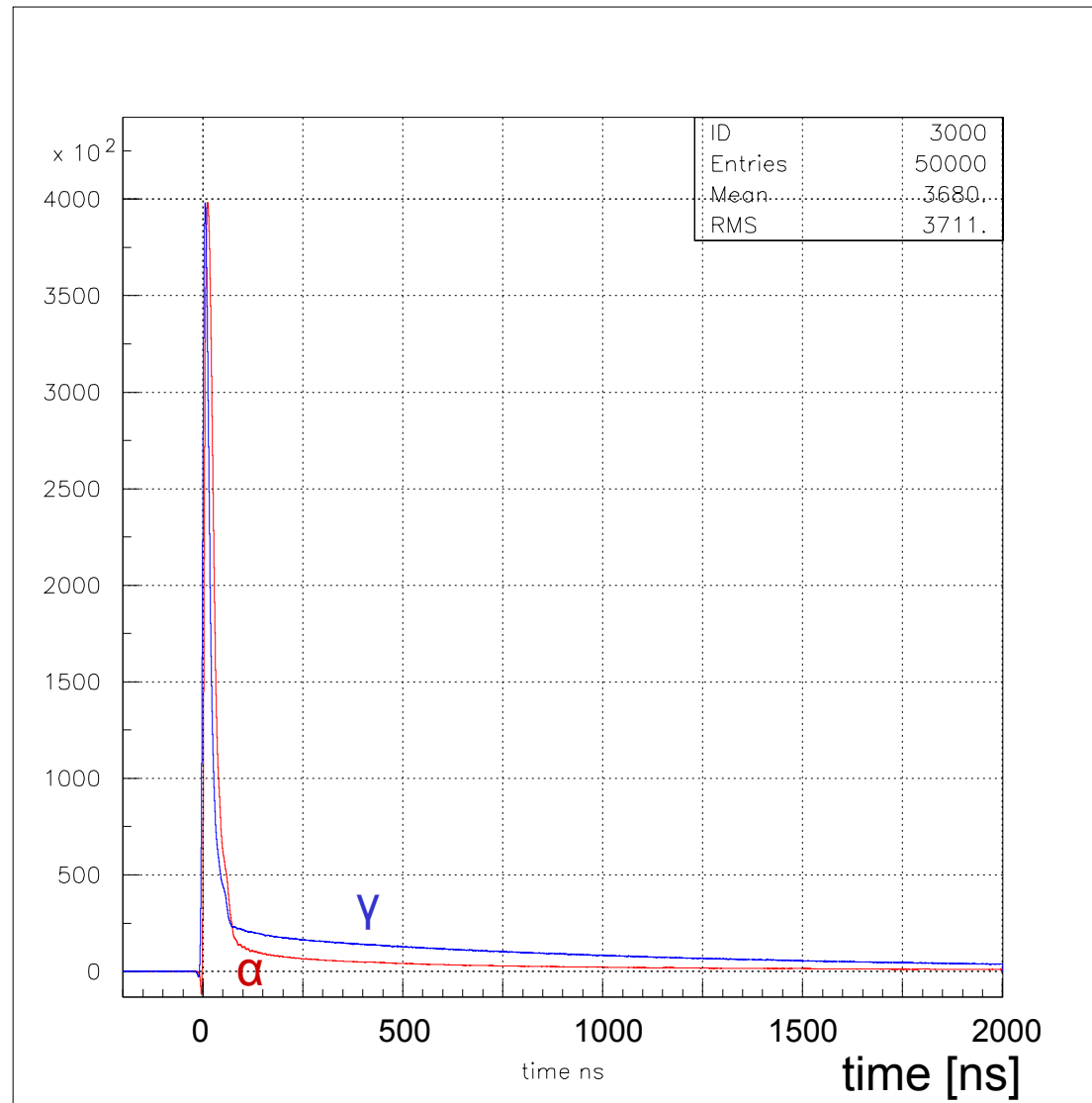
$\alpha$ 's : **1,3**

fission fragments/nuclei : **3**

