



GRIT AGATA VAMOS 2029-2030 Campaign Workshop

11 juin 2025 - 13 juin 2025, GANIL/Caen/France

The AGATA Data pipeline

from the 2014-21 campaign to the 2029-30 one

O.Stézowski
and the Data Processing Group

Many thanks to the Data Processing Team

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Outlines

- Current Data Processing Model
 - Limitations
 - What is to be improved ?
- Phase 2 Data Processing model
 - New electronics = new data pipeline
 - New monitoring
 - New architecture
- Conclusions

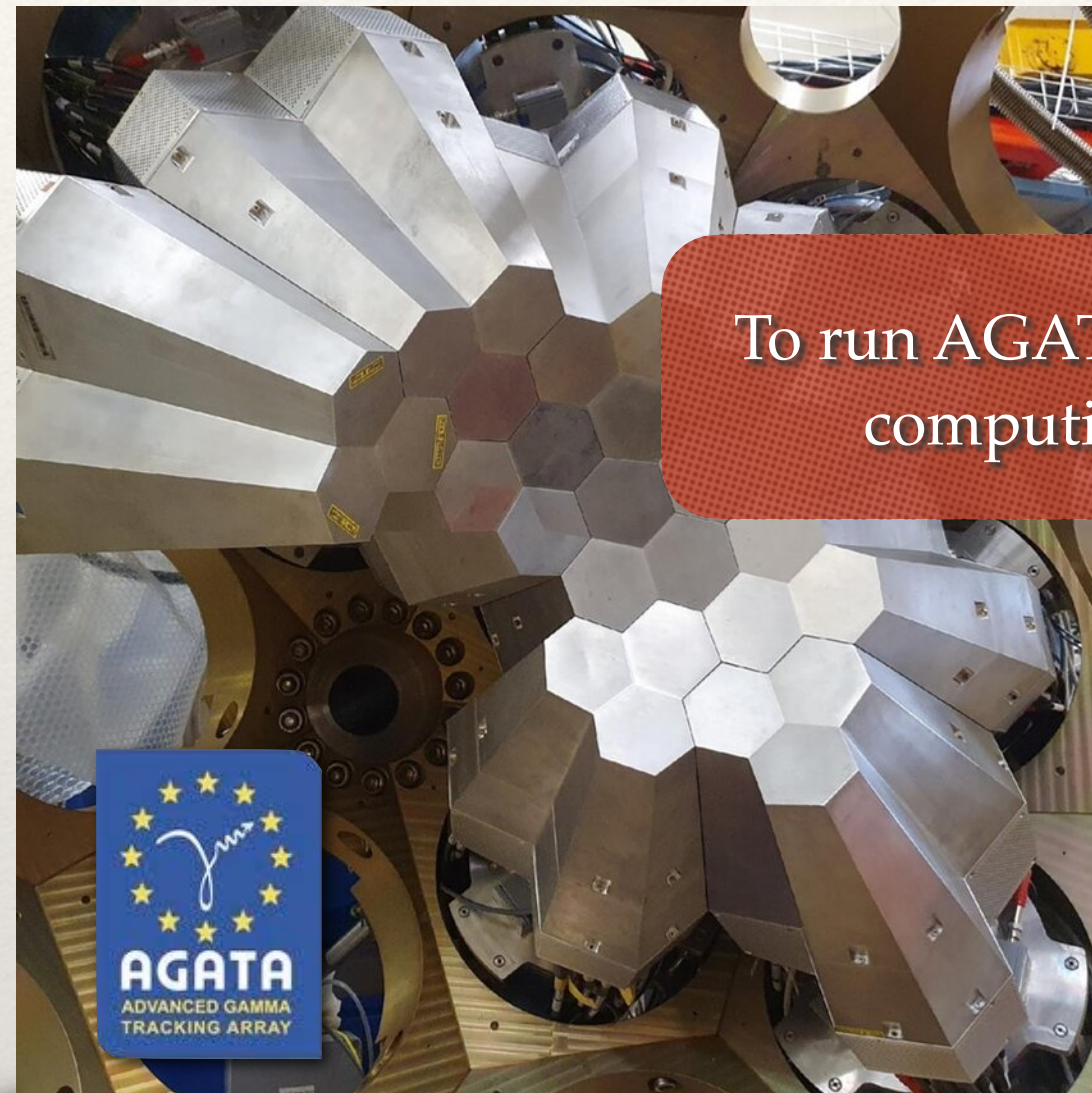
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Current Data Processing Model

Detector room

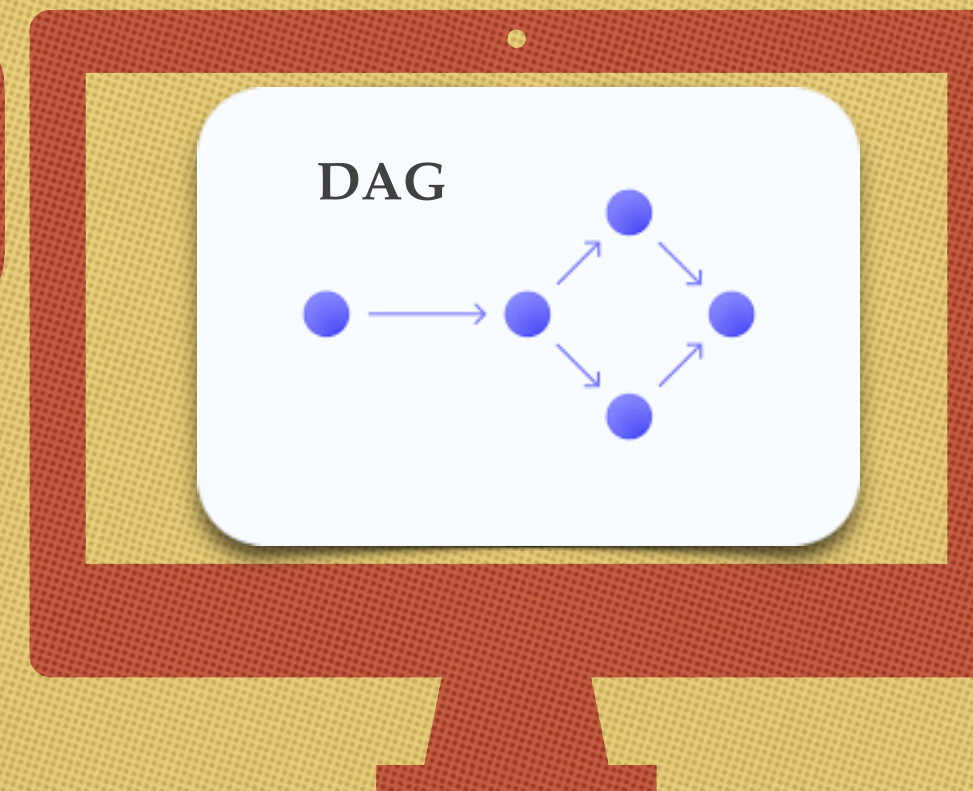


To run AGATA we do need computing power

+ ancillaries !!!

channels > N*37 digitised (100 samples) signals
We need Pulse Shape Analysis !
We need storage

We need to run a complex processing graph



We have resources for online

We don't have dedicated for offline
→ a standalone program for replay

AS MUCH AS POSSIBLE
online/offline shared same code ...

