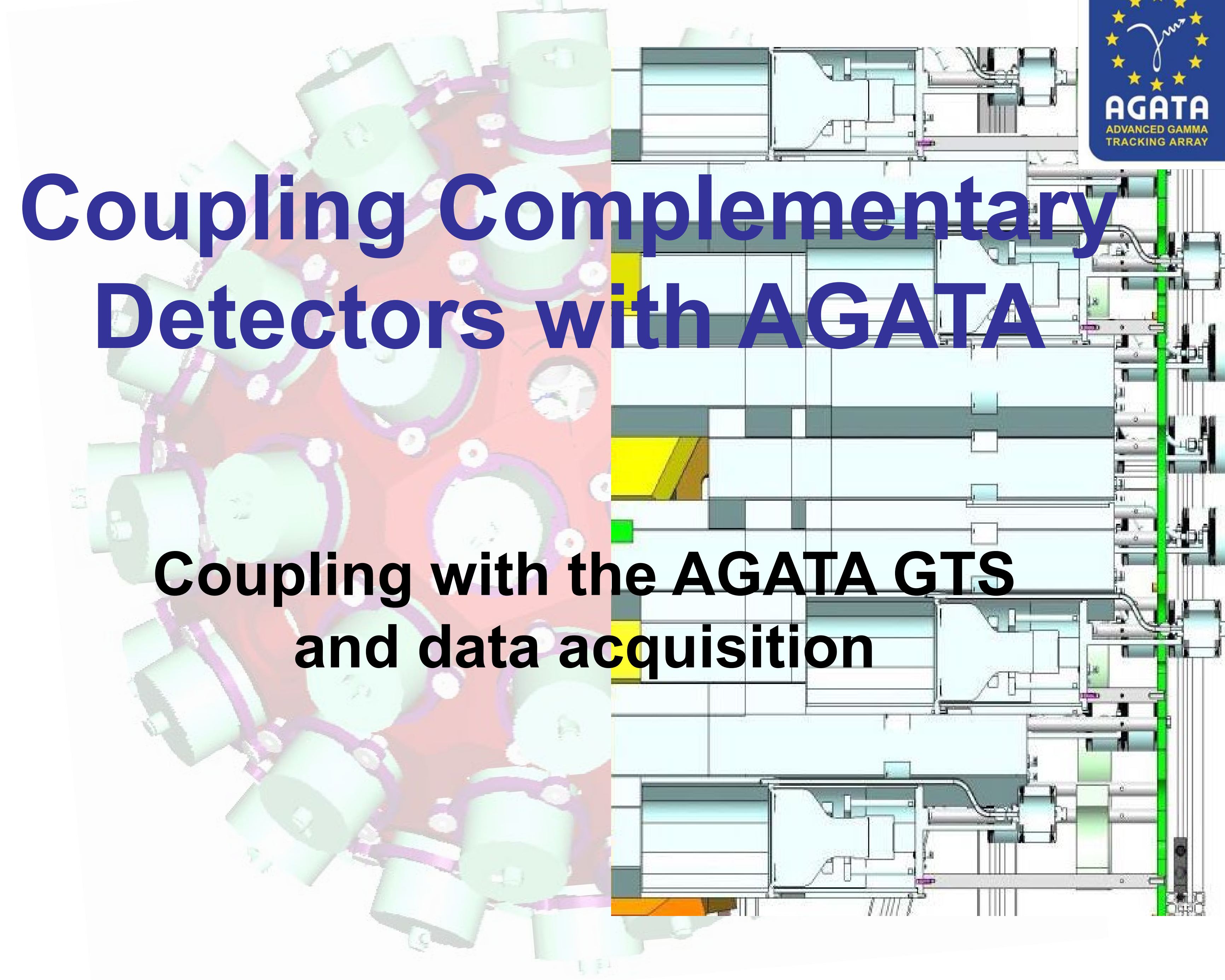
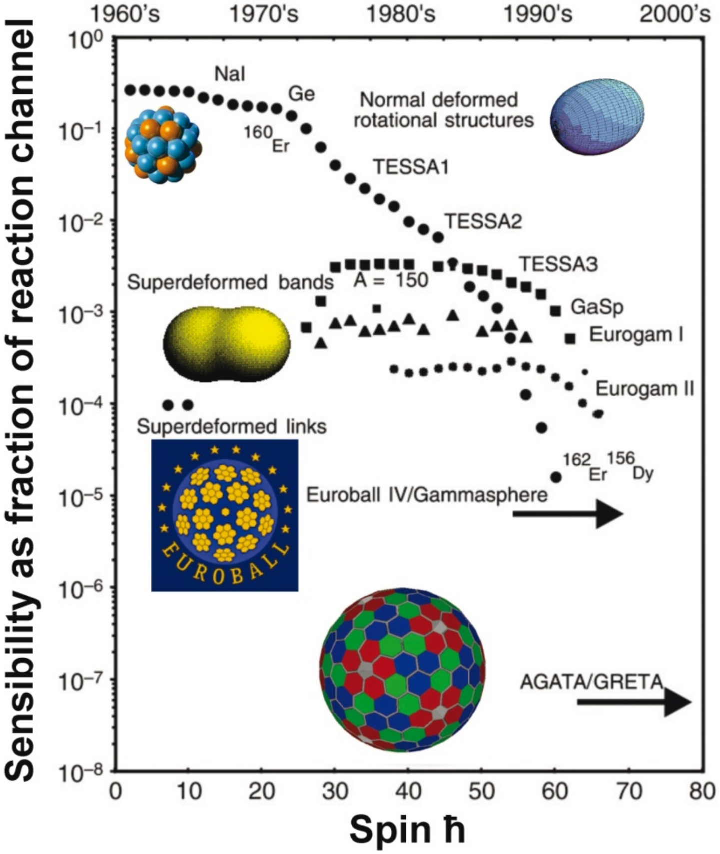
Coupling Complementary Detectors with AGATA



Coupling with the AGATA GTS and data acquisition

AGATA

(Advanced GAmma Tracking Array)