\* Hitachi et al. Phys.Rev.B 27(9):5279, 1983

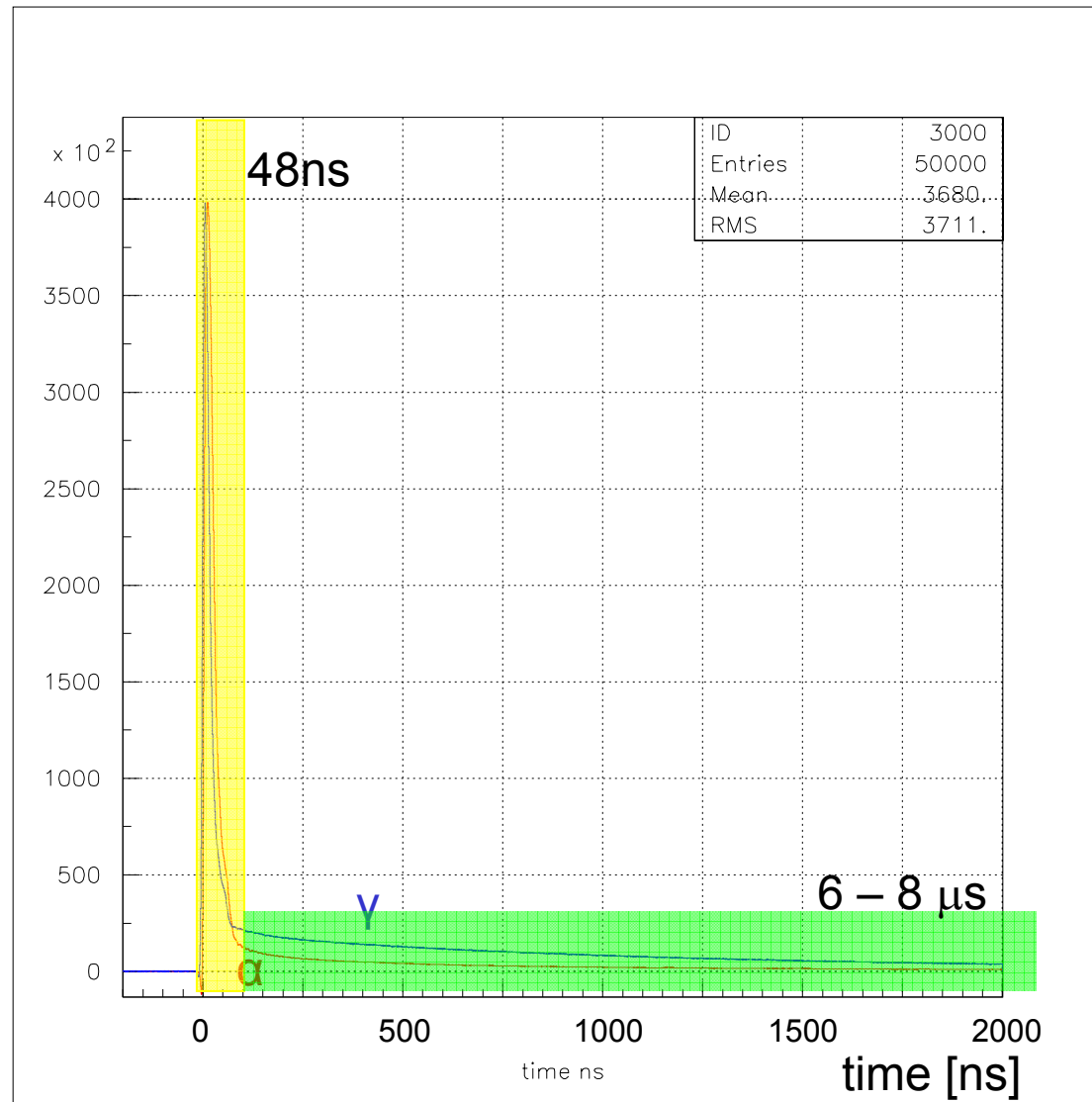
# LAr average pulse