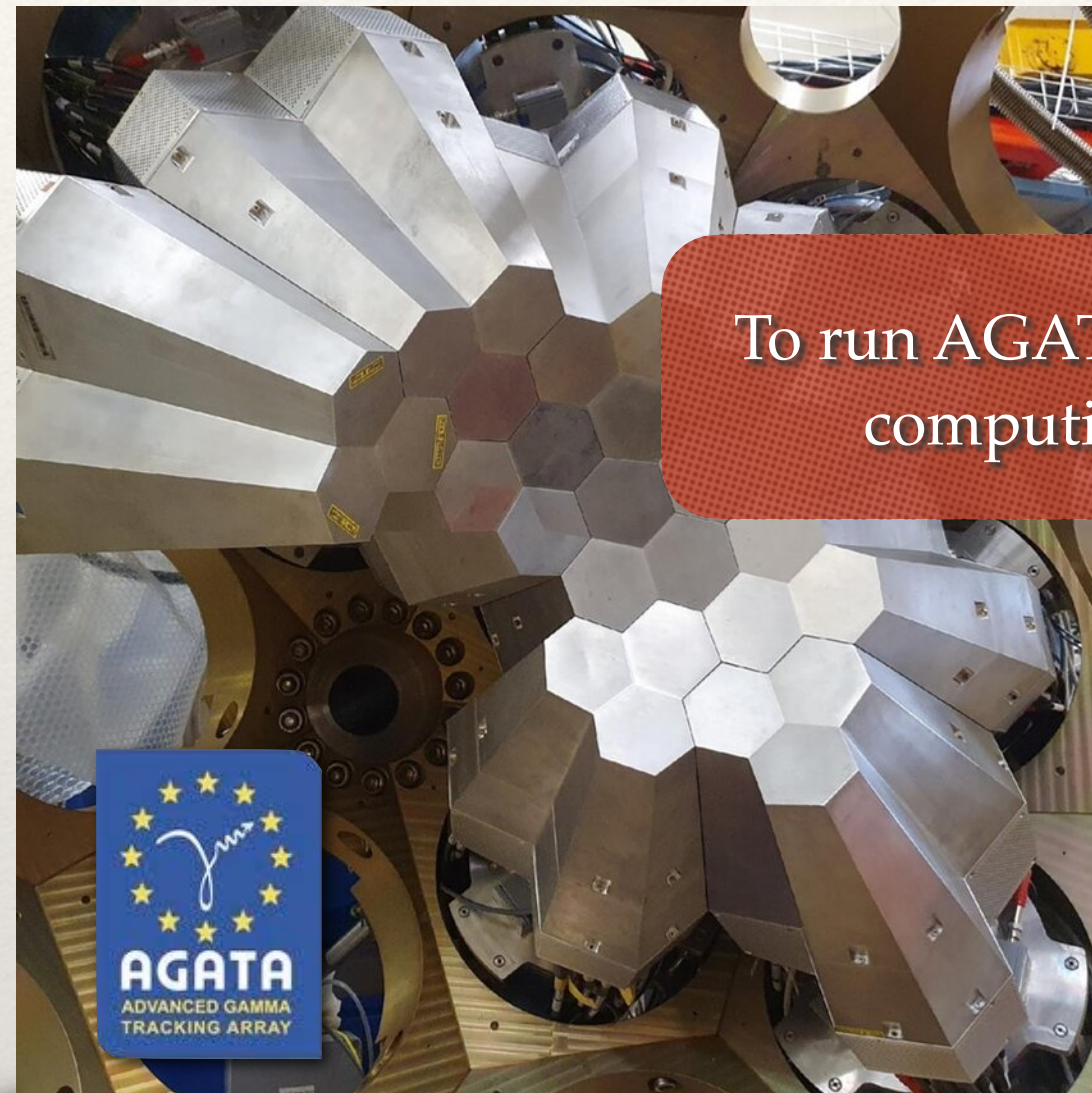
Online DAQ farm



Online Computer room @ LNL

Current Data Processing Model

Detector room

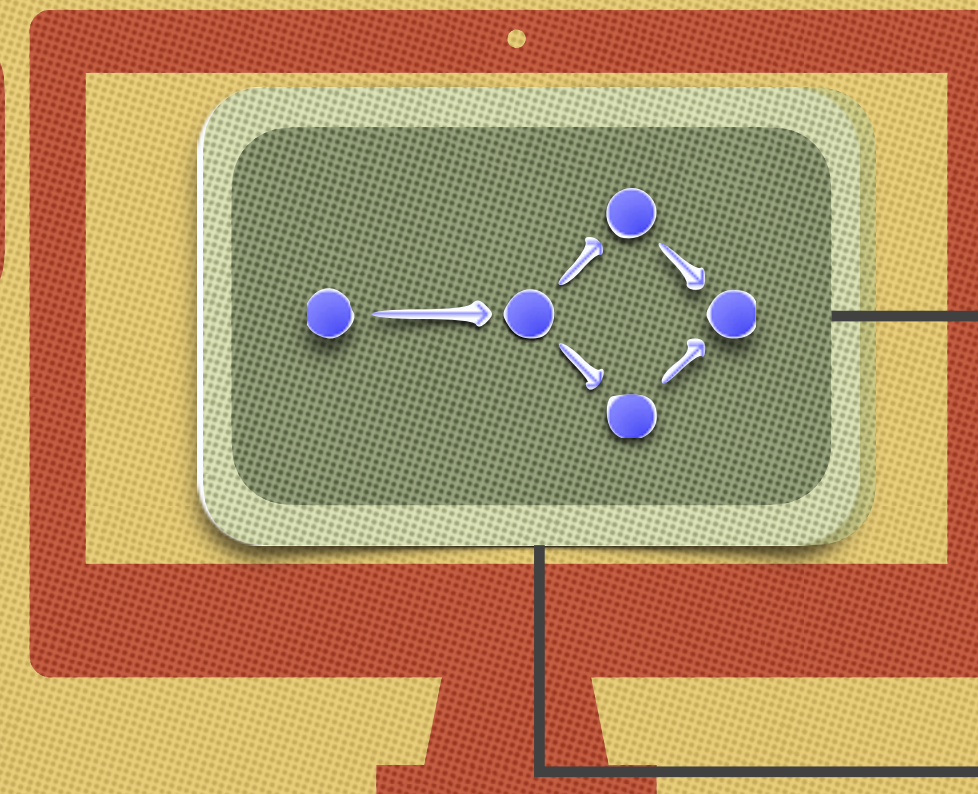


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Online DAQ farm

Computing nodes
Service nodes
Visu / Analysis
Disk arrays

Online Computer room @ LNL

