Ancillary Detectors and Data Analysis join meeting

Orsay, March 24 2004

March 30, 2004

Present: A. Banu, D. Bazzacco, T. Beck, F. Becker, P. Bednarczyk, M. Bellato, Y. Blumenfeld, P. Destisov, N. Erduran, E. Farnea, A. Gadea, G. Georgiev, A. Görgen, M. Górska, K. Hauschild, W. Korten, A. Lopez-Martens, R. Lozeva, A. Maj, S. Mandal, N. Margineaou, M. Palacz, C. Petrache, N. Redon, J. Roccaz, T. Saito, O. Stezowski, Ch. Theisen, J. Wrzesinski

Introduction

Andres Gadea reminds that a preliminary budget has been allocated by the AGATA Management Board. Since the situation is difficult and since the budget of some countries is provisional, the funds allocated to each task of the project, has been reduced to the minimum necessary to build the AGATA demonstrator and prove tracking. Today, there is just enough money to built the demonstrator and develop the associated electronics (the main part of this budget concerns the capsules).
25 k€ have been allocated to ancillary detectors. This money will be devoted to the interfacing between existing ancillary detectors and AGATA. For the demonstrator phase, the host laboratory or the collaborating groups will provide existing ancillaries.
Various detectors were already presented during the first meeting held during the AGATA week in September 2004 at Legnaro. The first priority is however the interfacing with the demonstrator electronics and data acquisition system:

- Trigger. Since the AGATA trigger is already well defined, this is our last chance to change the specifications
- Data acquisition

Concerning the "Ancillary detectors for the key experiments and the AGATA demonstrator" team, the question of the two possible Agata configurations (120 or 180 detectors) is raised. This has to be decided by the AMB in May 2004. However, the goal of this team is to define key experiments for the demonstrator phase. It is therefore not possible to decide on the basis of the demonstrator with only 5 detector modules.
Enrico Farnea reminds that to decide between the 120 or 180 configuration, one has to simulate a full experiment *i.e.*: simulate the cascade, track the gamma interaction and perform a real analysis of simulated data. This corresponds to a long job which is out of question in a short time. The efforts will be concentrated on schematic calculations with realistic experimental conditions.

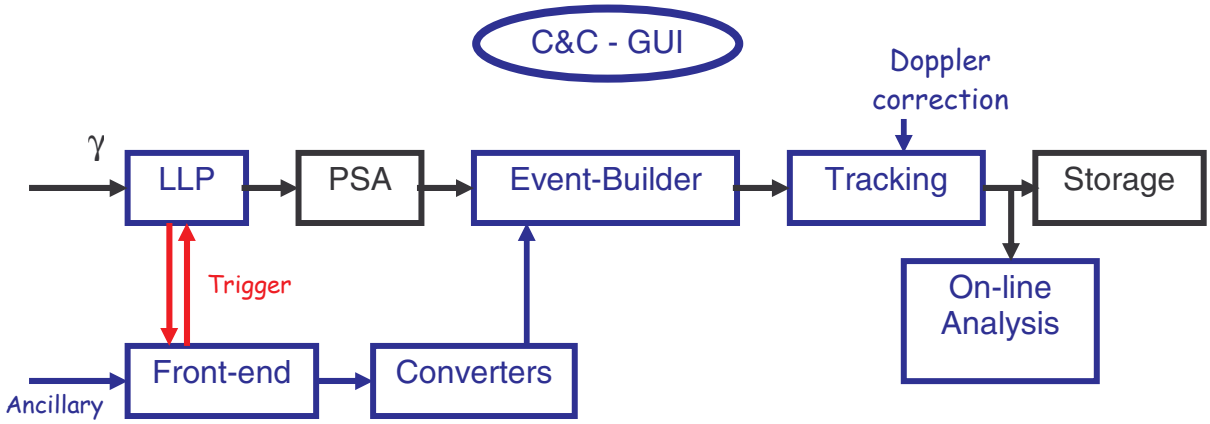
Electronics and data acquisition team

Ch. Theisen reminds briefly the goal of this team called formally *"Integration of ancillary detectors in the AGATA acquisition system. Developments of highly-integrated analogue electronics (ASIC)"*.
The setup of ancillary detectors has to be as easy as possible. Therefore, the number of interfaces and standard should not be multiplied. Since VME is widely used in all the laboratories for interfacing converters and acquisition, one should push toward this standard. This standard is indeed used for interfacing VXI, FERA or CAMAC standard. Moreover,

VME modules can be inserted in VXI standard using an adapter, although it is probably not the most robust solution. One example of the use of the same VME card at VXI and VME front ends, is the TITRIS module developed at GSI and used at RISING and CLARA.

