Crytur PWO + SiPM detector

Questions on Specifications

Energy resolution:

- Inner: 1%+2.5%/sqrtE + 1%/E
- Outer: 2%+4%/sqrtE + 2%/E

Are we talking about resolution degradation?
Is "E" Energy and is it expressed in MeV ?
What about offset, Integral non linearity, linearity degradation.

- Sampling rate: 250 MHz
- Peaking time: ~4ns
- Digitization gate: ~(100-200) ns

Peaking time = sampling time, aliasing (sensitivity to clock edge position) can create large digitization errors.
Pulse shape has to be well controlled (more information is needed).
How are samples processed to resolve pulse energy ?
Specifications needed on baseline restoration and pile up detection.
Digitization gate includes 25 to 50 samples, how are these samples used ?
How does digitization gate relate with the 3usec buffer size?

- Signal rate: =<1 MHz/channel

Is this peak or average count rate?
is the count rate continuous or discontinuous (burst?)
What are acceptable counting losses (pile up's, low energy counts...)

System Level Simulation (SLS)

”A collection of practical methods used in the field of systems engineering in order to simulate, with a computer, the global behavior of large systems composed of physical entities regulated by computational elements “ (Wikipedia) .

- While suited to large systems (Plants, aircrafts..), SLS remains beneficial in smaller systems when multi-physics or cross disciplinary models are involved.
- Global view can be achieved with adaptable level of details
- Possibility to **start small** (see example next slide)
  -> Simulation can begin even if system not fully specified (or without detailled knowledge of every part)
- Models can be broken in parts to be studied in parallel.
  -> Easier to derive local specifications
- Architecture can be made data driven, then multiple simulators (or simulation languages) can coexist and meet easily.
- Models can evolve in complexity as/if needed.
- Actual data can be substituted at any steps either directly or indirectly (e.g. impulse response).
- Similary, results of other simulations can be also substituted (or replayed at will).
- Parts of the system can operate in real time during simulations.
- In some instances, real systems can be substituted to models when ready (e.g. FPGA, ASIC’s).
- Optimizations (or worse case scenarios) can be performed at higher level in a short time.
- Supported by major computing platforms such as Matlab and Labview..

Application

PWO Scintillator + SiPM integration