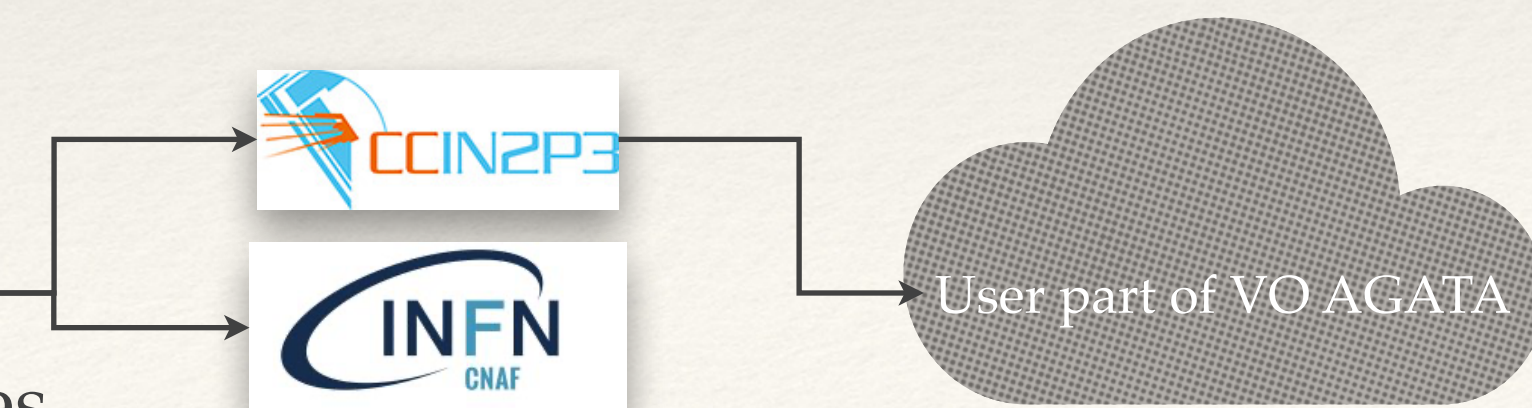
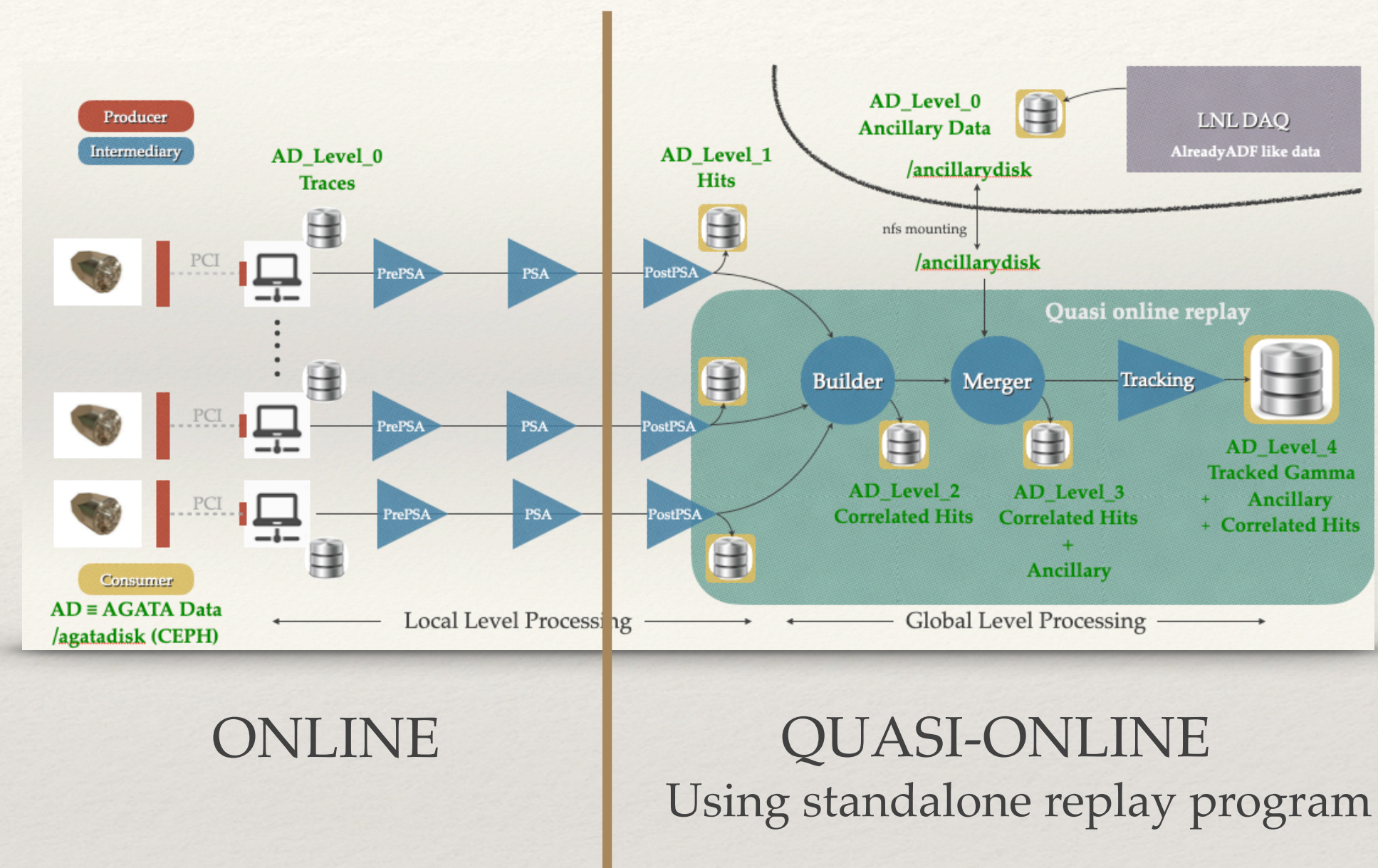
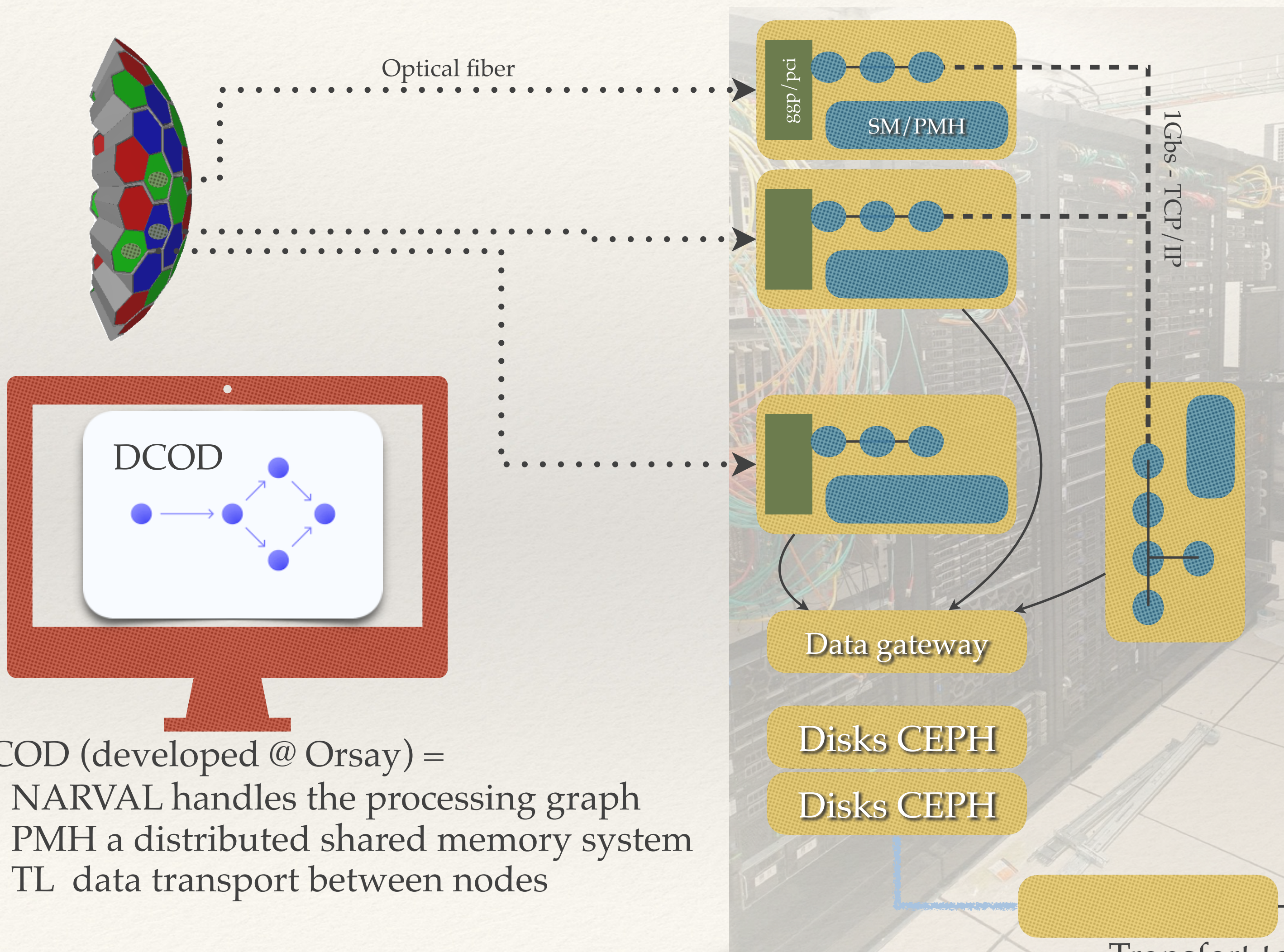
DCOD as a workflow manager

DCOD : NARVAL + PMH [RAM] + TL [Tran layer].

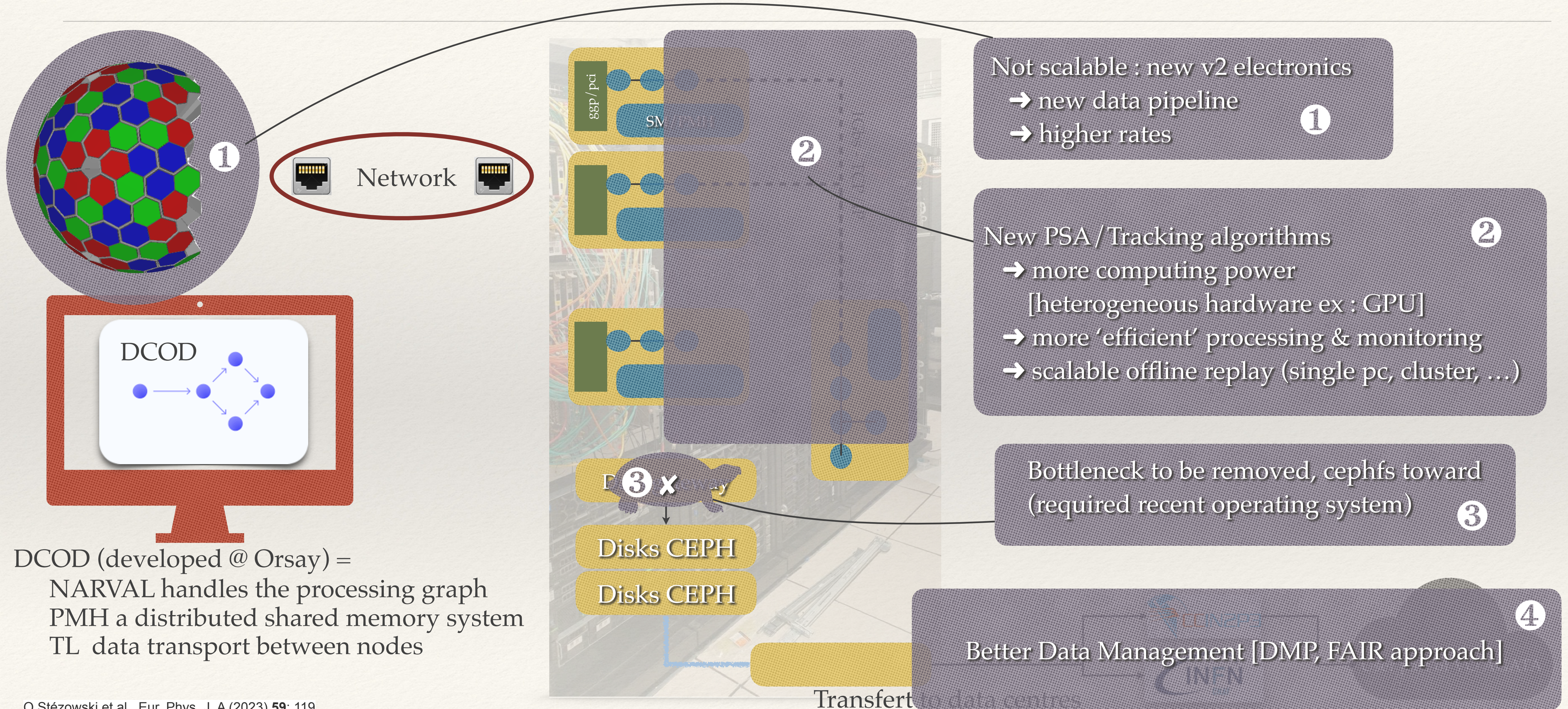
Topology Manager to ensure consistency between
Electronic ↔ DCOD ↔ computers

