ADVANCED GAMMA TRACKING ARRAY

AGATA and GRETINA status

Second AGATA-GRETINA tracking arrays collaboration meeting

4-6 April 2018
CSNSM-CNRS, Orsay

Amel KORICHI

19th AGATA week – IPHC Strasbourg, September 11-14, 2018

SCOPE and TOPICS

I-Review of AGATA and GRETINA/GRETA projects

II-Review of the decisions made during the first meeting

III- New algorithms, new basis developments/improvements for the decomposition/PSA and tracking. Simulations and performance of the arrays.

IV- Electronics-DAQ session : requirements for full arrays

V- Other topics and developments

VI- Open discussion

Detailed program and slides are available in the web site :

https://indico.in2p3.fr/event/16944/timetable/?view=standard

II-Review of the decisions made during the first meeting

AGATA data through GRETINA decomposition : Data translation and basis generation

GRETINA data through AGATA PSA

Event-by-event AGATA and GRETINA Tracking comparison

H. Crawford, A. Korichi, T. Lauritsen, O. Stézowski who volunteered to start the job

III-New algorithms, new basis developments/improvements for the decomposition/PSA and Tracking. Simulations and performance of the arrays

Long and very nice session for the PSA/decomp :
review of the current algorithms and new ideas using ML

Signal decomposition/PSA update
GRETA signal generation and AGATA Detector Library
In-situ experimental basis
New PSA algorithms
Machine Learning

Translating AGATA mezzanine data to GRETINA mode 3 (traces) format :

« It is a bit of work to translate the AGATA data » But Almost done …

From T. lauritsen presentation :

In AGATA, the segments are read out from the front to the back
In GRETINA the data is read out by first reading the front segments, then go to the next layer and so on
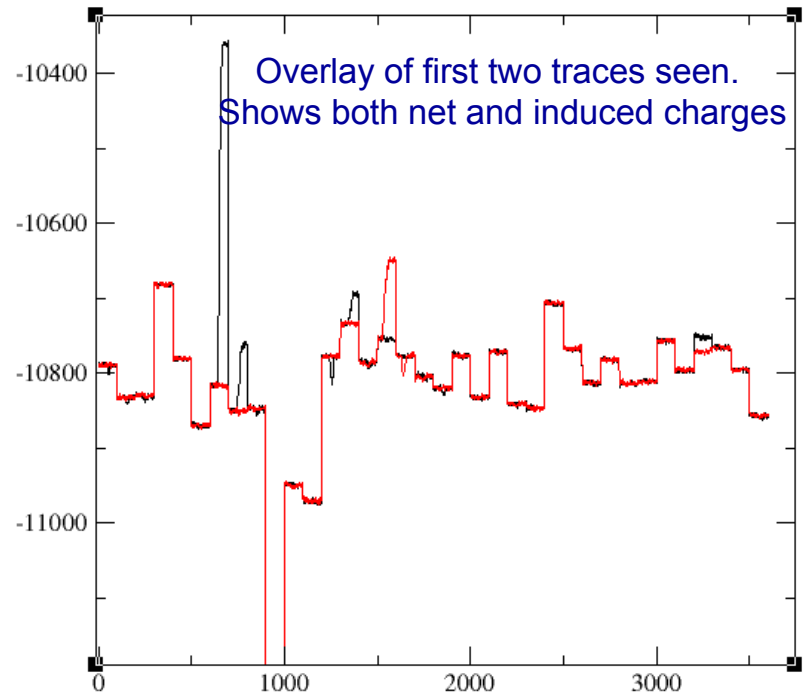
There is also a difference in :
clock and anti-clock wise readout convention

which I was not aware about before further checks (H. Hess.)
so Heather is taking care of that for now.

Which one is the first segment?

More later in the next coming weeks/monts

Important for the comparison of the PSA/Decomp algorithms !

Overlay of first two traces seen.
Shows both net and induced charges

Tue Jan 16 10:24:50 2018

AGATA data through GRETINA Signal Decomposition :

As one would expect :

Basis production for 02A & 02B of AGATA detectors

Basis Generation Procedure : inputs definition, Pristine basis generation, Superpulse analysis, Cross-talk correction

From Heather Crawford presentation at the 2nd AGATA & GRETINA collab. Meeting :

① Find crystal inputs;

② Calculate fields and crystal weighting potentials;

③ Generate a grid and basis signals;

④ Generate a raw (pristine) basis;

⑤ Produce a simulated superpulse (SP) using the raw signal basis;

⑥ Collect data for an experimental SP;

⑦ Build an experimental SP from the data;

⑧ Fit simulated SP against experimental SP to determine cross-talk parameters;

⑨ Generate a cross-talk corrected basis file.