Encapsulation

180 hexagonal crystals:	3 shapes
3 fold clusters (cold FET):	60 all equal
Inner radius (Ge):	23.5 cm
Amount of germanium:	362 kg
Solid angle coverage:	~82 %
36-fold segmentation	6480 segments
Crystal singles rate	~50 kHz
Efficiency (Mγ=1 [30]):	35% [23%]
Peak/Total (Mγ=1 [30]):	55% [46%]

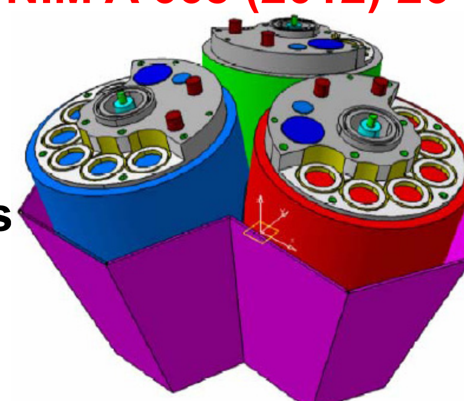
AGATA Collaboration NIM A 668 (2012) 26

6660 high-resolution digital electronics channels

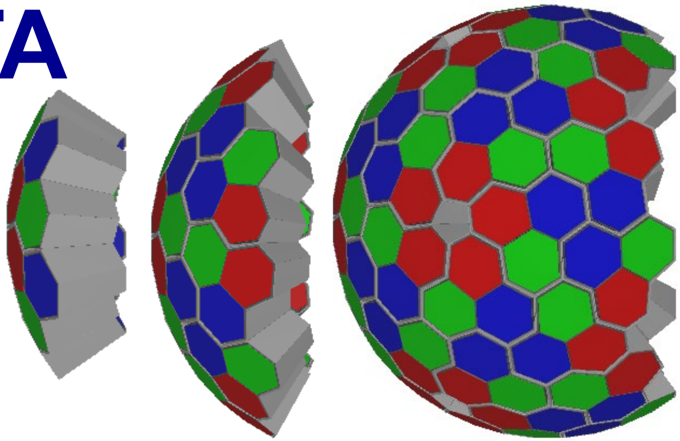
High throughput DAQ / Capability to record sampled pulses

Pulse Shape Analysis → position sensitive operation mode

γ-ray tracking algorithms → maximum efficiency and P/T



Complementary Instrumentation with AGATA

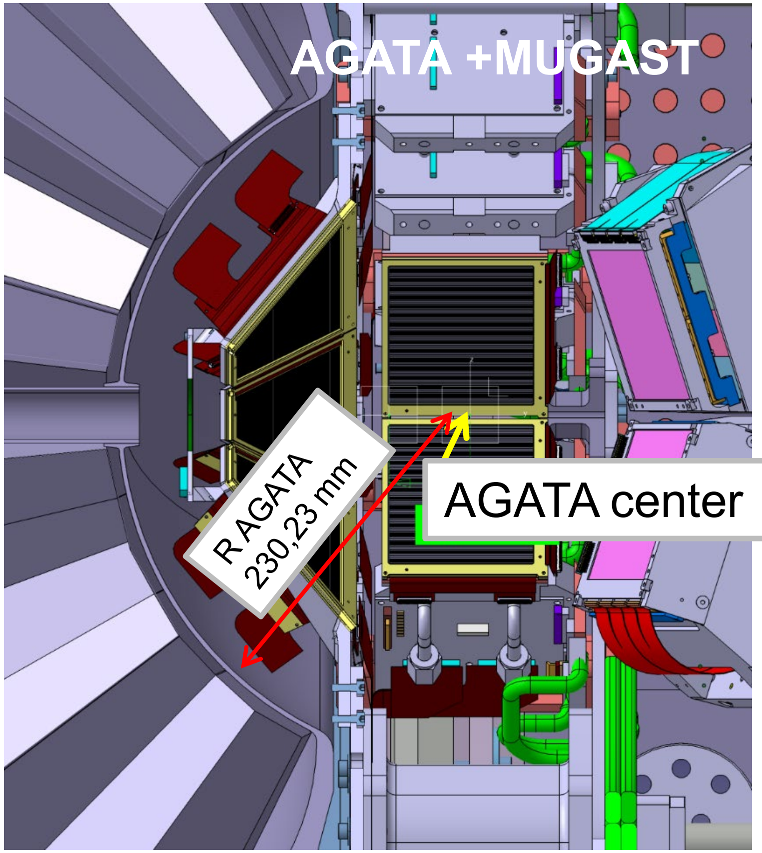


- Since the conceptual design, AGATA has been conceived as a flexible instrument to be combined with other instrumentation.