PEM to handle various operating systems

Current Data Processing Model - Online



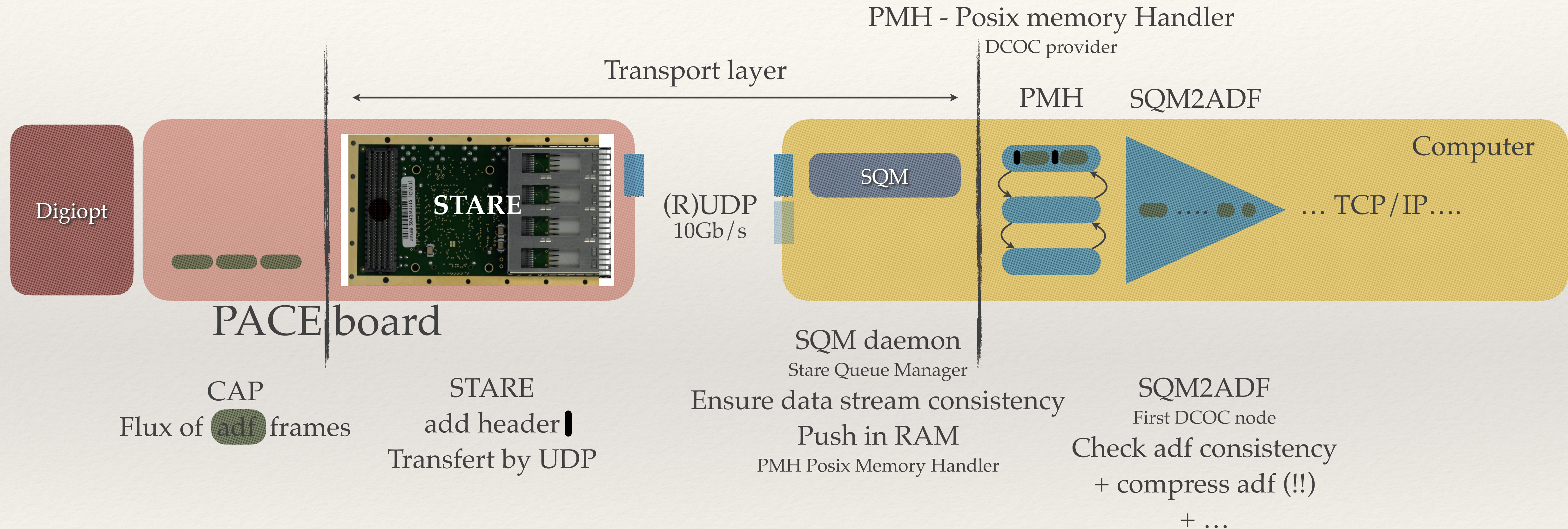
Future Data Processing Model - What to be changed



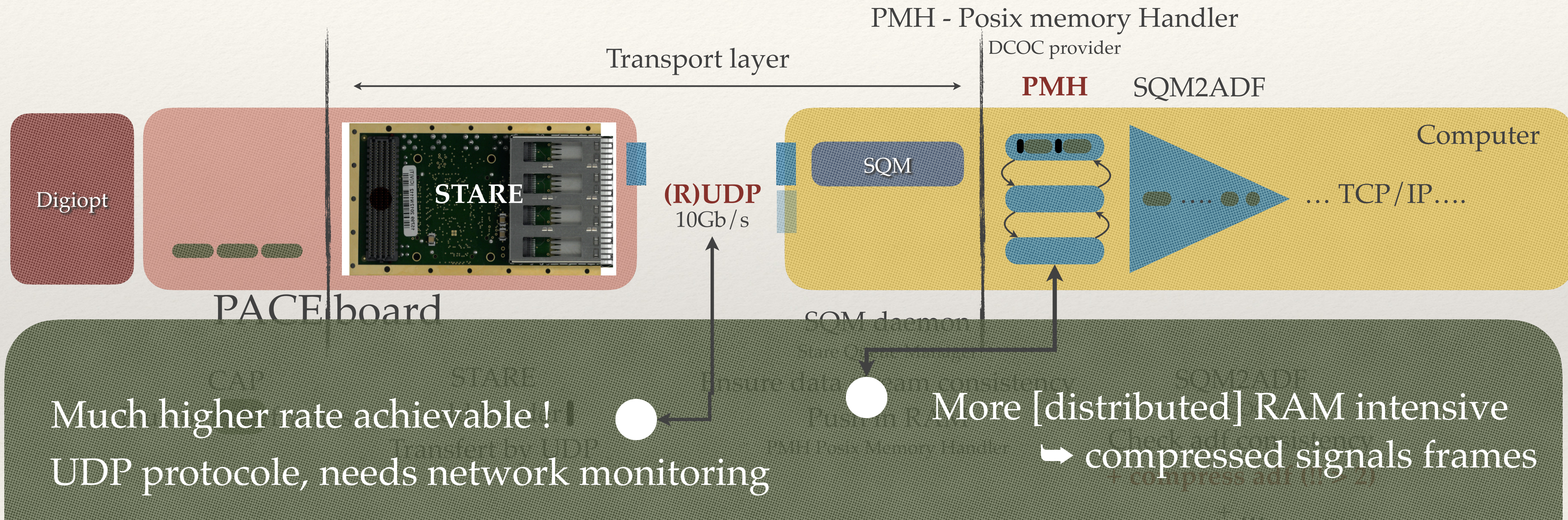
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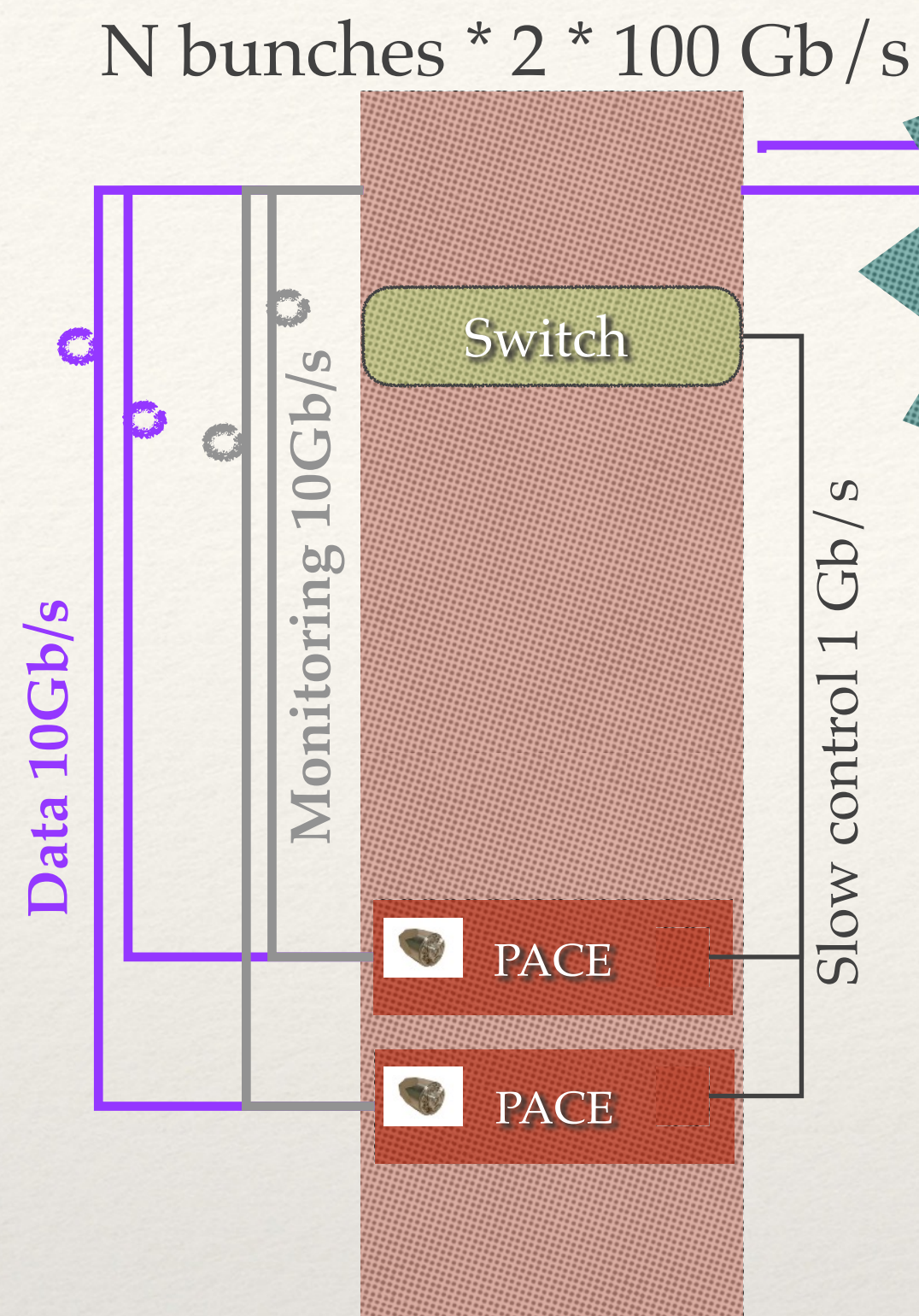
V2 electronics - New data pipeline



