Integration of CALICE DAQ in common DAQ

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Rationale of SW for common DAQ

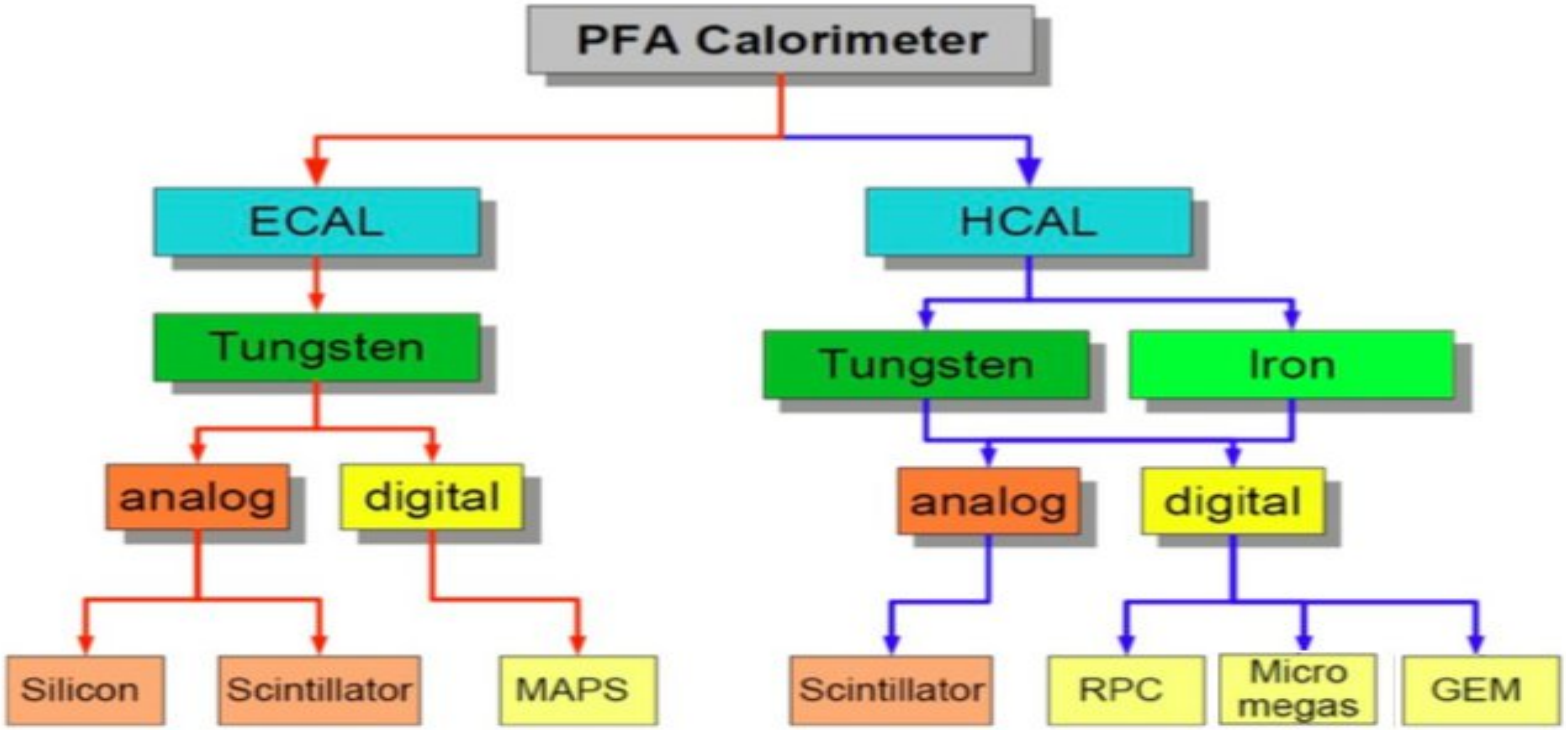
Merge Acquisition code with minimal modifications

- common global control → EUDAQ
  - ⊃ global monitoring:
    - DAQ: data fluxes, event numbers, number of readout elements
    - Physics on a subsample (tuned not to slow the DAQ):
      - » Histograms of critical quantities
      - » event display of a sub-subsample
- common data containers → LCIO
  - data stream should not necessarily go on a single computer (bottleneck)
  - but at least minimal data for monitoring

Sociology: within CALICE the DAQ SW strongly diverged (last 3 years).