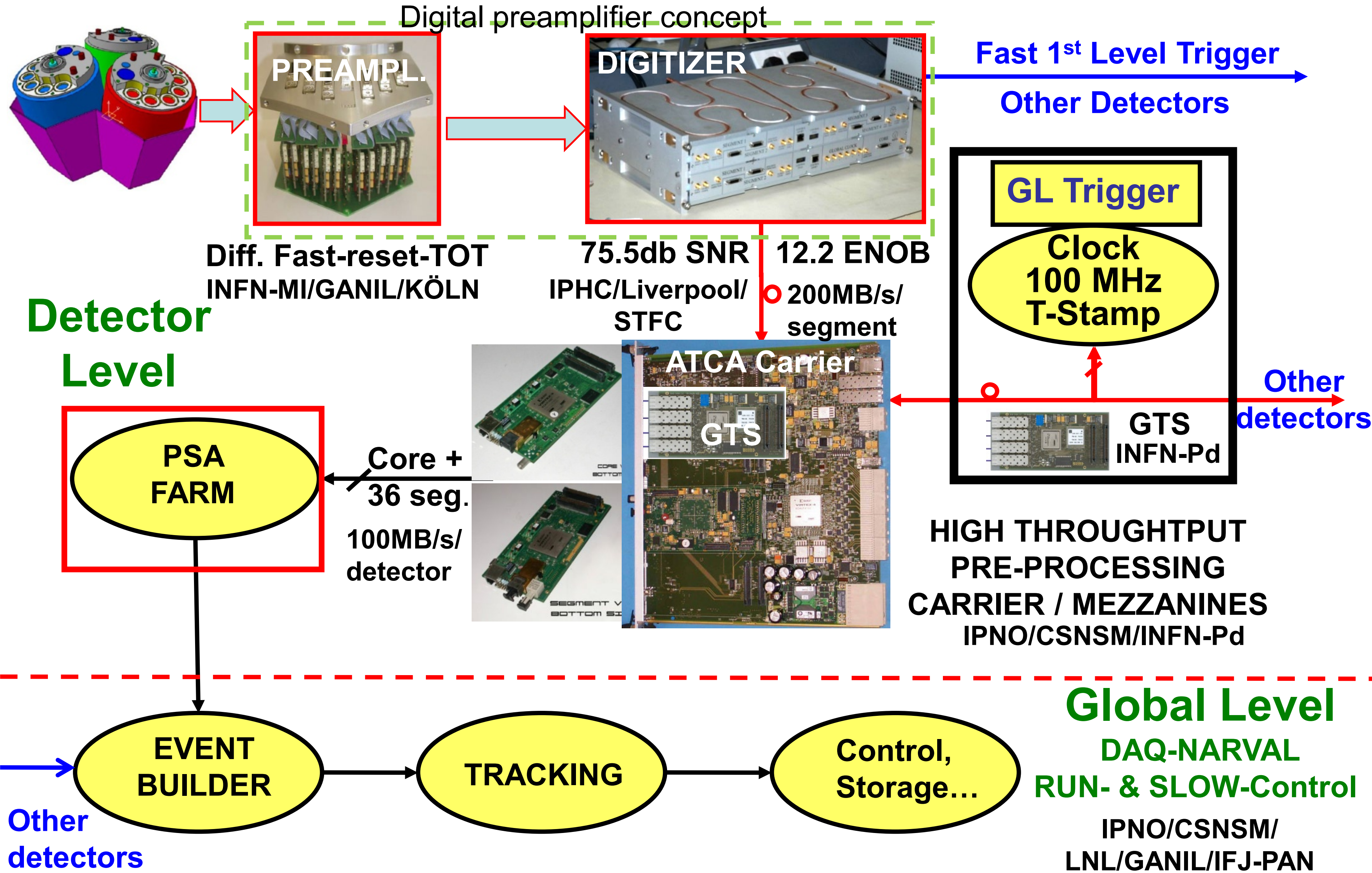
- Large inner-radius, possibility to select different configurations and electronics capable to interface with the AGATA Global Trigger and Synchronization

- Coupling with other instrumentation improves sensitivity providing reaction mechanism or tagging information.

- In addition, to exploit the full capabilities of AGATA is of paramount importance to get Information on the reaction kinematics with beam trackers, spectrometers, reaction product trackers or/and particle detectors.

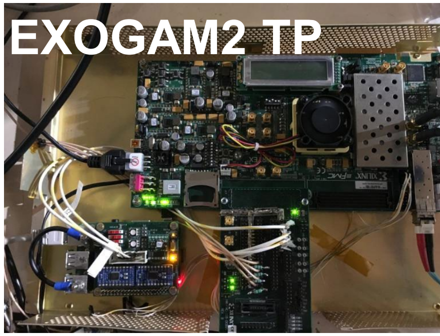


Structure of Electronics and DAQ



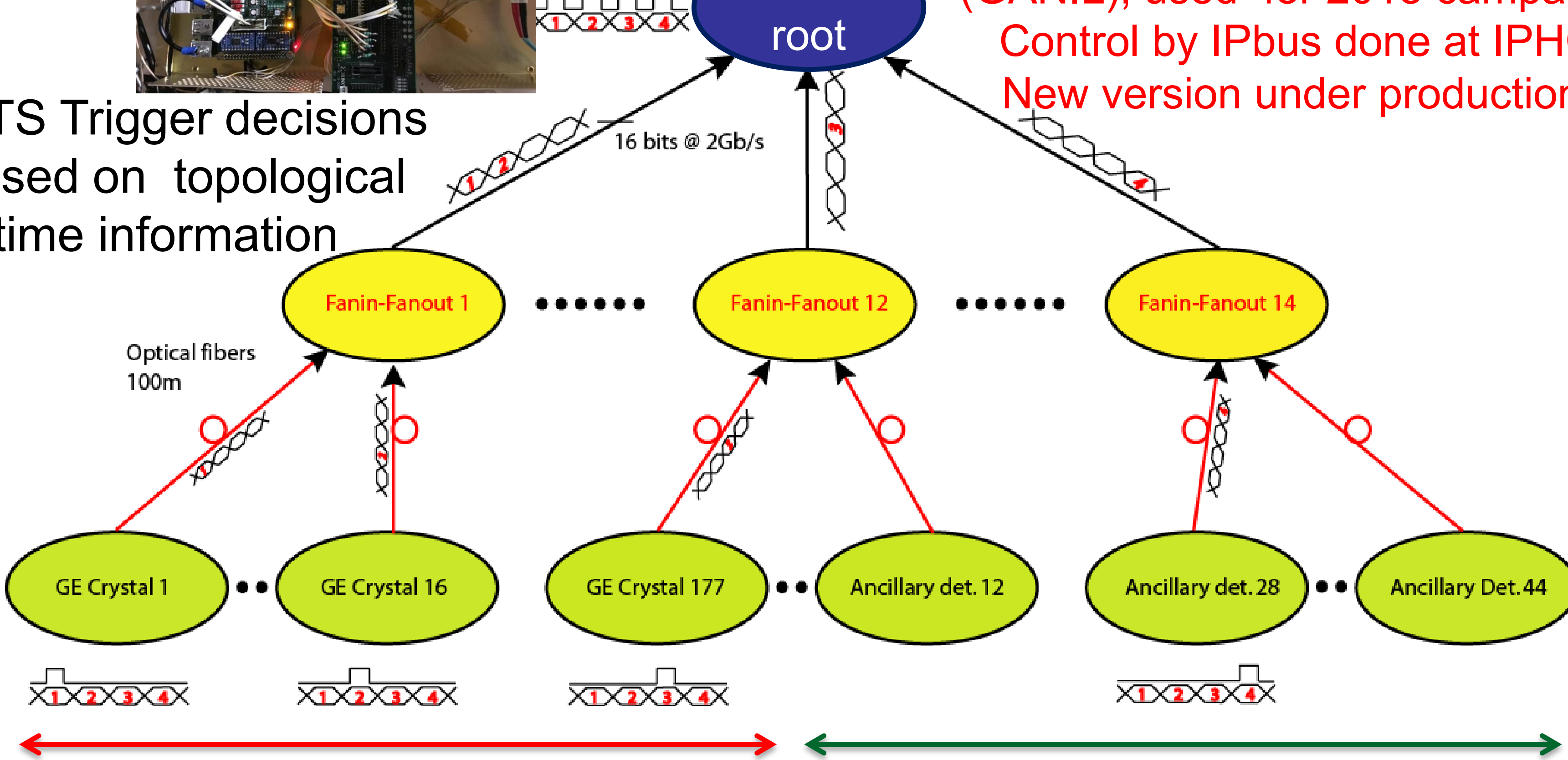
interface to GTS, merge time-stamped data into event builder, prompt local trigger from digitisers