V2 electronics - New data pipeline



NETWORK between DETECTOR & COMPUTER Room should handle the flow !



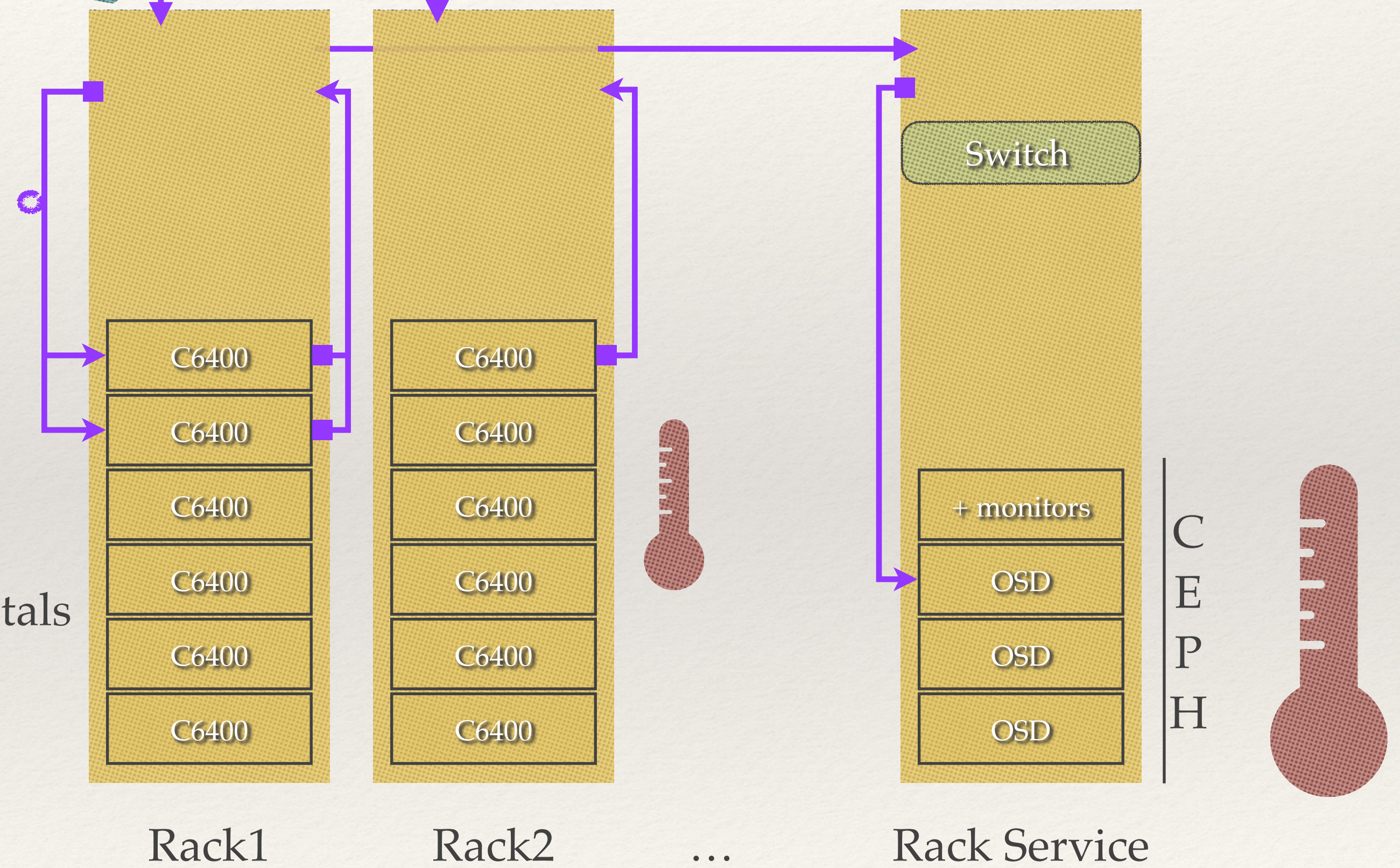
1π : 45 PACE boards
 2π : 90 PACE boards
 3π : 135 PACE boards
 4π : 180 PACE boards

Experimental Hall

Traffic on the network
 should
 be well mastered !!!
Advanced monitoring needed !

1 bunch = 6 C6400 = 24 crystals
 (C6400 = 4 Sleds = 4 crystals)
 1 C6400 = 8k€

Computing Room



Switch
 $32 * 100 \text{ Gbits/s}$
 15k€+ (1k€/100Gb/s)

8k€
 Switch Slow Control



At LNL, new nodes hosted in their Data Center



New data pipeline [+ monitoring] status

The different part have been developed / tested in various environments.