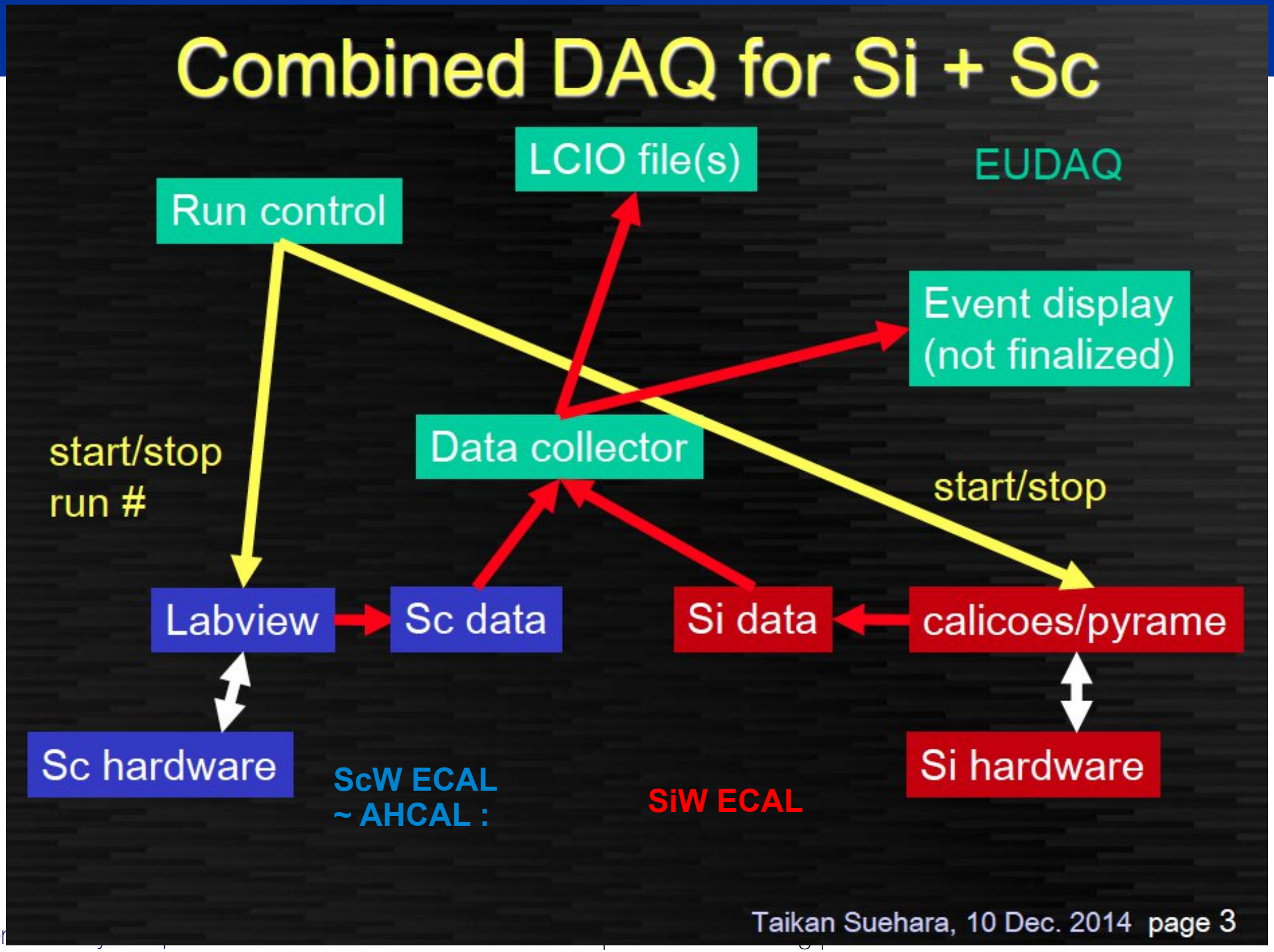
- Base from from 1st generation (ex: ConditionDB, Reconstruction framework) exits
- Technological prototypes (new HW) require new low level SW (interface to HW)

CALICE DAQ landscape



SKIROC2	SPIROC2	HARDROC / MICROROC	⇐ Same interface
ASU	EBU / HBU	``PCB''	PCB
ECAL-DIF	AHCAL-DIF	SDHCAL-DIF	InterFace
HDMI+HDMI	HDMI+USB	HDMI+USB	Connection
PYRAME/CALICOES	LabView	XDAQ	SW
LCIO	Raw/LCIO	LCIO	⇐ Same data format
LLR (Palaiseau)	*Kyushu + DESY*	*IPNL (Lyon)*	