shapes

## $\alpha$ - $\gamma$ discrimination



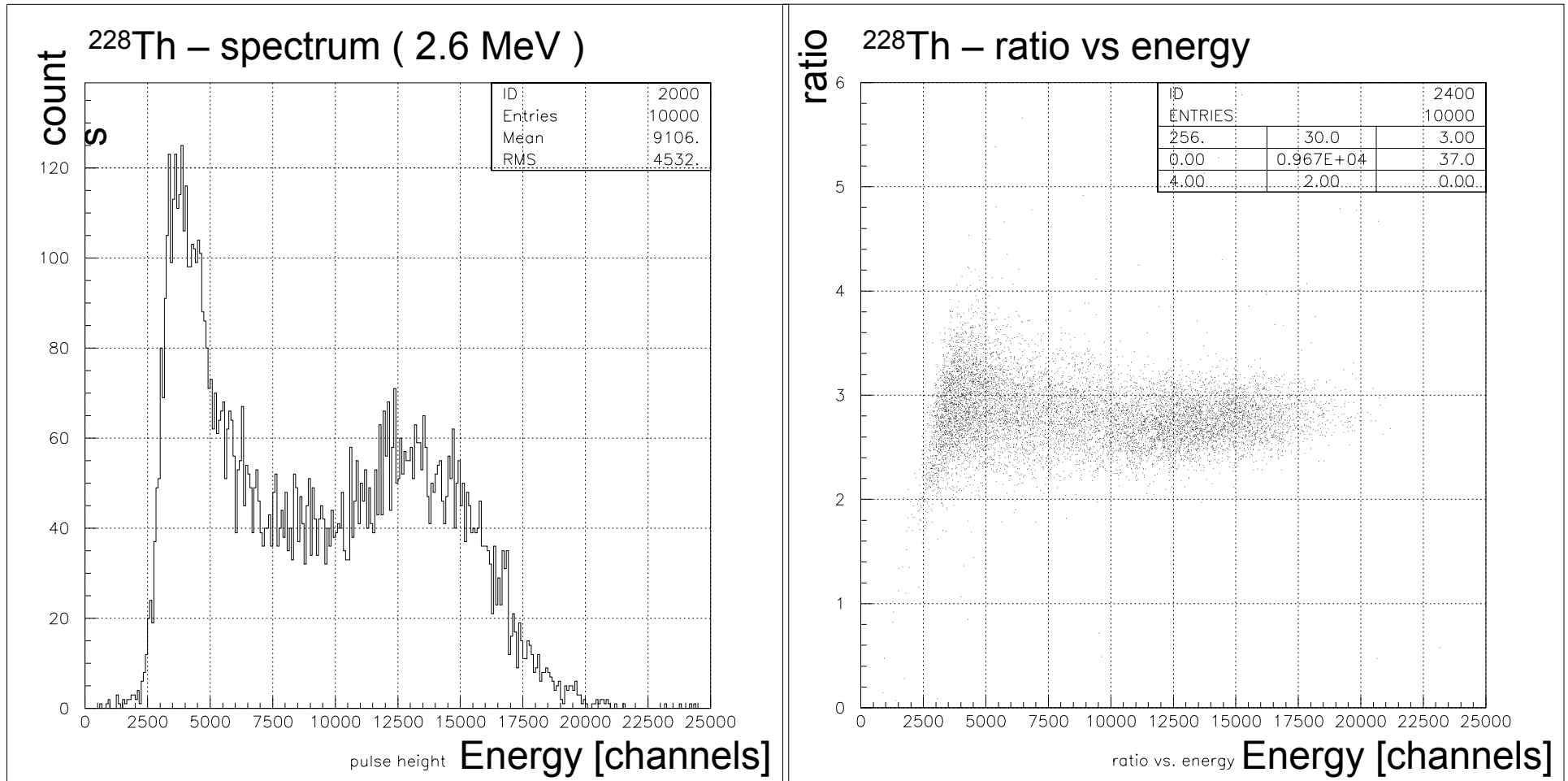