GTS Trigger & Synchronization Structure



Early AGATA GTS Trigger Processor limited to 40 TR (channels).
The EXOGAM2 GTS Trigger Processor, (GANIL), used for 2018 campaign,
Control by IPbus done at IPHC
New version under production.

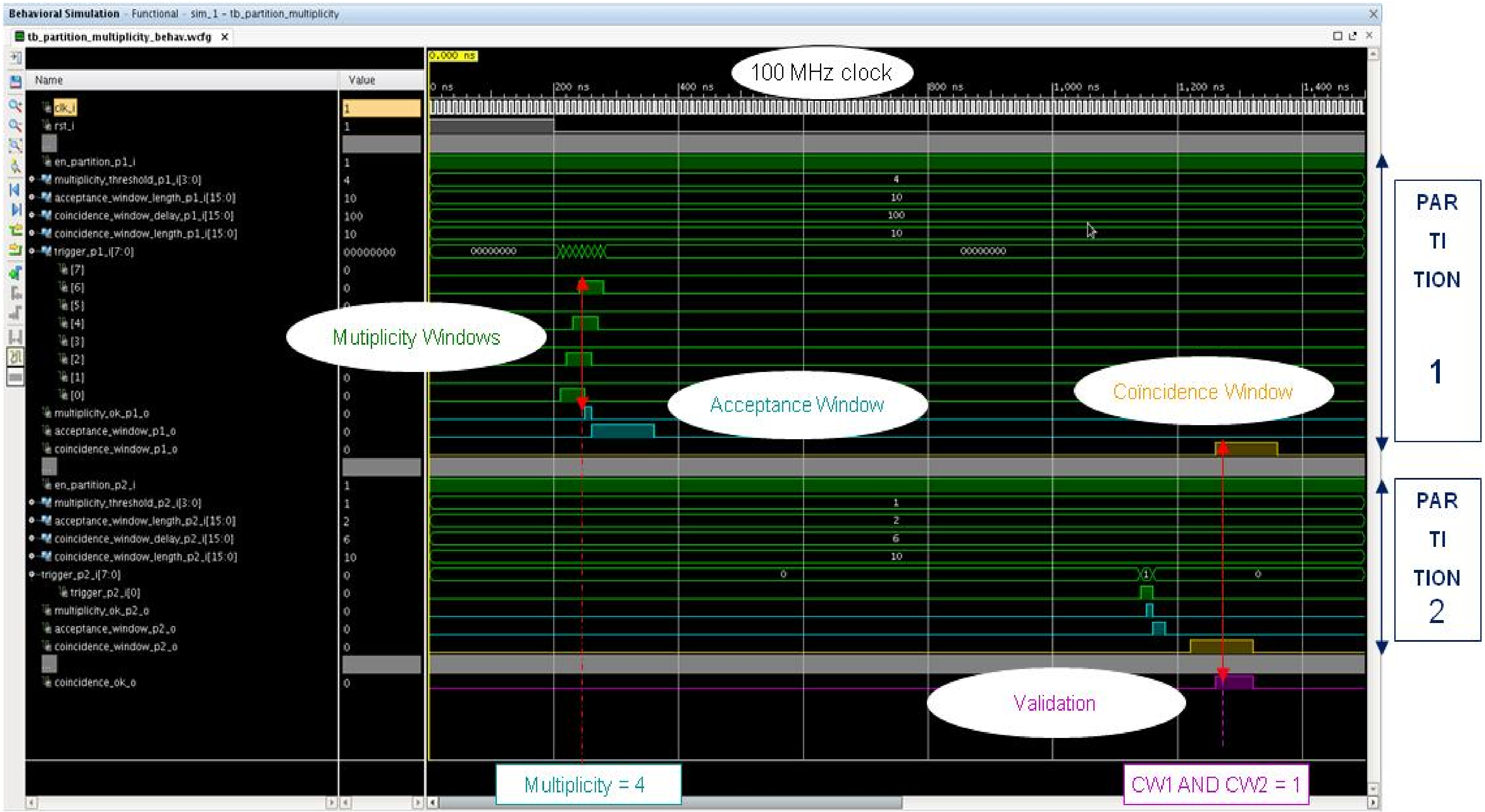
GTS Trigger decisions based on topological & time information