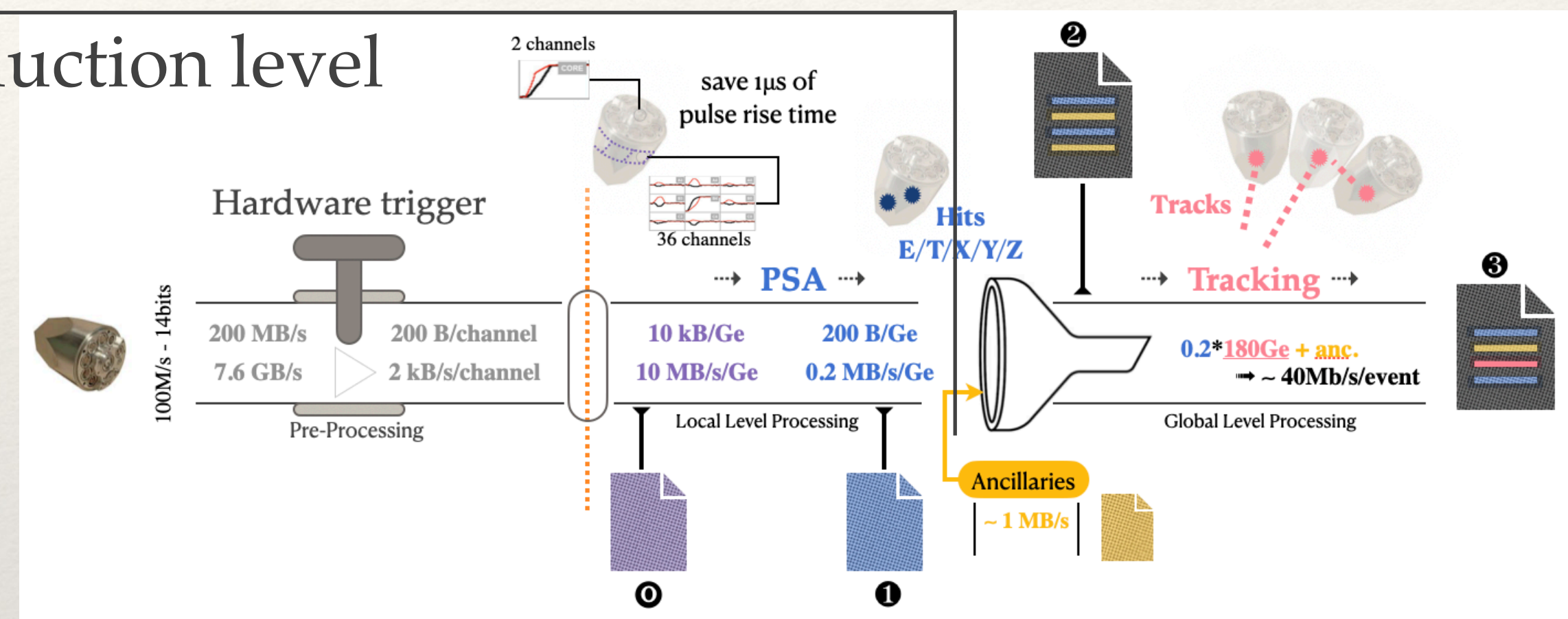
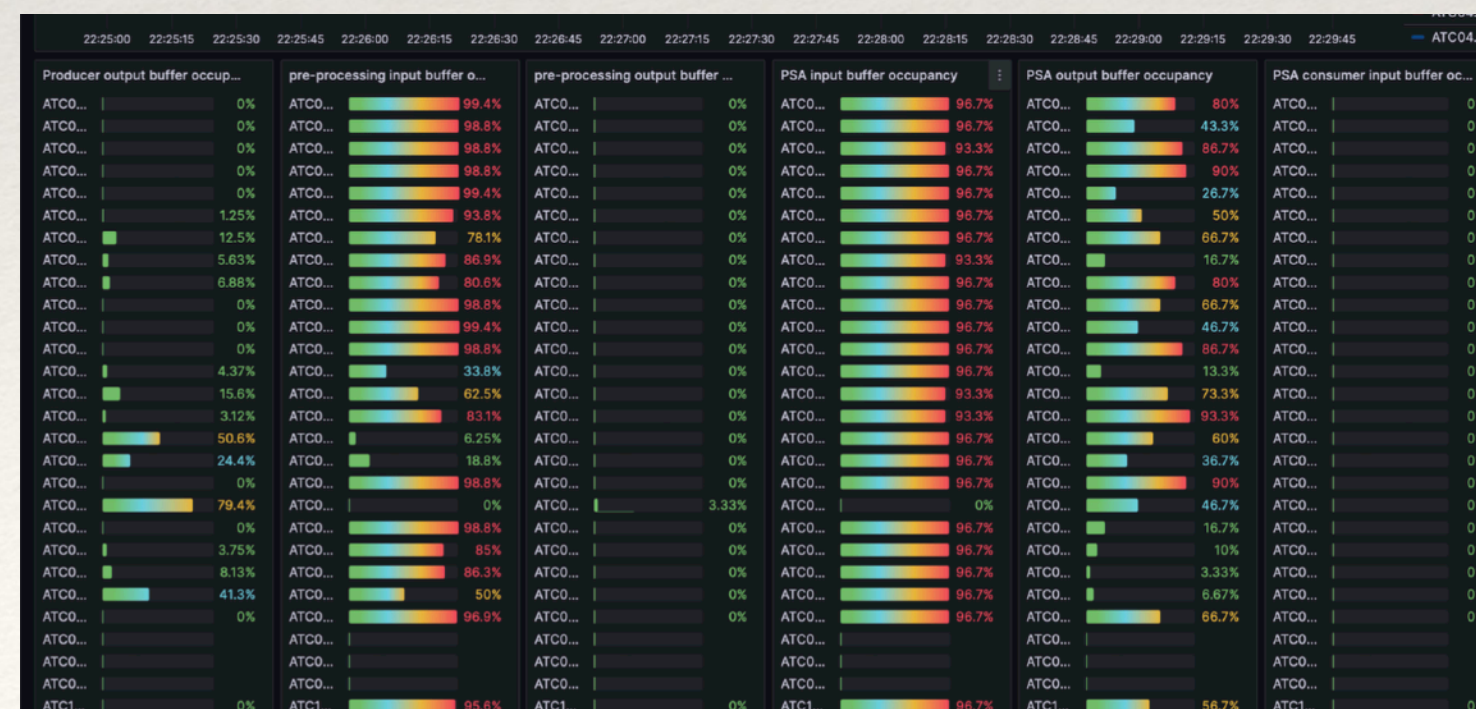
We still need full integration to reach production level

We now use time series databases for monitoring !