# LAr average pulse shapes

## $\alpha$ - $\gamma$ discrimination

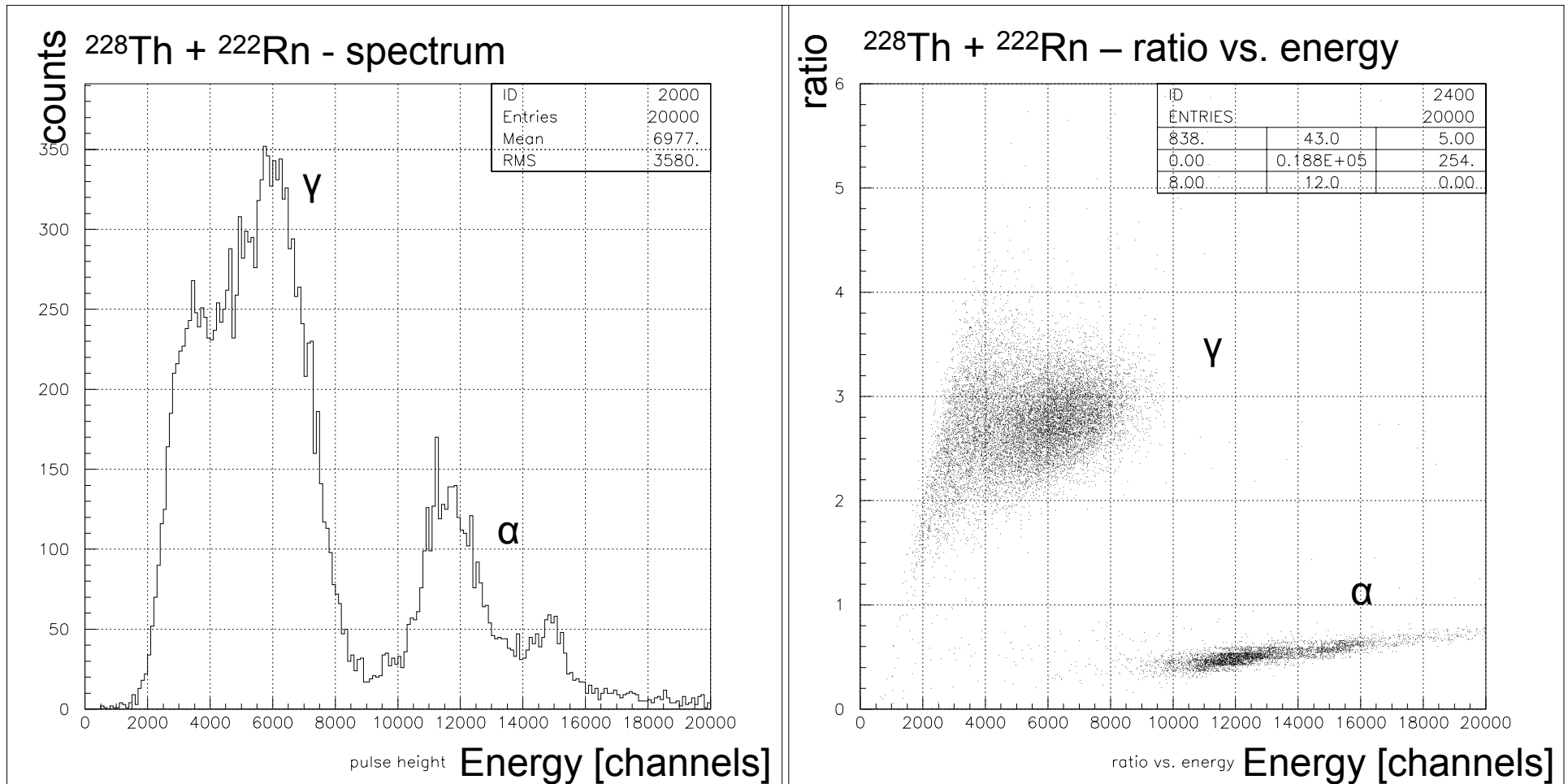