Partition 1 **Partition 2 …**

INFN-Padova, GANIL-Caen, IPHC-Strasbourg

NUMEXO2 / GANIL GTS Trigger Processor

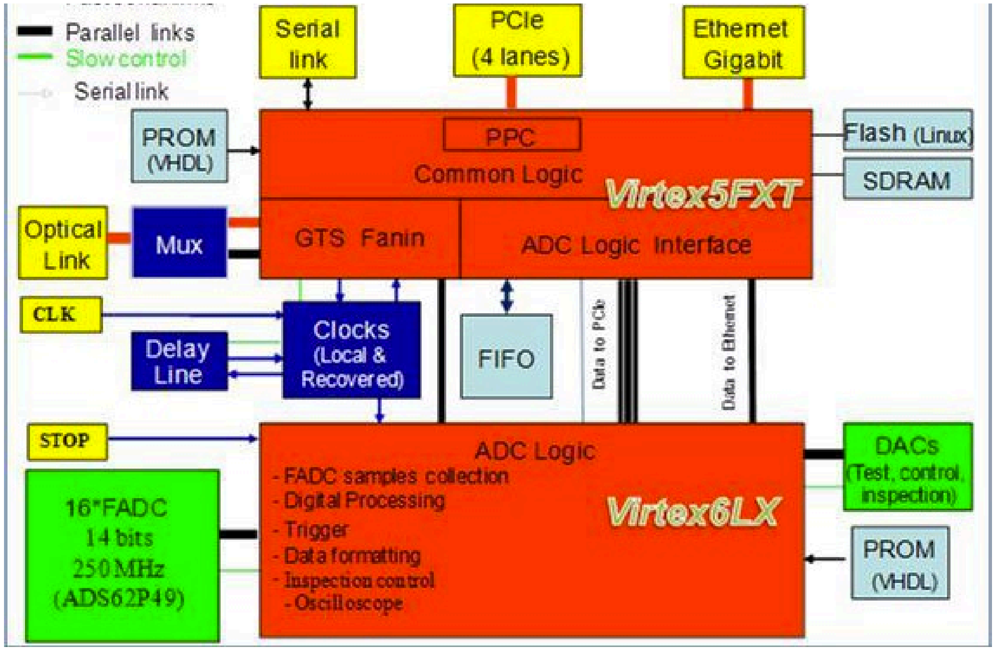


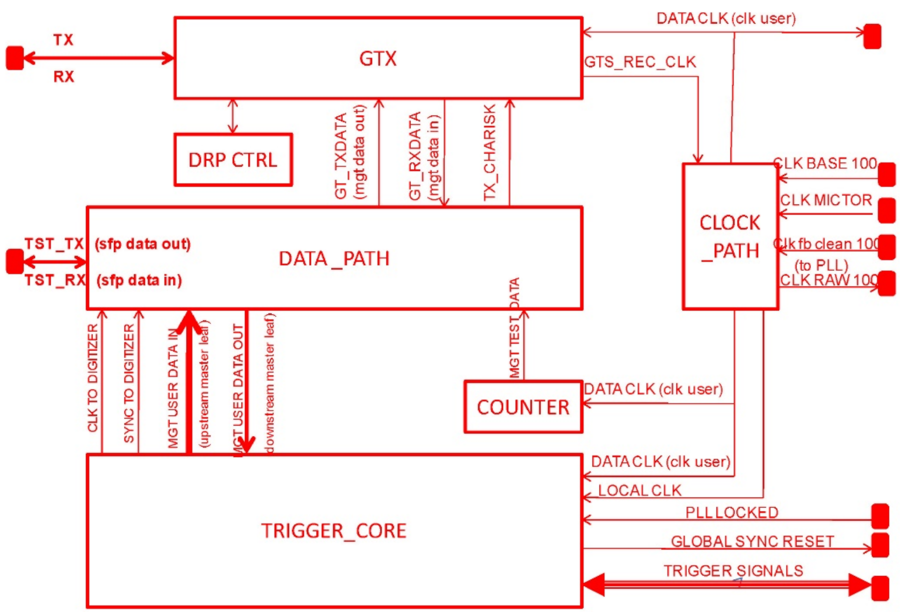
Looking forward to have a Hardware and a Software Trigger Levels

