AX-PET DAQ/Analysis meeting  
4/11/09


Agenda:
Status of measurements Mod2 (bld 304)
Results from Mod1 : _λ_WLS
Next plans

Status of the measurements :
- **Sample & Hold timing** for Module 2 done (now set correctly to ~100 ns)
- **Pedestals** cured (by switching off and on the ampl. power) and now monitored almost daily. No problem observed since more than two weeks (no further power off/on has been needed)
- **Low energy peak of intrinsic radioactivity**: it is confirmed to be exactly the Lu escape line (63 keV). This has been verified with an Am source (59 keV emission line). The lyso intrinsic radioactivity spectrum, acquired at low thr, shows 3 clear peaks, corresponding to 307 keV, 202 keV, 63 keV (also perfectly reproduced by the simulations)
- Check of spectra at 30 mV vs 70 mV thr / internal vs external trigger: there’s no deviation at all in the positions of the peaks in the different run conditions; differences are observed in the effect of the thr (low energy region) with internal wrt external trigger. This might be due to a different timing of the S&H, in any case does not represent a problem at all.
- **Energy calibration**: Energy calibrations have been repeated several times, the results are fully satisfactory. The deviation still observed between different runs (~ 3% max) comes from the uncertainty in the temperature reading/acquisition and represents the limit of the present method. Suggestion for improving: use one calibration set and adjust - for each individual run - the calibration parameters, scaling them on the real position of the photopeak detected in the run.
- **Energy resolution**: Typical results are:
  (a) energy resolution on the summed lyso spectra ~ 12.6% - 12.8%
  (b) average energy resolution in single crystals ~ 11.7%
- **First runs with small tagger and small beam spot on target** (centered on WLS13) - Example from Run1700 (see attached file). Main results:
  (a) energy resolution: ~ 13.25%
  (b) multiplicities: 1 lyso = 57% ; 2 lyso = 34%; 3 or more = 9% (2 lyso on diff layers: 21%)
  (c) typical cluster size : on average 3.3 WLS in the cluster
  (d) spatial resolution: σ_layer6 ~ 0.88; σ[d=0] ~ 0.76 (extrapolated from σ^2 vs d^2);
- **Runs at different Z position from center to edges of WLS**: contrary to what was expected, there’s no clear improvement in the spatial resolution when the beam spot is centered between 2 adjacent WLS. A new data set of runs at different thr (10mV to 50mV, step of 10 mV) has been also taken to look for any possible effect on the cluster size / spatial resolution (analysis not done yet)
  Suggestion: the ADC values are presently not corrected by the attenuation length, which can give a quite important contribution (see next item). The measurements of the spatial resolution at different positions must be repeated with the ADC values corrected by the λ.
- **Cluster analysis**: a few histograms must be added in the analysis (reconstructed z coordinate on each layer for different WLS multiplicity inside the cluster) + analysis of the data taken at different thr to have an idea of the noise in the WLS.
Attenuation length for WLS - data from Mod1 (See slides)
- Studies on the $\lambda_{WLS}$ from Y scan data on Mod1 (along 2 different WLS, at the center of the WLS)
- An attenuation length (~ 50 - 70 mm) significantly shorter than expected is found
- Still preliminary analysis

Future plans:
- By the end of this week, start the full scan run on Mod2.
- This week: start preparing the trigger system for the 2 modules coincidences. We'll setup the 2 modules trigger on a new NIM crate, without interfering with the present setup for Mod2 characterization. The next steps towards the 2 modules setup will involve the DAQ (run with 2 modules together, first internal then external trigger) and the analysis (acquire and plot results from both modules)
- The rotating table from Niel has been shipped, will arrive soon.