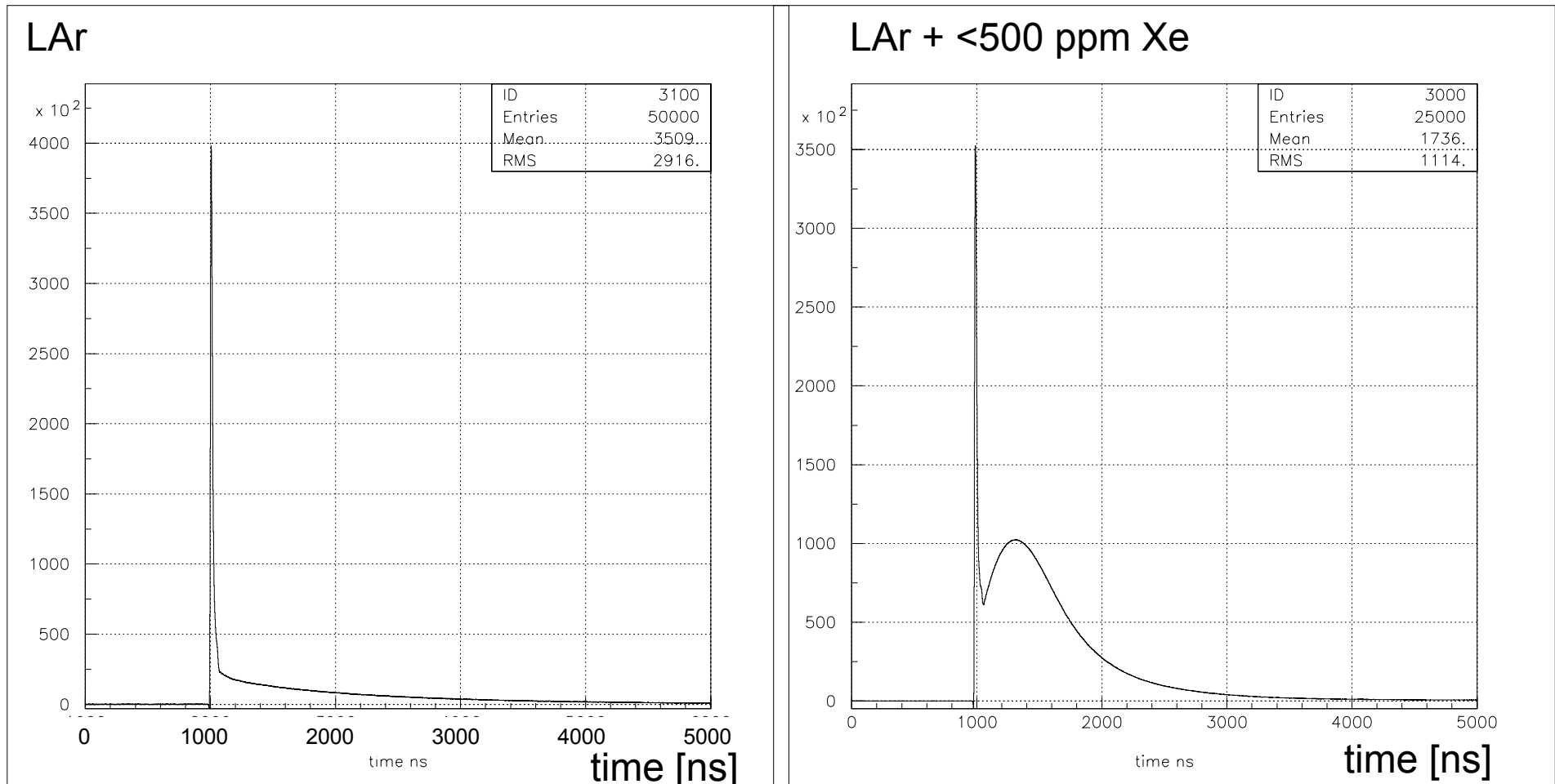
# $^{228}\text{Th}$ – spectrum and ratio slow/fast LAr-emission