Integration with EUDAQ

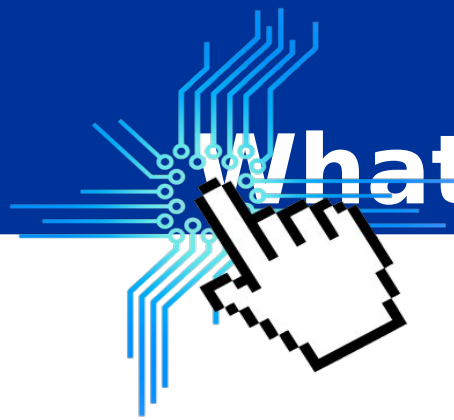


CALICE-SiW ECAL

Early version used here

Re-written last summer and released: Frédéric Magniette & Miguel Rubio-Roy (LLR)

- a “generic” low level SW → PYRAME
- a CALICE SiW-ECAL specific part → CALICOES



What's new in Pyrame ?

New configuration module : keep in real time an analog of every configuration values in the system ⟶ able to save the running configuration at any time

New bindings : C++, Labview, Xdaq

New generic class : ps (power supply), pg (pulse generator) to reduce the specificity of the drivers

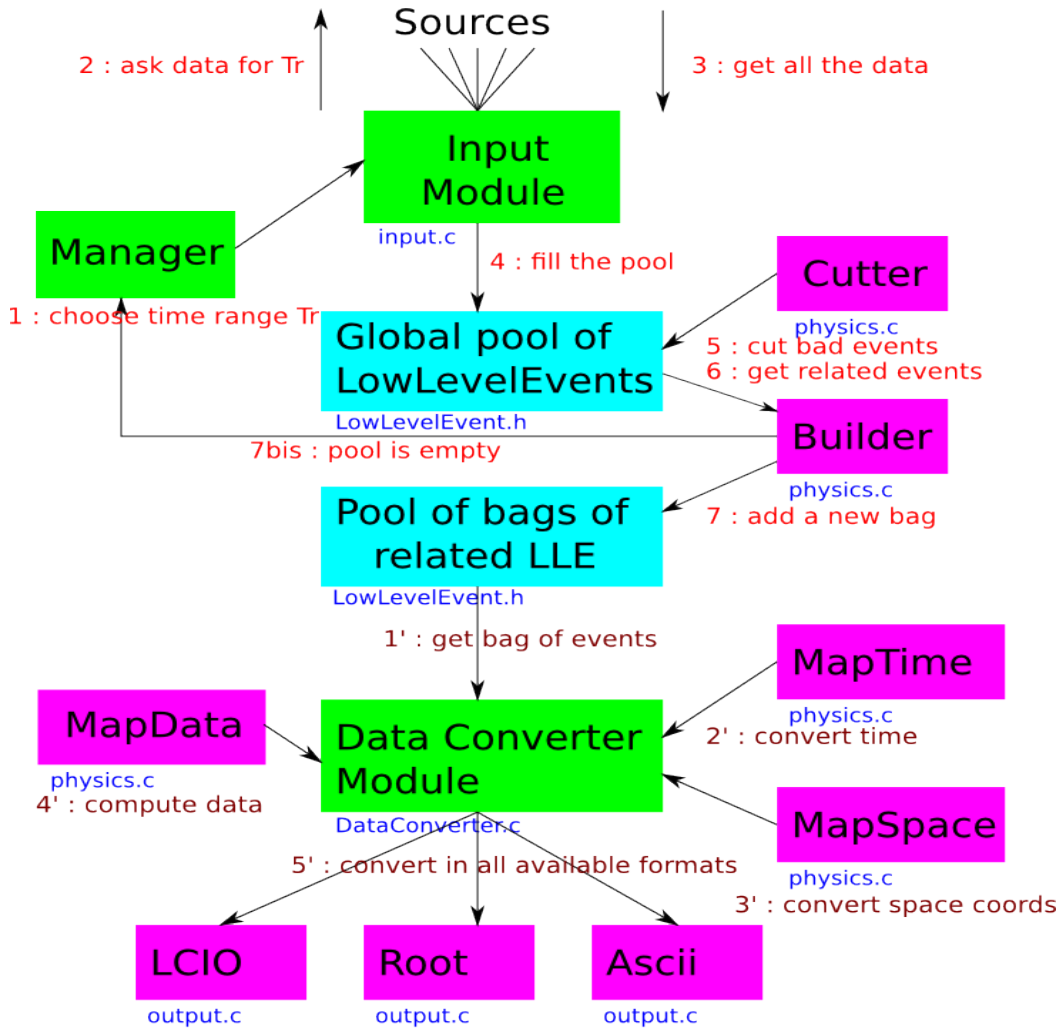
Lot's of new drivers (oscilloscopes, new power supplies, new pulse generators)