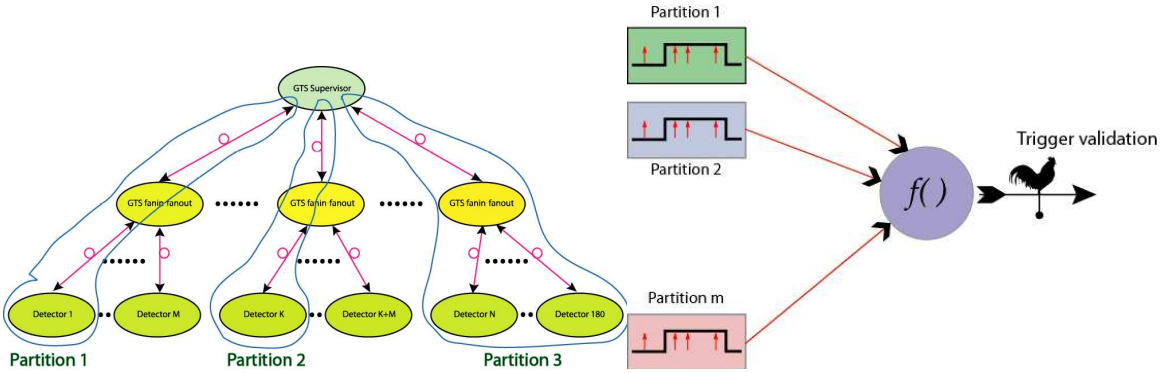
The AGATA trigger uses timestamp to correlate detectors or groups of detectors. This mode should also be used for ancillary detectors. Master and slave modes should be discussed. Since time-stamping is used, the ancillary master mode seems to be not mandatory. However, this mode will reduce the computing load of AGATA, in particular the PSA which may be a bottleneck in the chain. The urgent task of this team is to design an interface with the GTS (Global Trigger System) of AGATA.
Ancillaries have to be inserted into the AGATA data and Acquisition system. On one side, the data flows have to be merged[1] and on the other side, control has to be integrated in the AGATA GUI[2] (Graphical User Interface).
Development of ASIC's is foreseen for ancillary detectors. This is for instance the case of GRAPA which will include a few thousand of channel. The development of new chips has to be coordinated.
How to proceed in this team? One has first to look at what has been done previously at Euroball, Gasp, Rising, Clara, Jurogam… Positive as well as "errors" have to be considered in order to produce the best and most friendly interface. This team needs also strong connection with other groups and team : LLP for the trigger; GLP for the data merging; tracking to provide recoil velocity; DAQ for one-line and off-line analysis…
In order to collect information and requirements from ancillary developers and owners, an "ancillary form" is being prepared and will be distributed soon.
The team should obviously decide who will do what: interface with trigger (first priority of the team); web page …
Not mentioned, but also obvious are the costs and time scales.
Since this meeting is very short, a larger meeting is proposed before summer.
Everybody is welcomed to join the ancillary detector mailing list at GSI (http://www-aix.gsi.de/archives/). If the procedure fails, please contact the owner of the list *i.e.* Andres Gadea andres.gadea@lnl.infn.it

A global architecture of the AGATA electronics is presented bellow. Blue boxes represent topics in which this team has to interface.



[1] This point was discussed during the GLP meeting; March 25 2004, Orsay. The specification of the event-builder already includes ancillary detectors.
[2] Also discussed during the GLP meeting. Vic Pucknell to contact teams to define requirements.