Grafana board for V1 electronic@LNL



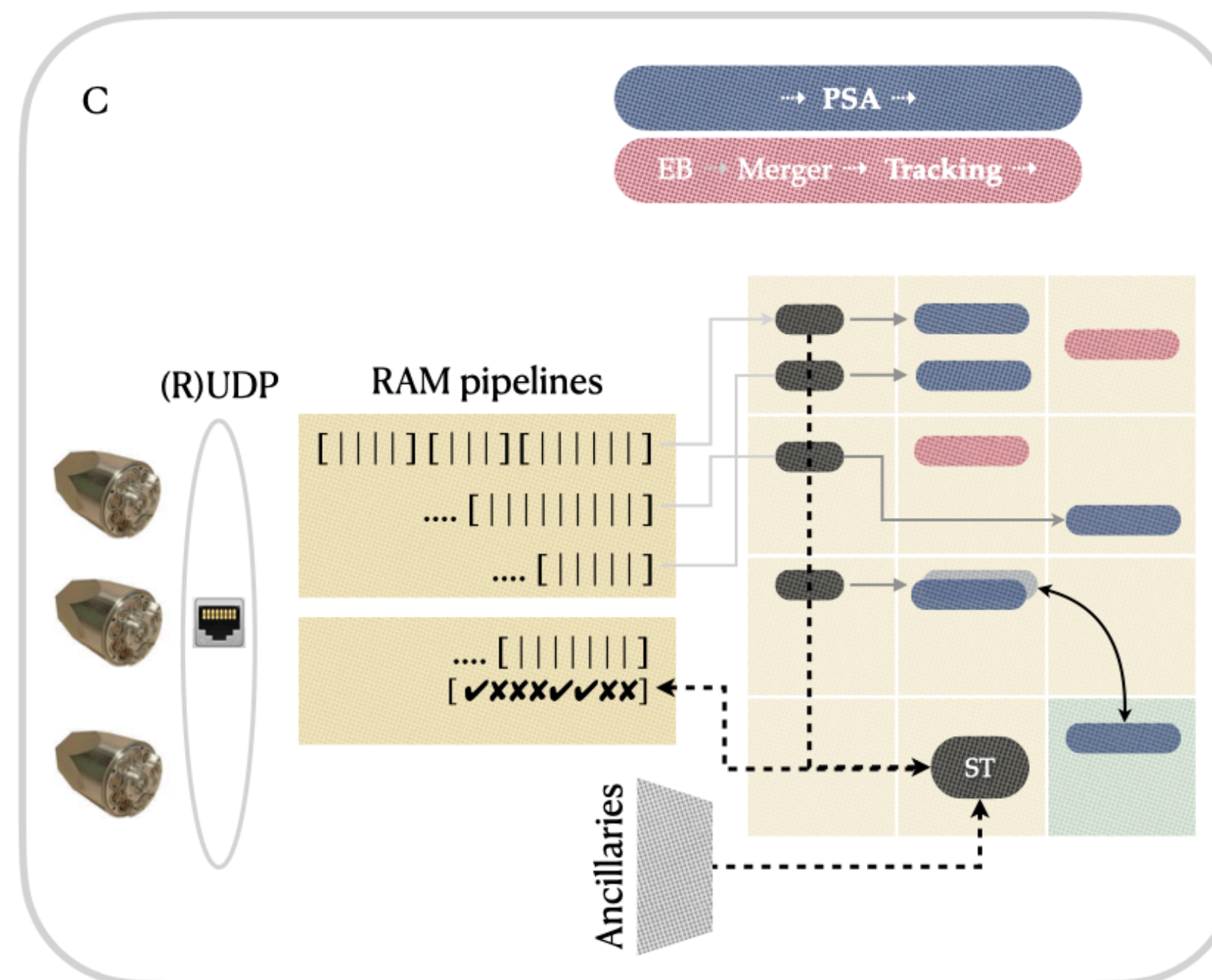
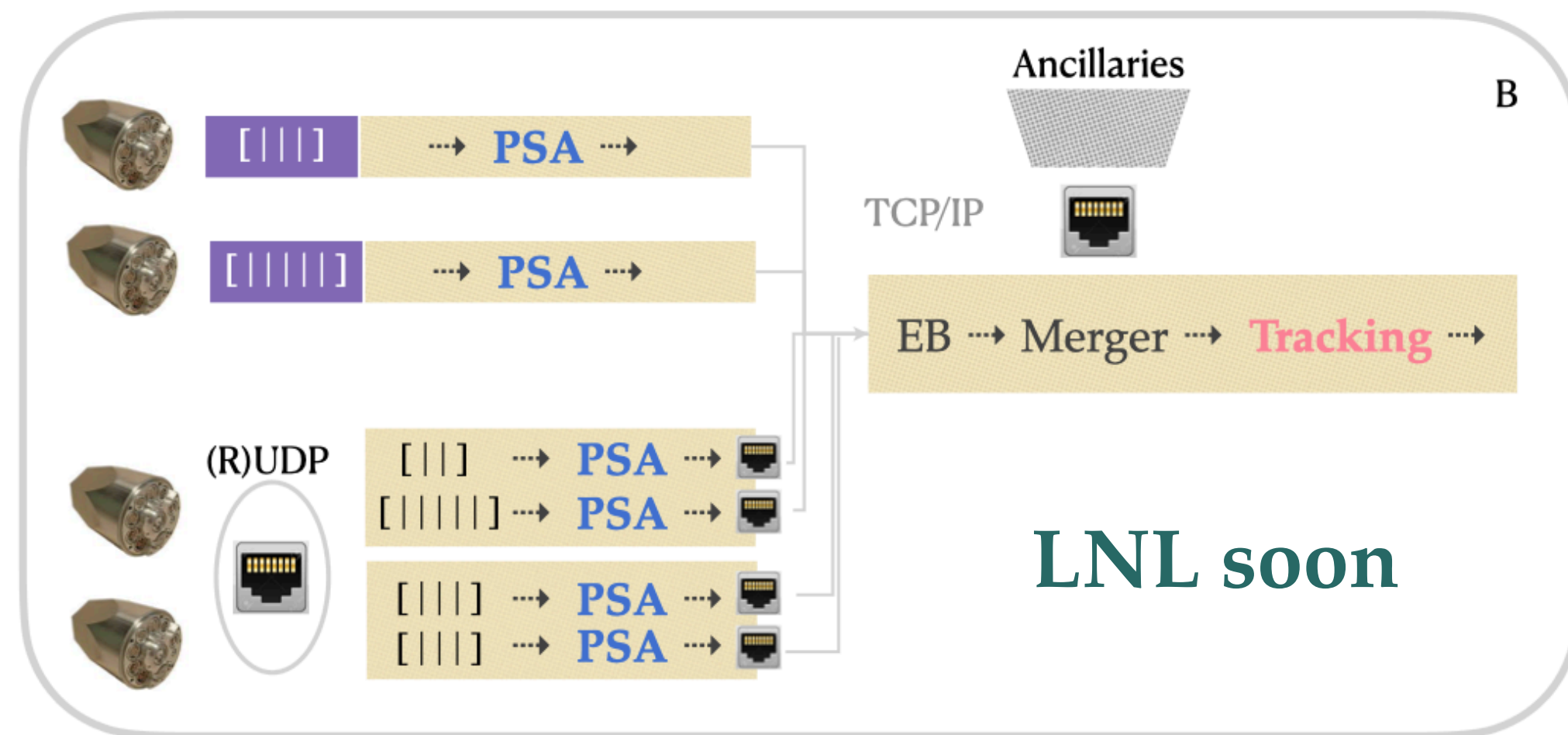
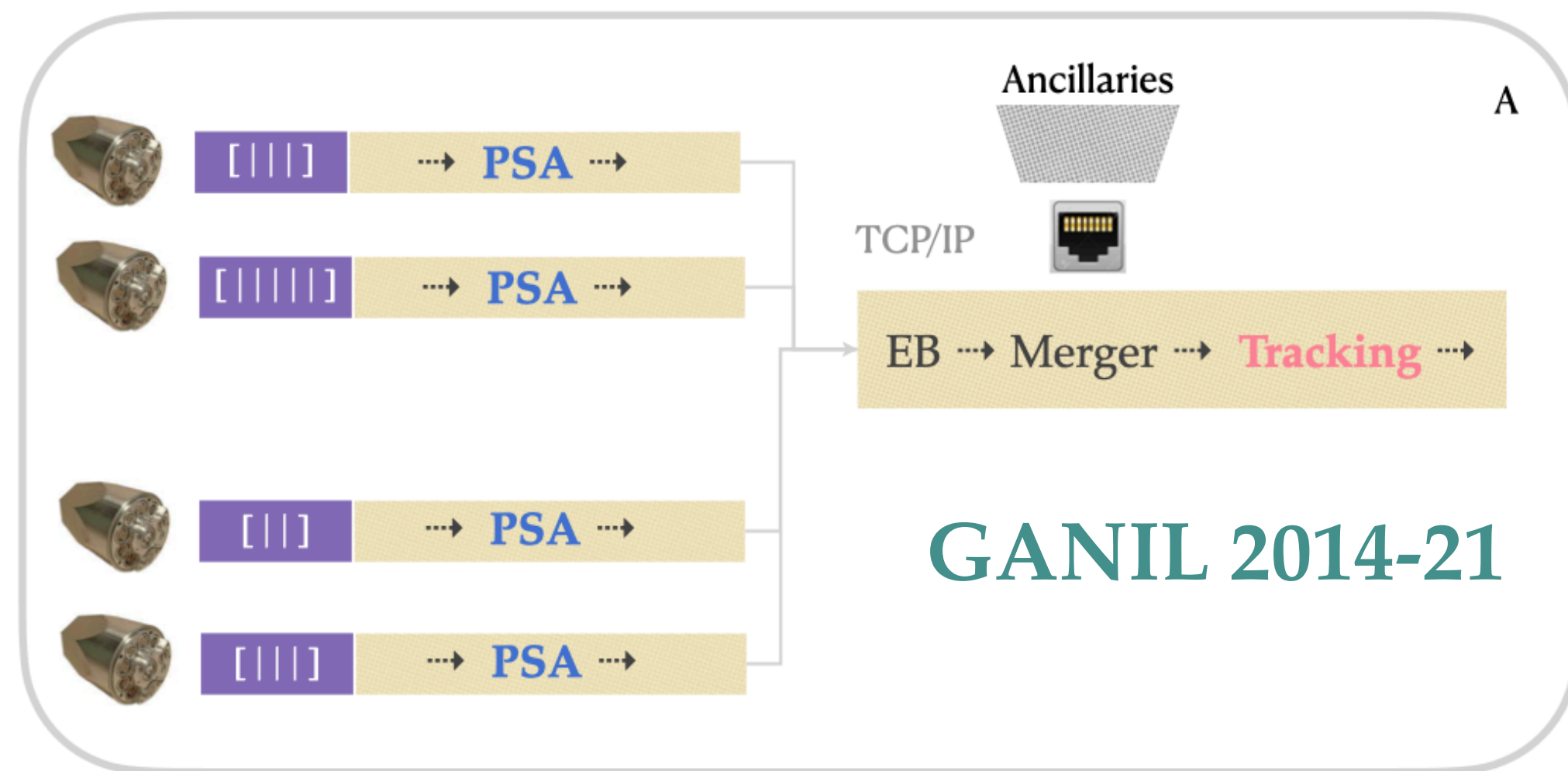
Buffer occupancy in NARVAL workflow@LNL



Fine tuning in PSA nodes, soon in prod.