Courtesy of M.Tripon and the GANIL collaborators

GANIL-Caen, IPHC-Strasbourg, CSNSM

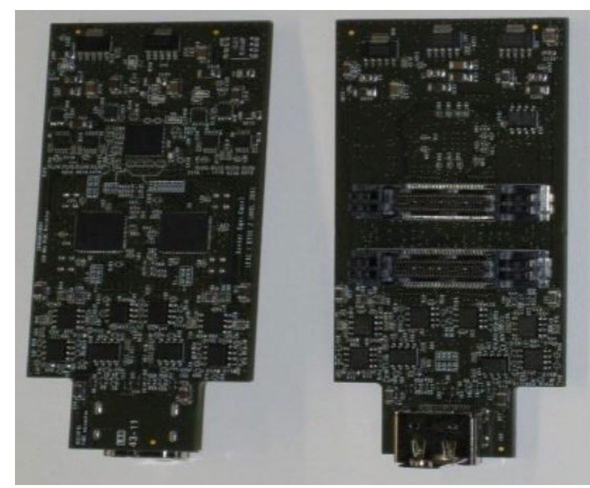
e.g. designed FEE for NEDA





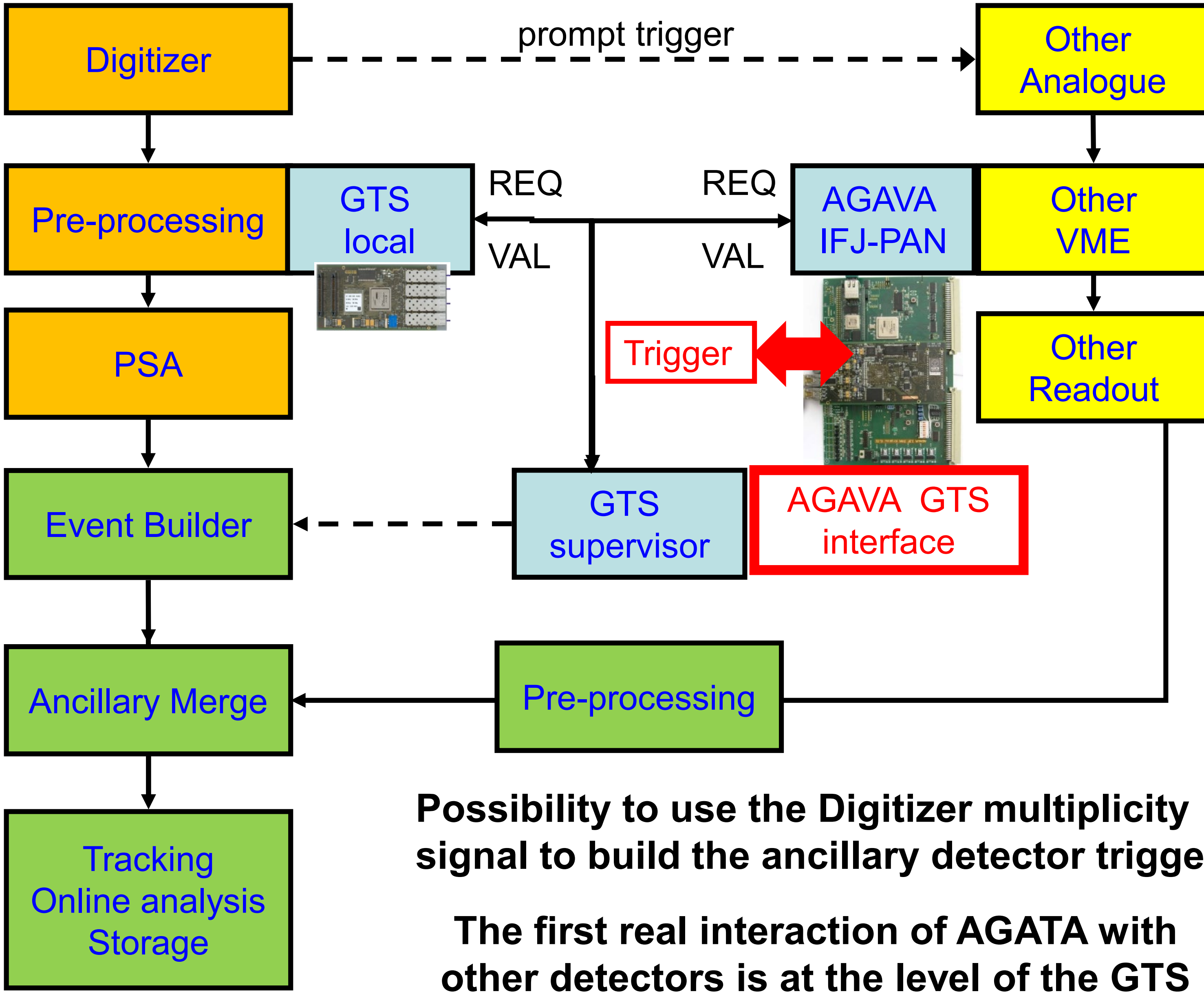
Design by GANIL

FADC Mezzanine



Design and Build by ETSE (UVEG) & IFIC in Collaboration with GANIL

AGATA and Other Detectors



Possibility to use the Digitizer multiplicity signal to build the ancillary detector trigger

The first real interaction of AGATA with other detectors is at the level of the GTS