The discussion continues with the trigger. Marco Bellato presents the main features of the GTS. Basically, the GTS mechanism is the following:
Detectors provide a trigger request signal to the GTS Supervisor. The trigger validation is provided if the signals fulfilled Boolean equations. Detectors can be grouped into partitions as shown bellow. Typically, an ancillary detector is a partition.
For instance, partition 1 can be a beam tracker, partition 2 AGATA…



The maximum time window in which coincidences are accepted is 20µs. Therefore, the validation signal is provided with this maximum delay. Delay latencies are taken into account for the decision. This signal is forwarded to GTS end nodes together with the timestamp and other control signal. During the discussion, it is agreed that a maximum coincidence window of 20µs fits with requirement of "late" detectors like recoil spectrometers.
However the minimum delay corresponding to the answer received by GTS nodes is around 2µs (this delay corresponds to the response of germanium detectors, the time to decide and generate the trigger validation, and the time to transmit information trough the optical transceivers). This delay seems to be too long for fast detectors having large counting rates (such as beam trackers or the Recoil Filter Detectors). Since the converters need the validation signal, a large dead-time may follow in case of large counting rates. A fast trigger signal including AGATA alone may be necessary. This problem should be discussed more into detail in a next meeting.

Ancillary detectors for the key experiments and AGATA Demonstrator

Nadine Redon reminds the goal of this group which is, as already mentioned above, to define key experiments for the demonstrator phase. The demonstrator will run with ancillary detectors. Thus, the work is strongly connected to all the ancillary detectors teams and the simulations of keys experiments. The final goal is to demonstrate the real tracking performances and compare them to what is simulated.
No actions concerning this part have been decided yet.

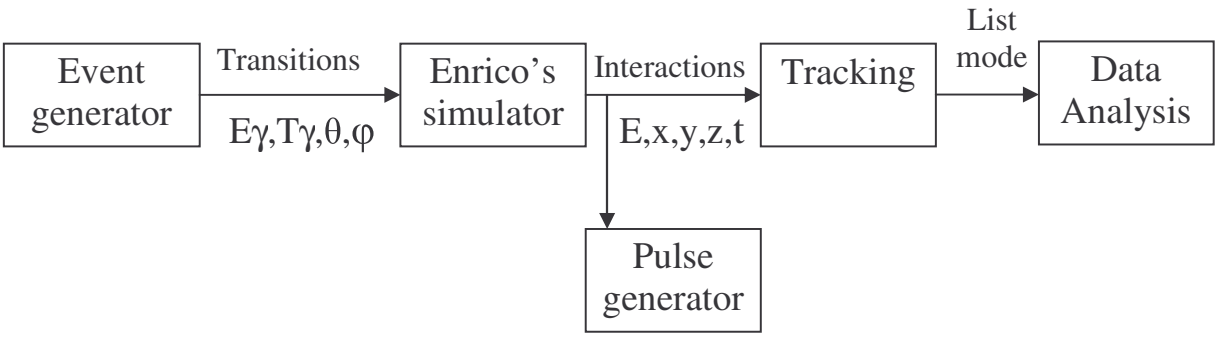
Simulations of key experiments

Enrico Farnea briefly reminds the goals and timescale: what should be done rapidly and what should be done in a larger time scale. As far as Enrico understood, the goal is to perform full simulations of experiments.
The status of the simulation code is presented.

A simulation of key experiment meeting should be organized. In general, Enrico regrets that there is not enough feedback, in particular for the simulator code. Today, ~1.5 man-year is working and the team should be urgently enlarged.

Olivier Stezowski presents the status of the data analysis team. A web page is being prepared (http://lyoinfo.in2p3.fr/matnuc/agata.html). Up to now, the work has been devoted to an event generator. This generator uses as an input a gls radware level-scheme file and produces gamma-rays. Detector response has been partially included. Some improvements are foreseen like inclusion of angular distributions or X-ray following internal conversion. The question of emission time is raised. If this time is simulated, this can be an output parameter of Enrico's simulator. Aracelli Lopez-Martens also suggests to simulate recoil shadow experiments to investigate if tracking works in this case. Enrico's simulator already accepts Oliviers's output. T. Saito mentions that simulations with π beams are in progress at GSI. Physical processes are included. Around 6 month of further work are needed to finalize the simulations.

A general layout of a full simulation scheme may be the following:



A list of experiments that should be simulated as soon as possible is decided:

- Relativistic Coulex experiment
  Action: T. Saito,
- High-spin experiment with statistical gamma-ray
  Action: Waely to contact S. Leoni and to produce a file
- Rotational cascade including angular distribution
  Action: A. Gadea.