AX-PET DAQ/Analysis meeting
16/12/09


Agenda:
- Very first results from 2 modules coincidence
- Next needed measurements (Outcome from discussion Paola/Josep)
- Analysis for 2 modules coincidence: Update
- Attenuation lengths for crystals

Very first results from 2 modules coincidence (See slides):
- First data with the 2 modules at d=15cm available.
- Coincidence rate ~ 3.5 kHz (LL.HL.notHHL_mod1.AND.mod2)
- Patched version of the analysis used for the moment
- Events selected with 1!  lyso in each module, at the photopeak, with a unique reconstructed z coordinate: Efficiency of those “pure coincidence” events (“1-1”, non ambiguos z) ~ 23%
- “Line of response” drawn separately for X-Y and X-Z plane
- Intersection with plane X=0 plotted (max stat ~ 23kevts, out of a 100kevts run).
- Conclusions about the results:
  - There is a clear difference between the Y projection and the Z projection on the X plane, the first comes from DISCRETE info from the crystal position, the latter from the CONTINUOUS z distribution from WLS (z is derived from the standard cluster algorithm)
  - As for z projection: A nice gaussian is obtained (σ=0.66mm). This should contain both the real source size and the spatial resolution. Such a nice result was never obtained with the single module characterization, pointing to the fact that we had a much bigger uncertainty in the position of the source/tagger wrt the 2 modules coinc. setup.
- Next tests to be done:
  - Fit different X plane intersection to find the real position of the source (minimizing RMS)
    (i.e. not necessarily the plane X=0 represents the source position!)
  - Study the Z projection vs different WLS multiplicities in the cluster
  - Build sinograms from these data (Paola is already working on this topic)

Next needed measurements (outcome from discussion between Paola and Josep):
- As suggested by Viviana, different runs with the present setup (all in same conditions) can be used to fake acquisition of the 2 modules at different positions of the modules around the source. First real image reconstruction can be tried on this (useful test of all the elements: analysis, software.....)
- Data needed : 10 runs, 500 kevts each (i.e. ~ 100kevts of good coincidences), all in the same running/geometrical conditions, possibly at stable temperature (and in any case with bias corrected for temperature). Viviana will take care of the runs in the next 2 days.
- DAQ change needed for the future: Add an option in the DAQ to switch from acquisition based on total Nr of events OR acquisition based on a fixed time duration.

Analysis update (See slides):
- analysis version to create the trees from 2 modules data file : ready
- analysis version to create the histograms (starting from the trees) : ready for ‘single module’ histograms; still under development the part requiring common info from both modules
- Paolo/Chiara / everybody else interested: draw a sketch (‘block diagram’) of the analysis structure, including all the needs (useful also for the students coming in Jan)

Attenuation lengths for crystals (See slides):
- Slightly different method applied (2D plots, ADC counts vs reconstructed z (standard cluster alg.)) to extract λ, but old results confirmed: a too high rise at the end of the crystal (opposite to the MPPC) is found, which cannot be fitted with nominal λ and reflectivity R<1.
- Still quite significant differences from one crystal to the other are observed.