The acquisition time is now multi-media through a plugin system supporting (Raw ethernet, TCP client and server , UDP and USB)

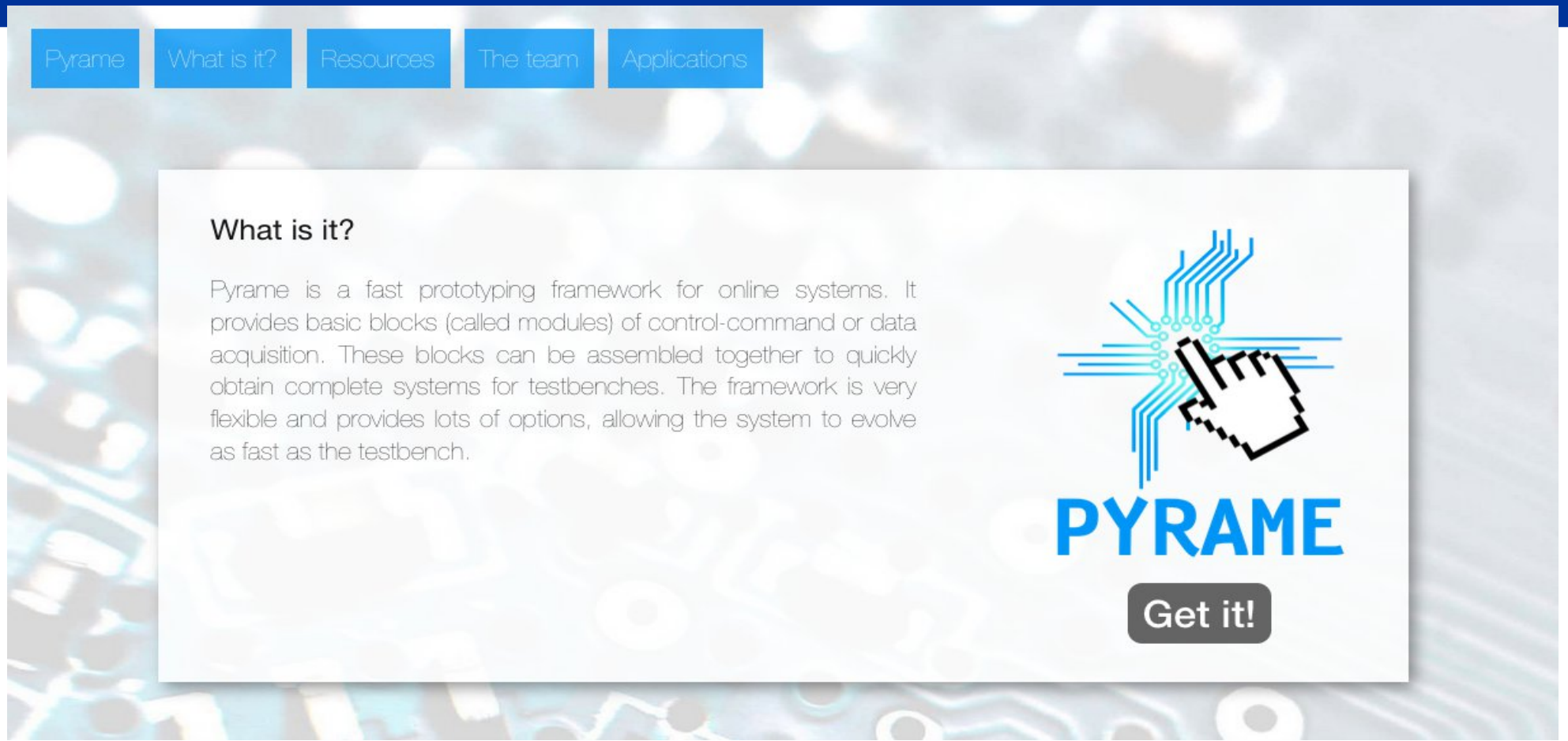
A time tagging system has been implemented to share clock between multiple channels (extraction and injection)

The CalXML tool is now completely generic (not related to calicoes anymore)

What's new ? : the event builder



What's new in Pyrame ?



Complete online documentation

- Available as open-source software (LGPL Licence): http://llr.in2p3.fr/sites/pyrame/

Some publications (TWEPP'13, IN2P3 Computing letter)

External users : CPPM in Marseilles

What's new in Calicoes ?