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Basis production for 02A & 02B of AGATA detectors

Geometry modified to AGATA geometry for A, B and C-type crystals
Impurity data etc. for 02A, 02B and 02C
New simulation for AGATA in UCGretina package (GEANT4)
Updates to subsequent codes due to format change

Status :

Superpulse Fitting Results :
DXT and IXT parameters for AGATA and GRETINA fits however are similar…

Delay parameters are comparable

Tau parameters are very different – AGATA consistently pushes segment tau to low, or even negative values

AGATA $\chi2$ not great for both A and B crystals

Mechanics are in place to produce AGATA basis through the GRETINA tool chain
First basis shows unexpected parameter set given visual inspection
Possibly higher statistics experimental SP, and options to constrain fit parameters will improve –
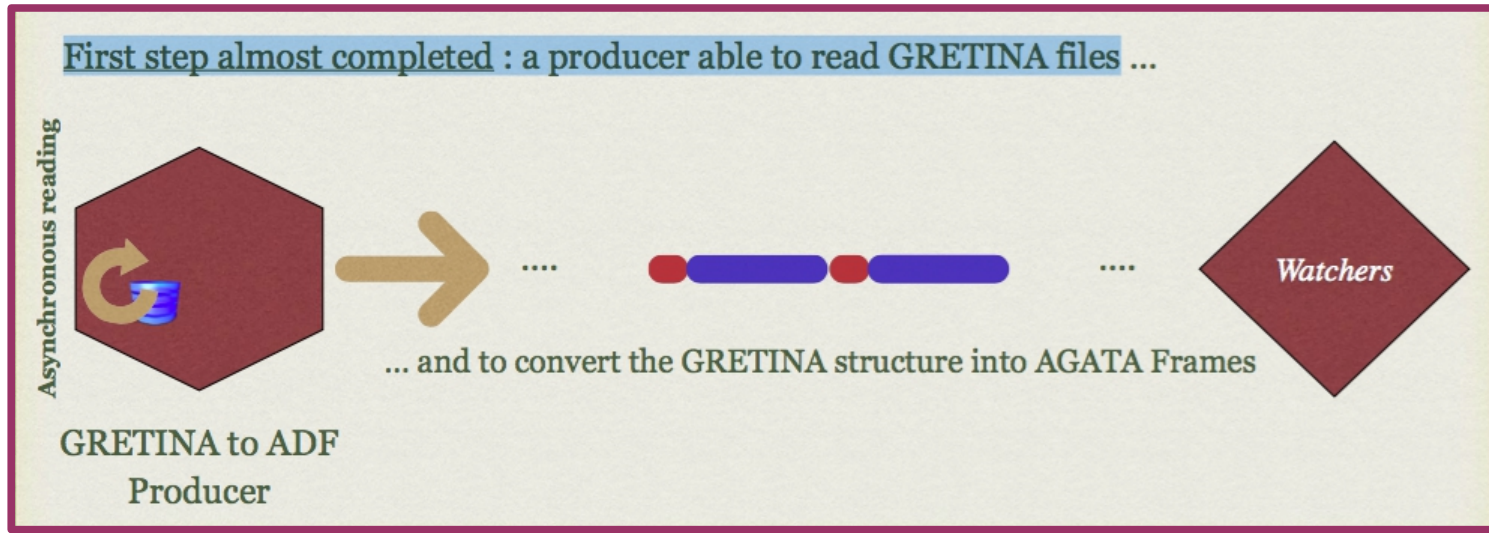
work in progress!

Translating GRETINA data to AGATA format

« It is a bit of work to translate the GRETINA data » But Almost done …

From Olivier Stézowski presentation :

The work has started … has been stopped … … … has started again … since last workshop

First step almost completed : a producer able to read GRETINA files …

Asynchronous reading

… and to convert the GRETINA structure into AGATA Frames

Watchers

GRETINA to ADF
Producer

More from Olivier Stézowski !!

Summary of the AGATA-GRETINA free Discussion

Number of Topics : PSA, tracking, simulations

o How do we get Feed-back between PSA and tracking simulations.
o Ideas were raised about machine learning.
o Identify/continue to identify people to be involved with the tasks.

PSA discussion : ideas from D. Radford (slides on the web site) But :

Ideas on how to improve the basis :
For example :
Investigate variation from crystal to crystal: e.g.,
     how much variation is there in the geometry.
    Biggest improvement -> cloud charge incorporation in the basis- not easy.
    Cross-talk with dead layers, electronics response,
    Joa's (P. Desesquelles) estimators etc …

Future Plans :

Interaction between PSA and tracking : what should we do ?
* deliver uncertainties to tracking from PSA (promised last time)
 easy to do with GRETINA (on going)

This task is also included in the ANR application (Joa Ljunvall) .

This is important because playing with the χ^2 output of the decomp code and gating on that quantity does not change the tracking.

Help is needed for a systematic study-

* Make tracking looking at 2/several solutions? But this requires a lot of work.

* Machine learning -> some possible collaboration on that to learn together
 Some applications are pretty magical but result is not guarantee for us.

Olivier and Mario : new team for machine learning to explore the area
David's student & post-doc will be involved but other people are Welcome!

Conclusion :

> **Very healthy to the 2 communities to come together,**
> **theses meetings are extremely useful and**
> **we agreed to continue the series.**

Next AGATA-GRETINA collaboration meeting : in the USA (ANL?)
We will make a decision/announcement soon (october)