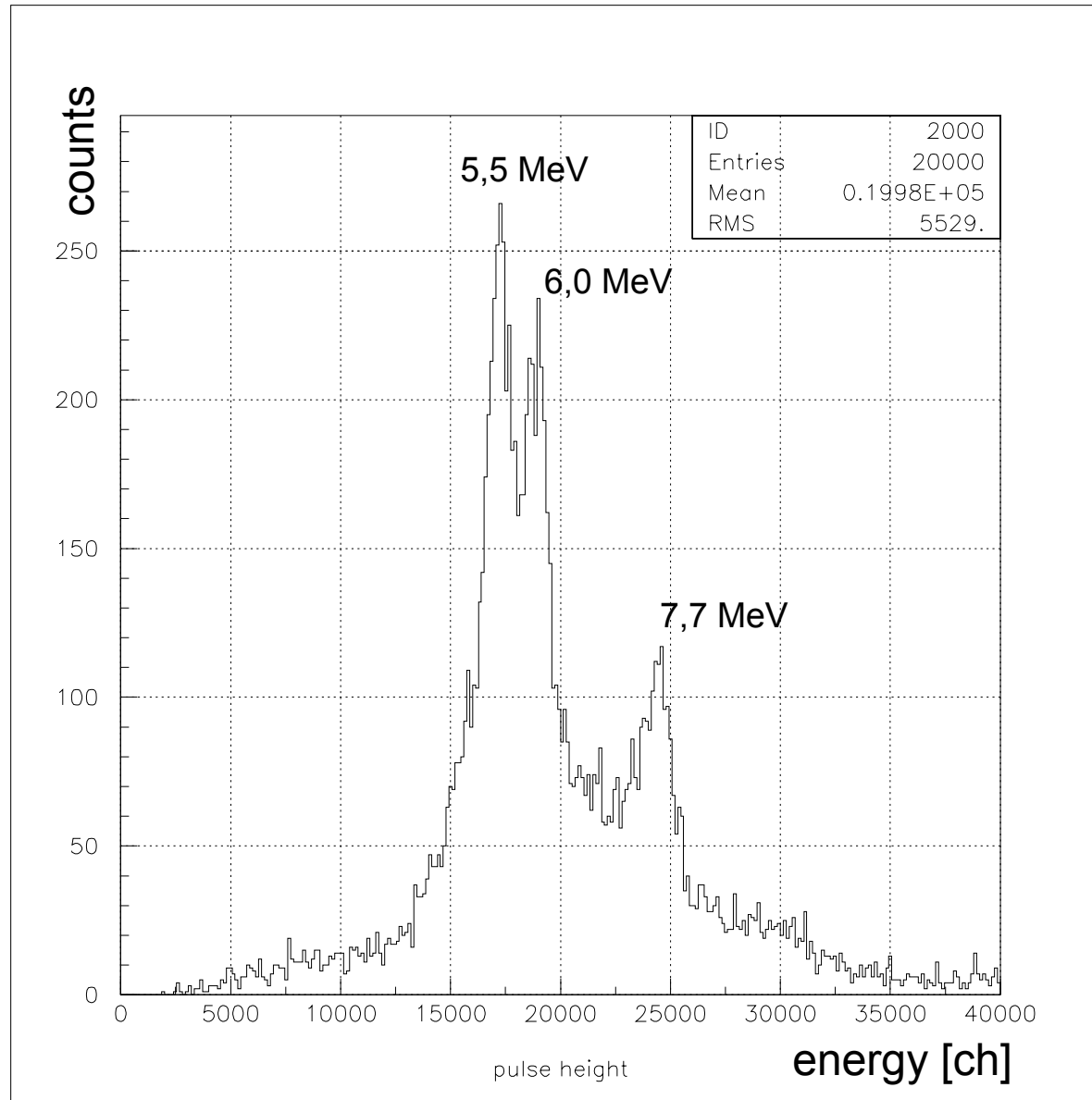
# $^{222}\text{Rn} + ^{228}\text{Th}$ – spectrum and ratio slow/fast component



# LAr + Xe vs. LAr only comparision of average $\gamma$ pulse shapes



# Lar+Xe: $^{222}\text{Rn}$ - $\alpha$ spectrum



# Conclusions

- Light yield stable for more than 6 months and several opening/closing cycles
  - WLS: VM2000 + (PST+ 10% TPB) coating is stable and robust
- energy resolution equal to NaI detector
- $n - \alpha - (\gamma/\beta)$  discrimination works
- Adding Xenon increases light yield
  - work in progress