Lot's of internal modifications to cope with Pyrame V2

Lot's of modifications in the high level part to ease the use :

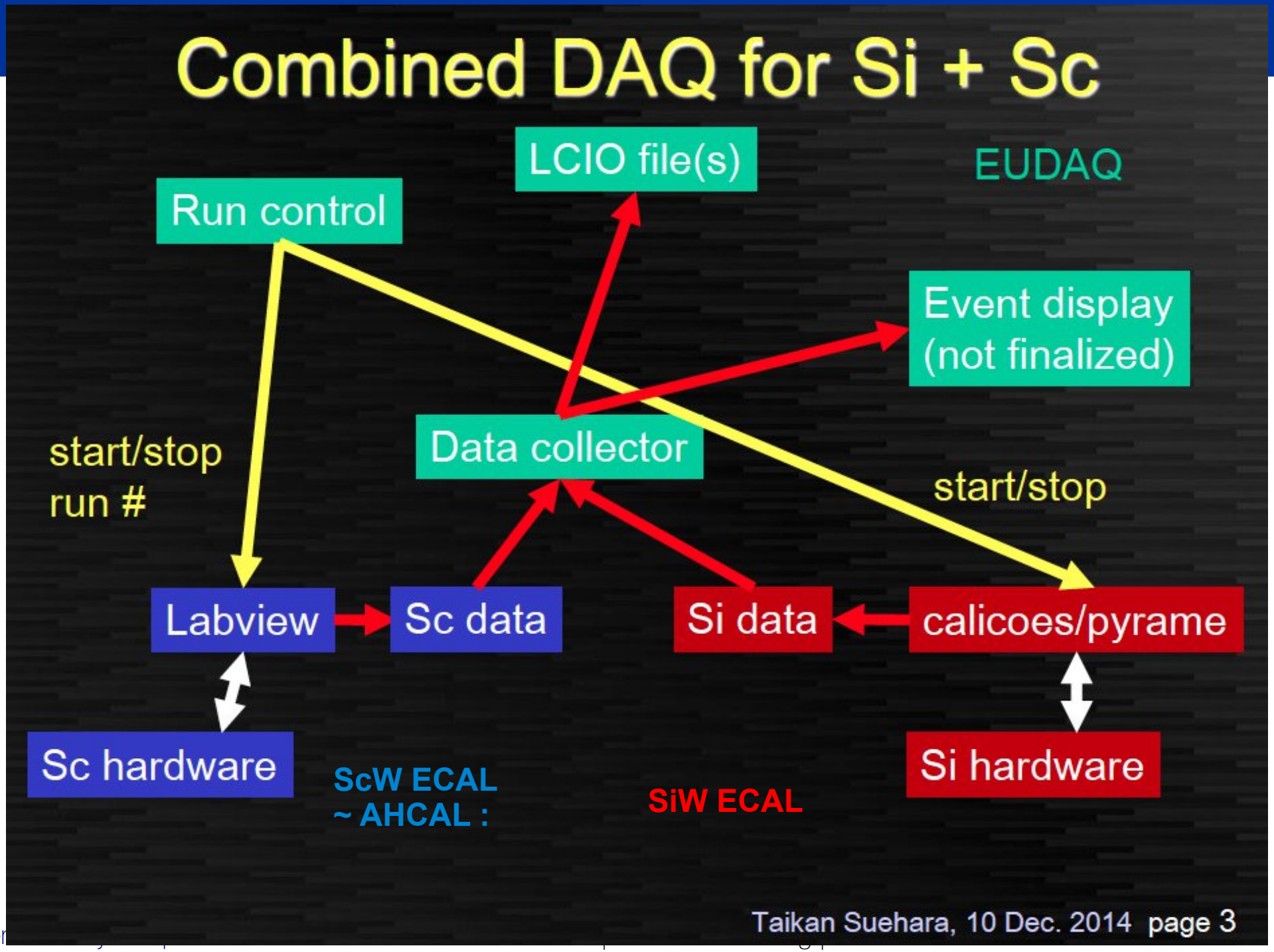
- Removal of the OFF state, unused
- Full support of the **multiple PCs acquisition**
- New **loading/saving configuration primitives** through integration of Pyrame V2 config module. Ability to dump the whole configuration in a single file at any time
- Automatic configuration saving at startacq
- New naming system of the components to be able to call actions on the slab names instead of the dif number
- A **GUI** for the high level part of the detector (state machine and loading/saving config + statistics)