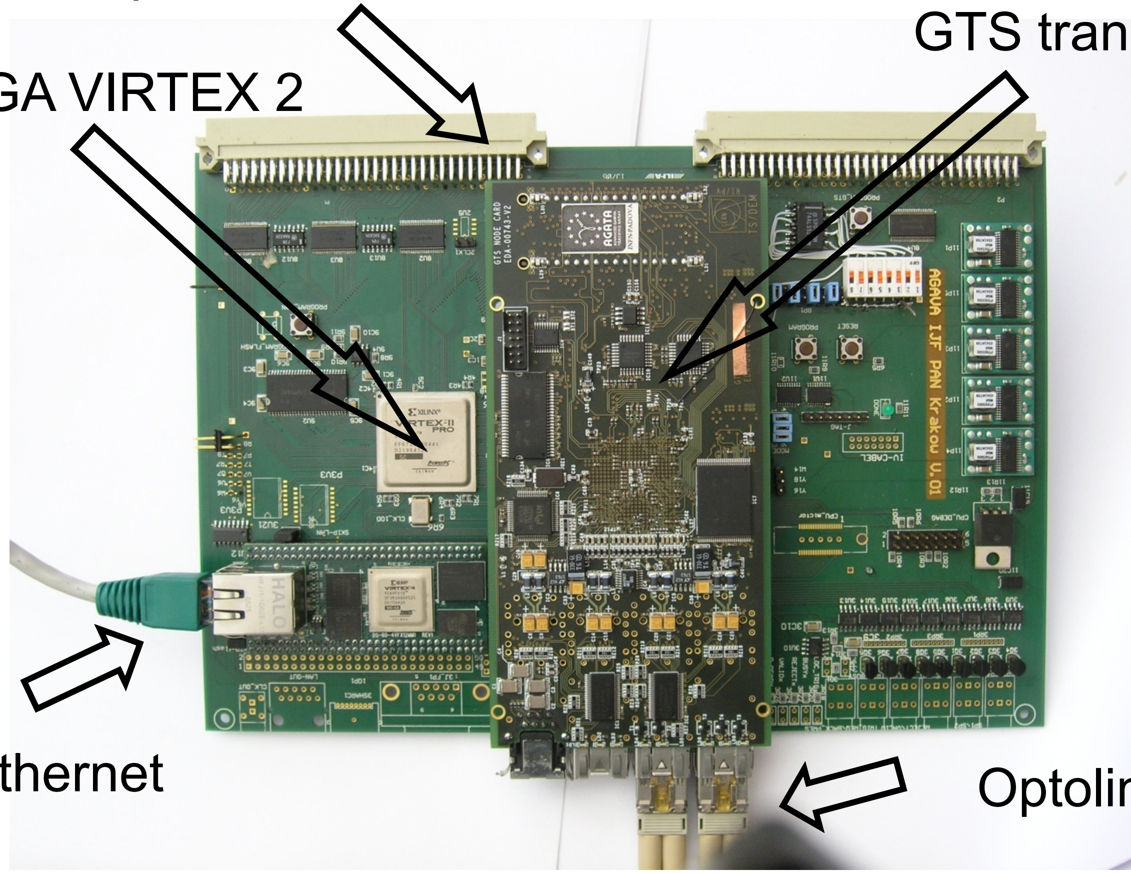
AGAVA VME card

IFJ-PAN, Kraków & INFN-Milano

VME backplane connector

GTS transceiver

FPGA VIRTEX 2

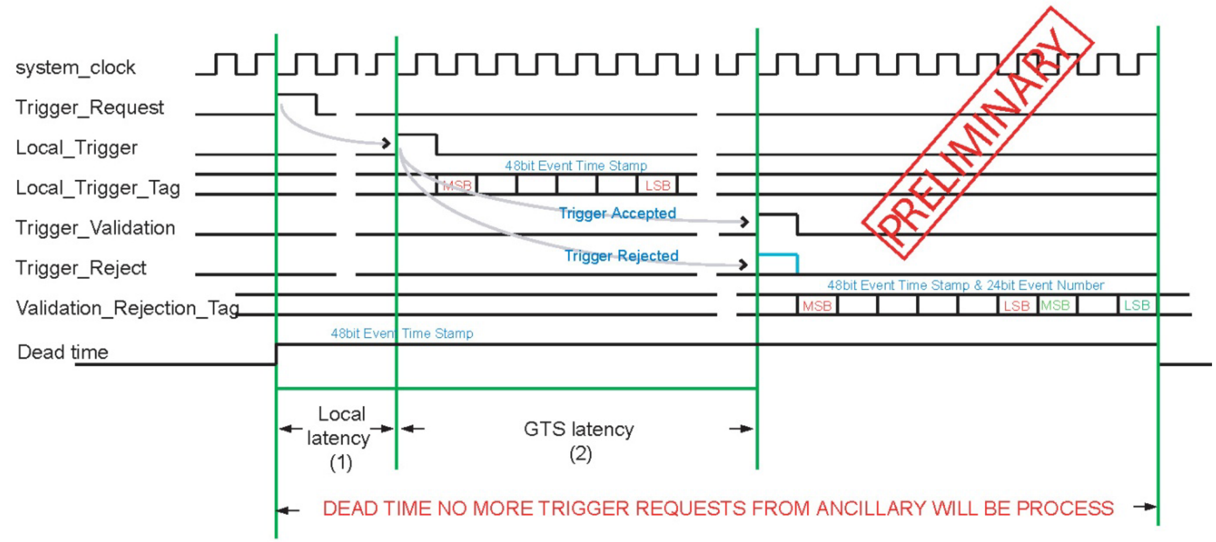


Ethernet

Optolink to GTS

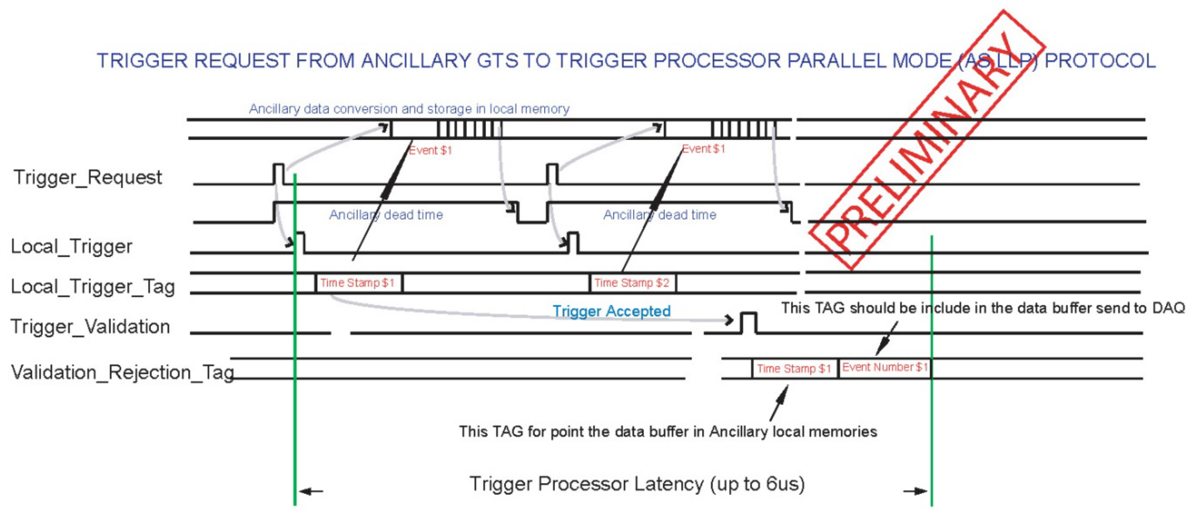
“CLASSIC” AGAVA TRIGGER MODES

TRIGGER REQUEST FROM ANCILLARY TO TRIGGER PROCESSOR COMMON DEAD TIME PROTOCOL



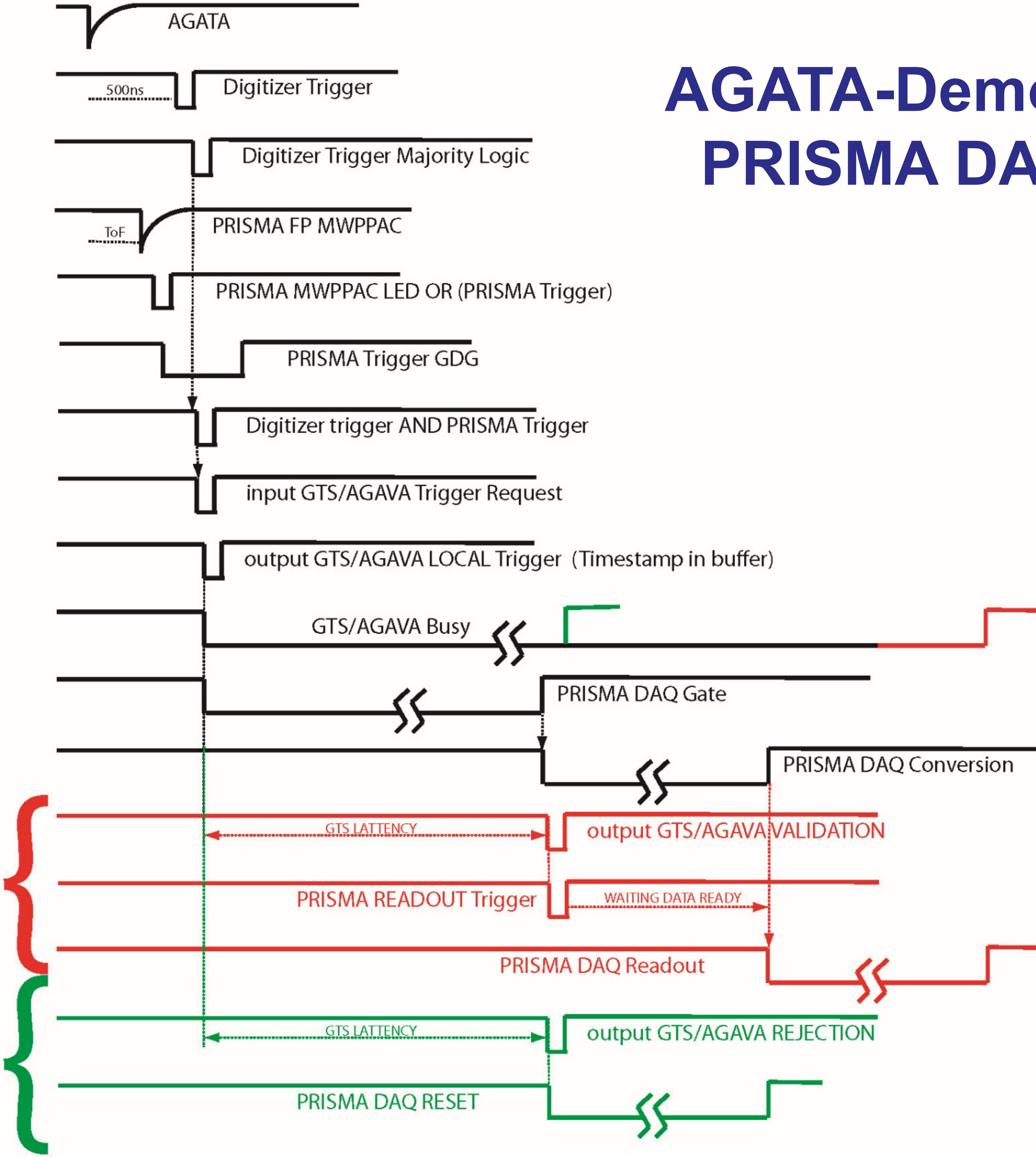
(1) Could be one or few clock cycles
(2) Latency from GTS and Trigger processor (up to 6usec)

TRIGGER REQUEST FROM ANCILLARY GTS TO TRIGGER PROCESSOR PARALLEL MODE (AS LLP) PROTOCOL



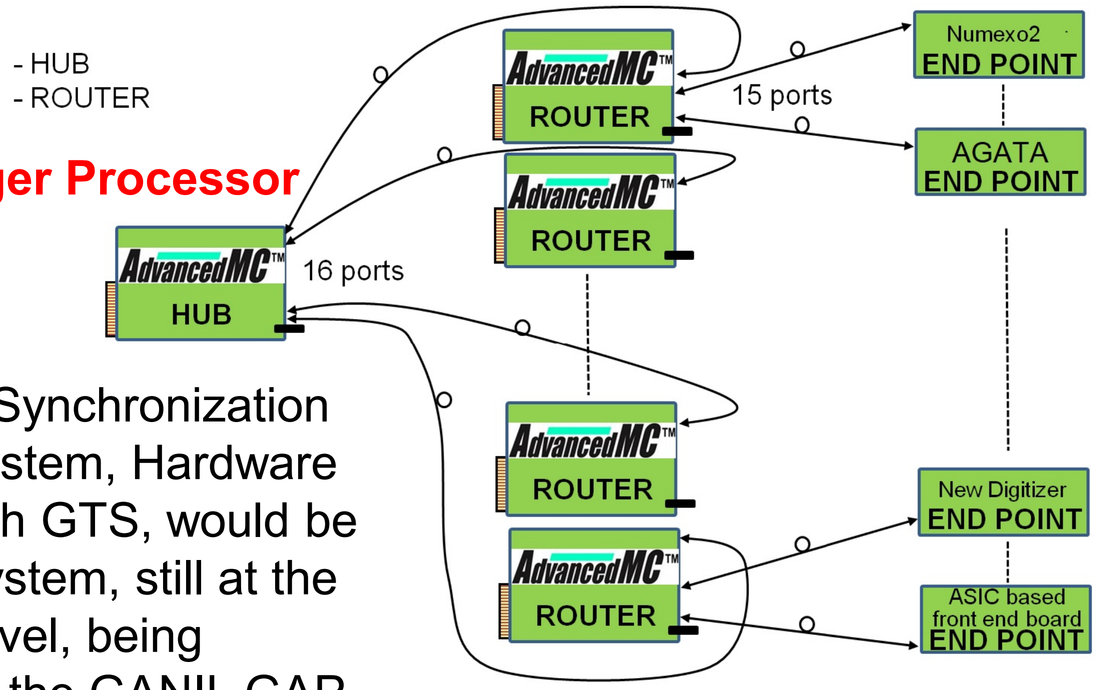
FORESSEN TDR MODE USING METRONOME AND SHARK LINK CONNECTION

AGATA-Demonstrator PRISMA DAQ cycle



GTS → SMART

UPGRADE OR NEW SYNCHRONIZATION/TRIGGER SYSTEM



One possible Synchronization and Trigger system, Hardware compatible with GTS, would be the SMART system, still at the prototyping level, being developed by the GANIL GAP (G. Wittwer, F.Saillant et al.).

Expected to start in 2021 with the present GTS system but we would need to migrate towards a new system (SMART) system during the early years of the Phase 2.
Note that the pre-processing embedded GTS hardware is compatible with the SMART hardware. In SMART the HUB hosts the Trigger Processor.

GANIL, AGATA Electronics W.G.

Summary

- The coupling of AGATA with Complementary instrumentation is done both at the Trigger Level and Data Flow level.
- It might provided information needed by the tracking codes.
- Coupling with the Trigger and Synchronization done using front end electronics incorporating GTS or using AGAVA.
- Future setups should consider the migration to SMART. WE need to discuss the possible development of an AGAVA-like board for the SMART GTS.

Thanks' to all the AGATA Collaborators

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Una manera de hacer Europa

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