Toward a new processing farm



A CPU Node

A GPU Node

ST
Software Trigger

PCIe card

[] : block of consecutive inputs

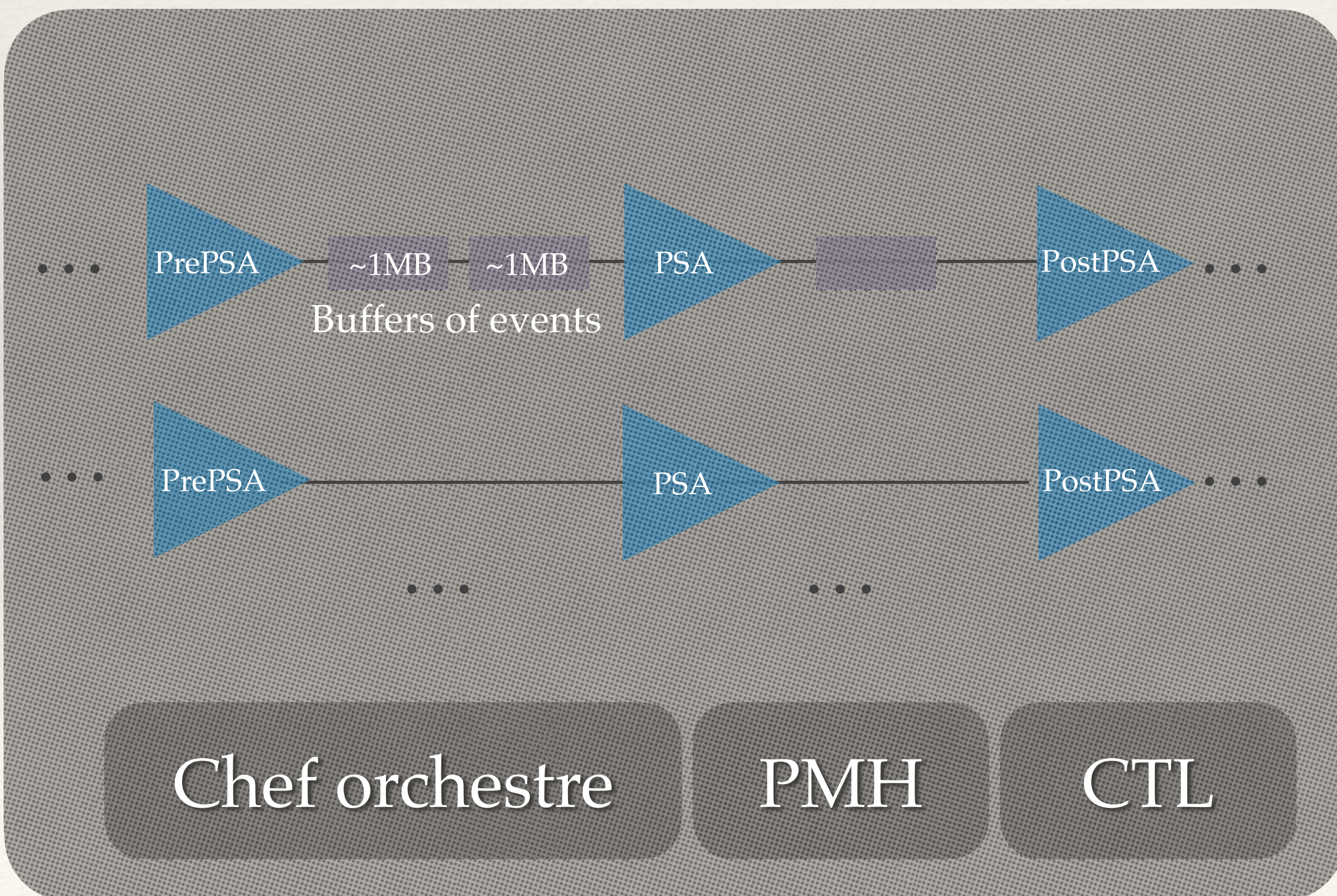
Ingredients

Dynamic load balancing
Heterogeneous HW
[GPU]
Software Trigger

Docker virtualisation
[avoid OS issues]
Docker swarm [cluster]
Portainer

Shared Memory [REDIS]
Message broker [REDIS]

Toward a new processing farm : principle



DCOD for online is a our foundation : handle static part of the processing graph

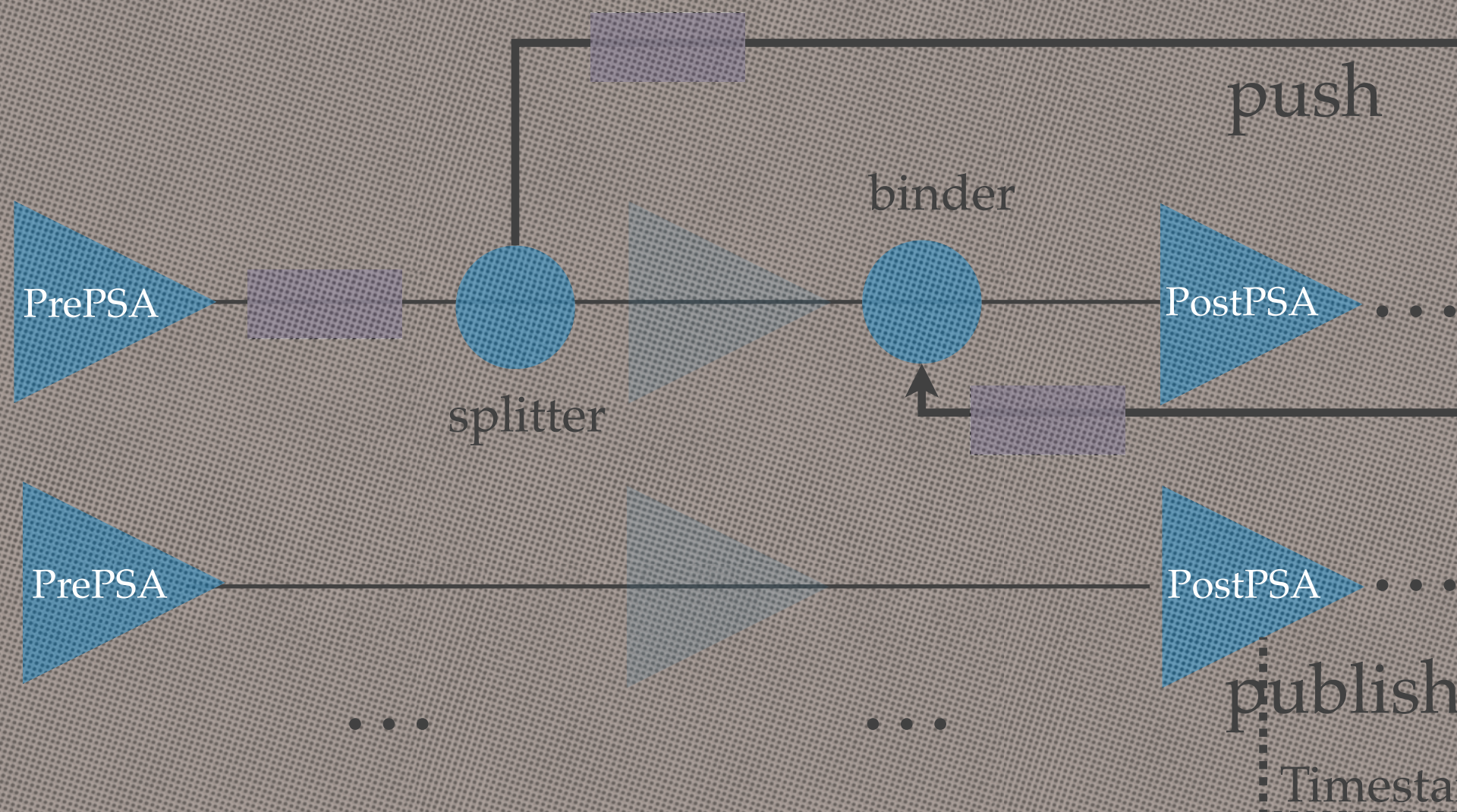
② New Data Processing - general scheme

We use  **redis** as Shared Memory & Message Broker

Open software
High performances

SM MB

We add micro services thought containers (docker, docker-swarm)



Chef orchestre

PMH

CTL

DCOD for online is a our foundation

SM / Redis

SM / Redis

MB / Redis

full monitoring control
on / off / reset ...

containerized app.

PSA

PSA

PSA

one can run
as many as
needed with
portainer

docker-swarm
portainer

subscribe

UI

Time series DB



AGASPY



graphana

General scheme

Message Broker
MB

It is scalable
It can handle GPU
It allows Software Trigger
i.e avoid running PSA

Chef orchestre

PMH

CTL

DCOD for online is a our foundation

full monitoring control
on / off / reset ...

UI

AGASPY

graphana

Conclusions

2021-25 main developments toward a HPC online farm performed

New pipeline (v2 electronic), new monitoring [time series DB]

Dynamic load balancing on top of DCOD

We need to test / debug / improve / benchmark

...

For the next GANIL campaign

The infrastructure [Hard / Soft] will be 'bigger'

With already have experience of merging data

It could be adf based or @ final ROOT level

...

We have to learn dealing with 'low' counting rates

We have started with EXOTIC beams @ LNL

....

We have a dedicated rack for that @ Orsay