The Software test-beam

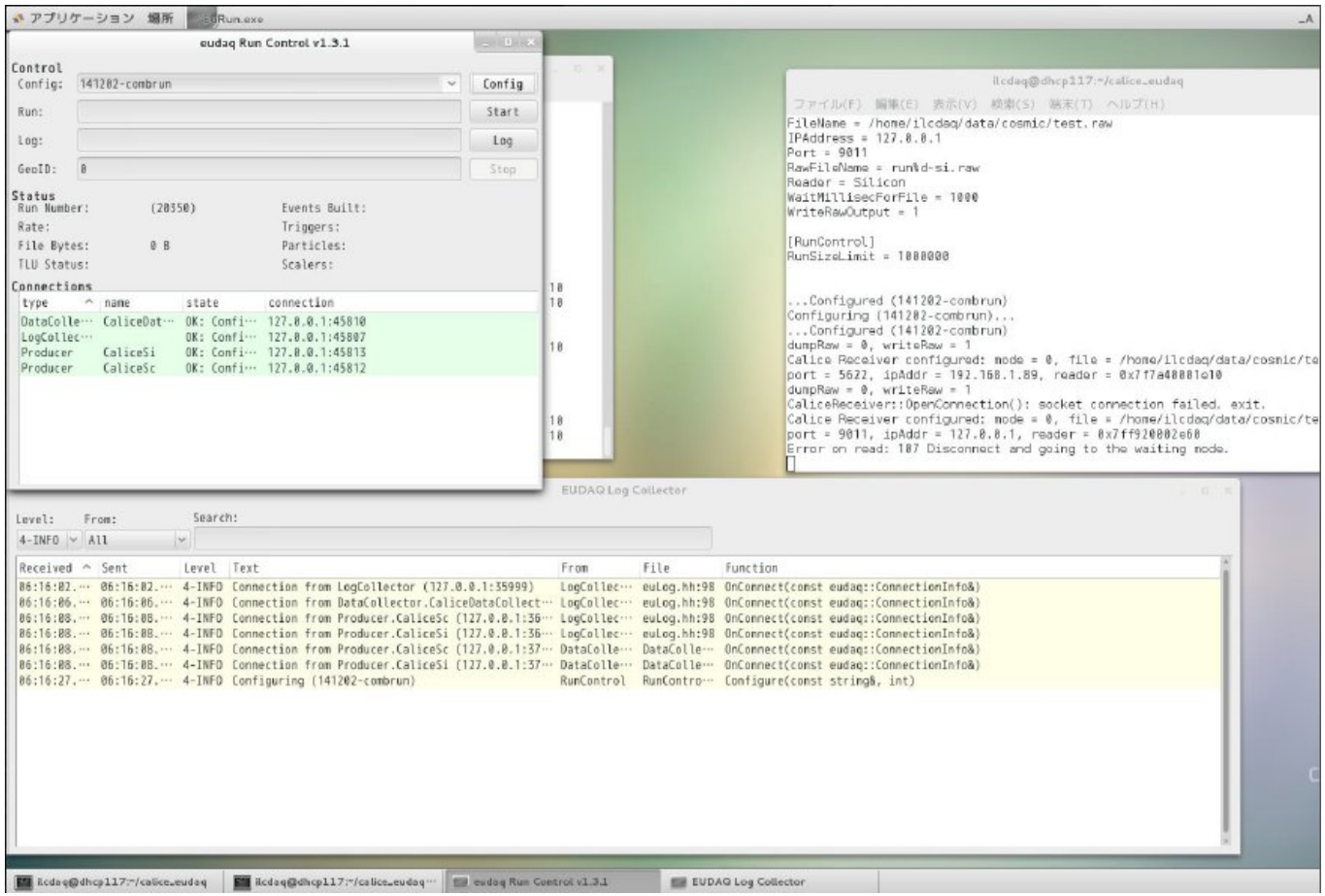
Cosmic test-beam :

- Basic test (1 slab) : success
- Stress test (6 slabs on a GDCC) : GDCC is very robust (0% of packet loss)
- Repartition test (2 PC with 2 GDCCs and 3 slabs for each) : full validation of the distributed scheme
- Frequency scanning (scan the spill freq and see corruption status) : done (no analysis yet)
- Calibration survey :
  - fast calibration algorithm to pycaldaq
  - Fully automatic S-curves implementation
- Complete cosmic calibration :
  - Scurve with noise
  - Comparison of the different calibration algorithm
- Cosmic data taking (if it remains time)

