Data acquisition for DESIR

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Context

ICC ACQ working group for SPIRAL2 (B. Raine)

<u>Objectives</u> : make recommandations and define standards for developments of DAQ software for existing and future detectors of GANIL/SPIRAL2

→ GANIL is not able to provide DAQ system for all the setups implemented @ SPIRAL2, especially for huge instruments (ACTAR, AGATA, FAZIA, …)

→ Problem : in some cases, the differents DAQ systems must be mixed

⇒

- GANIL develops global run control and electronic control tools for a general purpose usage
- Some standards are (will be) defined for :
  - communication between run control and electronic (slow) control : SOAP protocol
  - data flow : NARVAL (AGATA, IPNO)
  - data format : @ next meeting (1 June 2010, GANIL)

⇒ Meetings for specialists …

What about DESIR ?

→ Lower scale experiments (~ 100 parameters)

→ Many own DAQ systems

to be evaluated

DAQ quiz for DESIR

Do you plan to use your own DAQ system ? YES ☐ NO ☐

Sent to 10 users : Lumiere(1)/ Bestiol(6)/ Traps(3)

What about DESIR ?

→ Lower scale experiments (~ 100 parameters)

→ Many own DAQ systems

ok !

to be evaluated

DAQ quiz for DESIR

Do you plan to use your own DAQ system ? YES 8 NO 3

Sent to 10 users : Lumiere(1)/ Bestiol(6)/ Traps(3)

to go further…

- External network connection (100%)
- External signals from GANIL (100%)
  - → beams related signals (RF, buncher, beam gate,…)
  - → GPS time reference or timestamp
- Data storage (3/8) : 500 GB → 10 TB
- 1 specific demand : local computer (off-line analysis)
  + VME/NIM crates (numbers ??)

All these requirements can certainly be provided ….

DAQ quiz for DESIR

Do you plan to use your own DAQ system ? YES 8 NO 3

from Bestiol

- Number of parameters : Amplitude : 240 → 500; Timing : 20 → 500; Scalers : 128 → 240

OK !

Lower scale experiments

- Time resolution : 100ps → 1µs
- Events rate : 10^2/s → 10^4 /s
- Slow Control (2/3) : to be included in DAQ
- External signals (2/3) : - related to beam (RF, …)
  - time stamp
- External network connection (100%)

→ In principle, local DAQ developments are adapted to such "reasonnable" experiments

Example : FASTER @ LPC-CAEN

(Fast Acquisition SysTem on Ethernet netwoRk)

Contact : etasse@ lpccaen.in2p3.fr

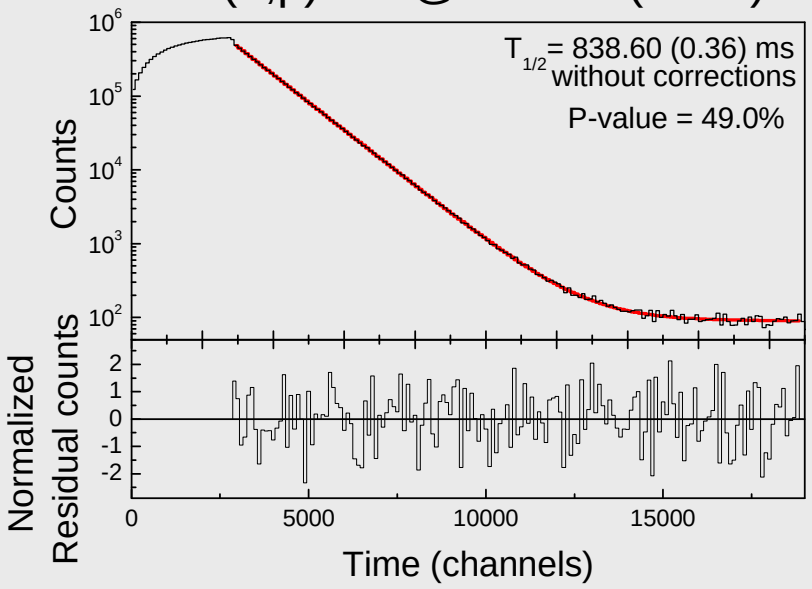
→ Digital processing of detectors P.A. signals

→ Fast data transfer through ethernet network (1-10Gbit/s)

→ ToF resolution : already 15ps between logical signals (1V)
objective : 30ps between physical signals

Test : 1 plastic scintillator for β detection (1QDC + timestamp)

^{7}Li(d,p) ^{8}Li @ Sevilla (2009)



- Cycle : 3s (~3.5 $T_{1/2}$) beam on
  17s (~ 20 $T_{1/2}$) beam off
- Rates : ~ 6 10^4 events/cycle
  max : 25 counts/ms
- No dead-time
- Result : gain of a factor 2.5 in σ_T
  obtained in 4.5h

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Short range plan :

1) June-August 2010
(ILL – PSI, Naviliat)

9 QDC + GPS ($\Delta t \sim 10ns$)
Data flow : ~ 10^6 /s (during short periods)
1st level trigger (low treshold)

2) November-December 2010
(Si-CsI +DEMON@GANIL)

12 ADC + 10 QDC & ToF ($\Delta t \sim 500ps$ - 1ns)
Data flow : ~ 10^4 /s
2nd level trigger (coinc. in same board)

3) End 2011
(new n detector, Orr)

20 ADC + ~100 QDC & ToF ($\Delta t \sim 200ps$)
3rd level trigger ($\neq$ signals from $\neq$ boards)

→ *Local DAQ system able to process some hundred parameters in 2012*