Integration with EUDAQ



EUDAQ in action with calos



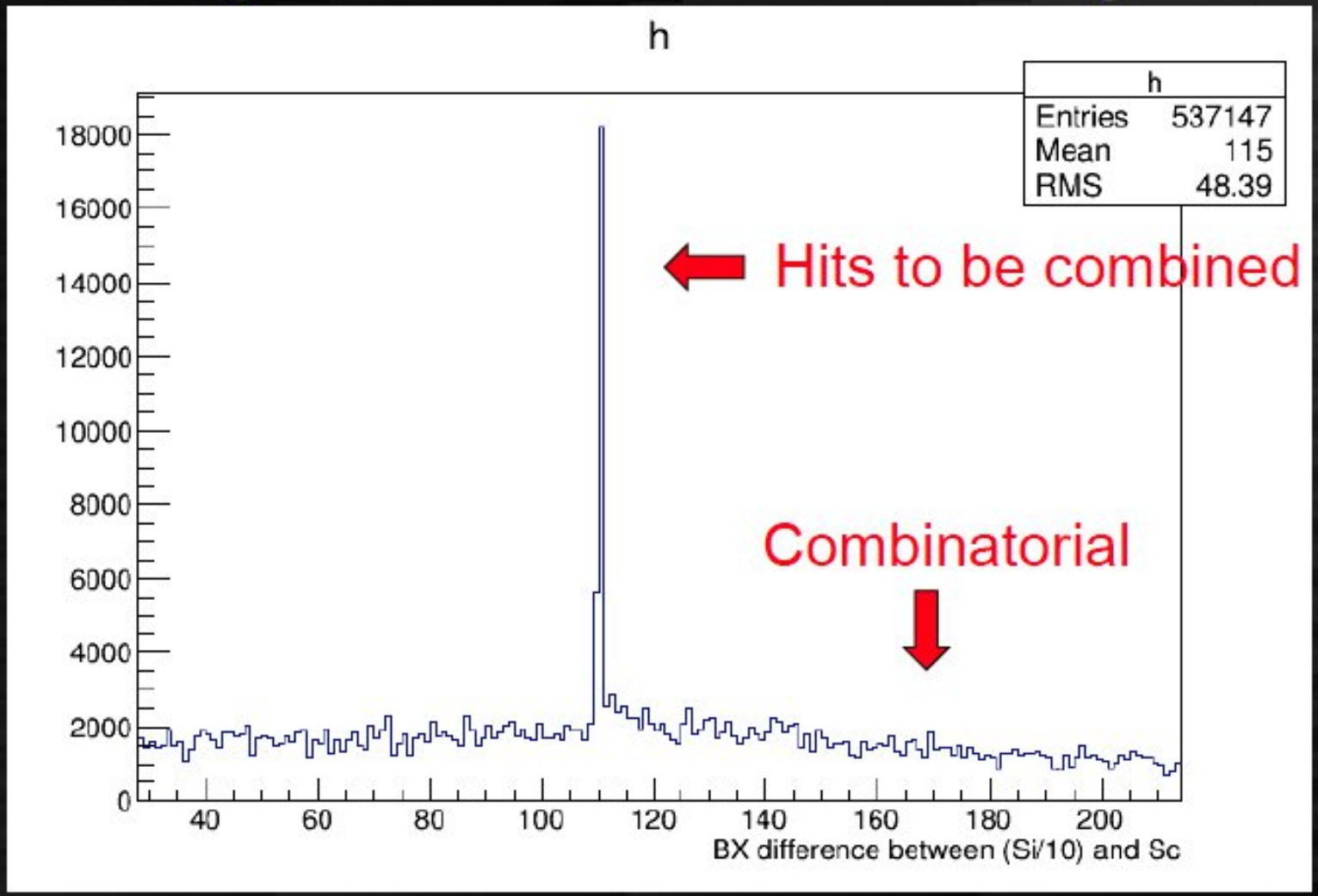
Technically Succesfull Combined Test Beam at CERN last week

- 1 layer of SiW ECAL (ASU)
- 3 layers of ScW ECAL (EBU)
- 12 Layers of AHCAL (24 HBU)

Using EUDAQ v1.3.1 (v2 “too complicated”)

Courtesy of T. Suehara

A quick result – BX sync



Muon beam, All Sc hits to be compared with Si hits
~ 1000 Readout cycles accumulated

Steps forward

After much circonvolution convergence process seems to resume...

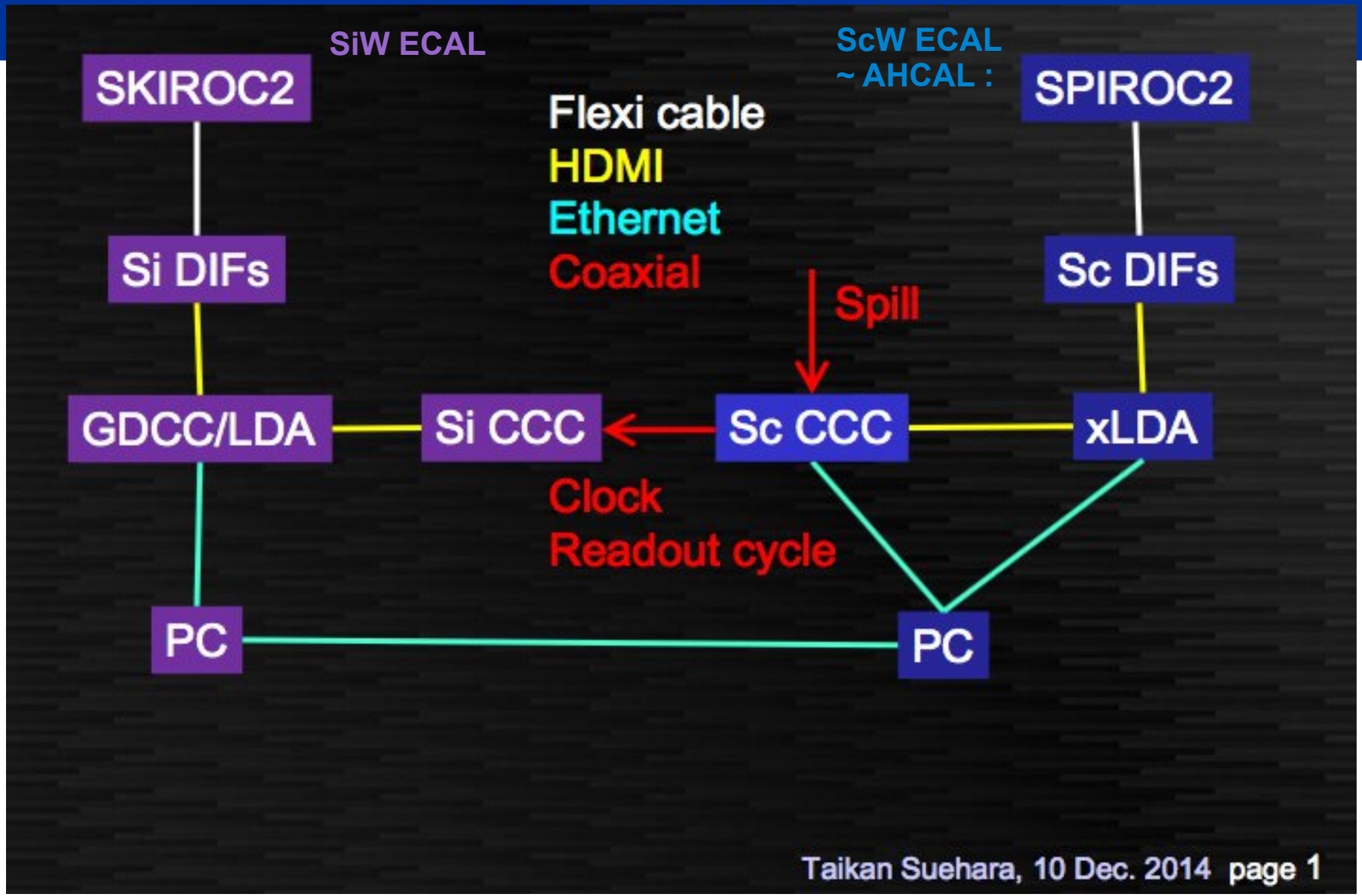
- A DAQ Task Force has been set-up (launch meeting 1 hour (!) ago) to recollect the effort within CALICE.

Technically:

- Move to EUDAQ2
  - Integrate lastest version of PYRAME+CALICOES
  - Develop Monitoring and Event Display
  - Interface with historic CALICE tools (CondDB, logging, ...)
- Develop Configuration tools
  - Several tools exists: to be extended for larger set-up

Extras

HW sync


SiW ECAL
ScW ECAL
~ AHCAL :
SKIROC2
SPIROC2
Flexi cable
HDMI
Ethernet
Coaxial
Si DIFs
Sc DIFs
Spill
GDCC/LDA
Si CCC
Sc CCC
xLDA
Clock
Readout cycle
PC
PC
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Synchronization of clock/spill

- Independent CCC board for Si and Sc
  - Difference on fast command specification (should be fixed later)
- Clock - Sc clock output connected to Si
- Spill & busy
  - Sc CCC creates output of “Readout cycle (RC)” TTL signal by (Spill & !Busy) to Si CCC
  - All busy from Sc layers combined at Sc CCC
  - Si converts RC up to start, down to stop
  - Si busy is not treated