

Report from the Technical Board



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CALICE Collaboration Meeting Shinshu March 2012

Role of Technical Board

- Important executive body of CALICE
- Keeping track of activities
- Forum of experts of different detector technologies
- Foster collaboration between different projects
- Identification of needs for co-ordination and resources
- Technical preparation of strategic decisions to be taken by CALICE steering board
- TB can (and maybe should?) be the main communication channel between CALICE and testbeam sites
At least when preparing major beam test
At least it has to ensure that this communication happens

Since Heidelberg

Once again busy months ...

- Large scale beam tests (i.e. 1m³ prototypes)
 - RPC DHCAL
 - Physics Prototype of W-HCAL
 - SDHCAL prototype (including Micromegas)
- Planning of running in 2012 (CERN, DESY)
 - CERN: SDCHAL, WDHCAL
 - DESY: Ecal, AHCAL
- DAQ2

Configuration RPC DHCAL Nov. 2011

50 layers, no absorber

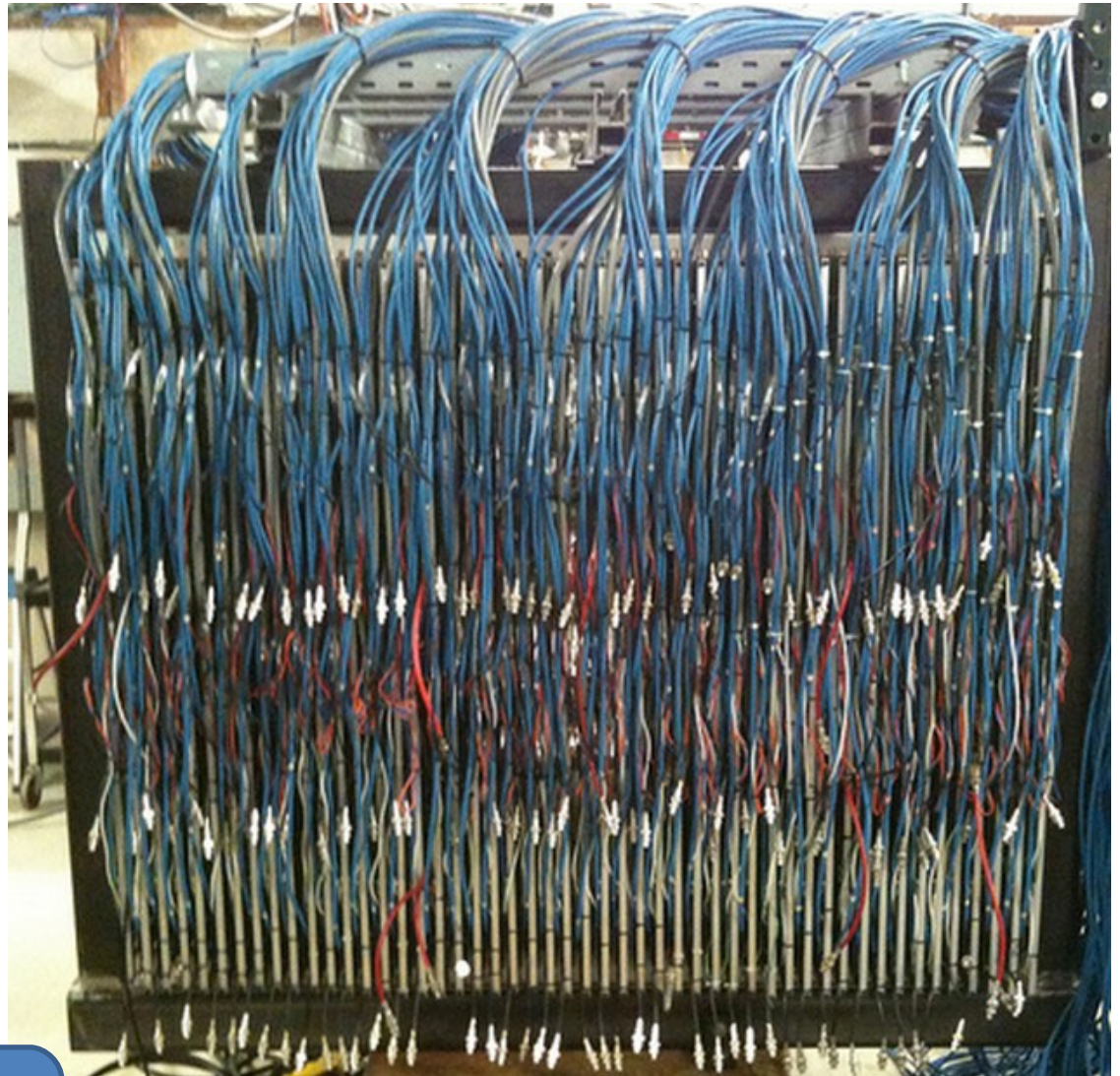
-> **13 X_0**

-> **1.3 λ_I**

460,800 readout channels

- Successful data with secondary Beam
- No success with tertiary beam (very small energies)

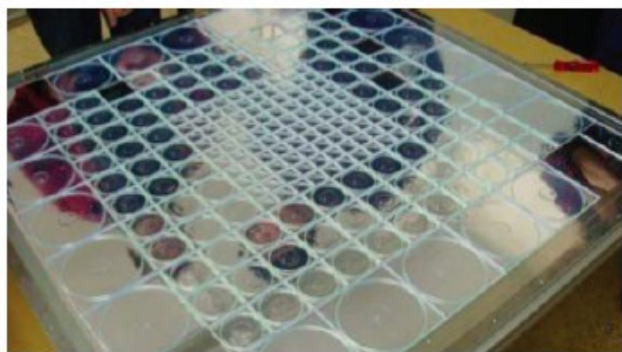
This marks the end of a successful test beam campaign at Fermilab



CALICE input on analogue and digital calos

Whcal Prototype

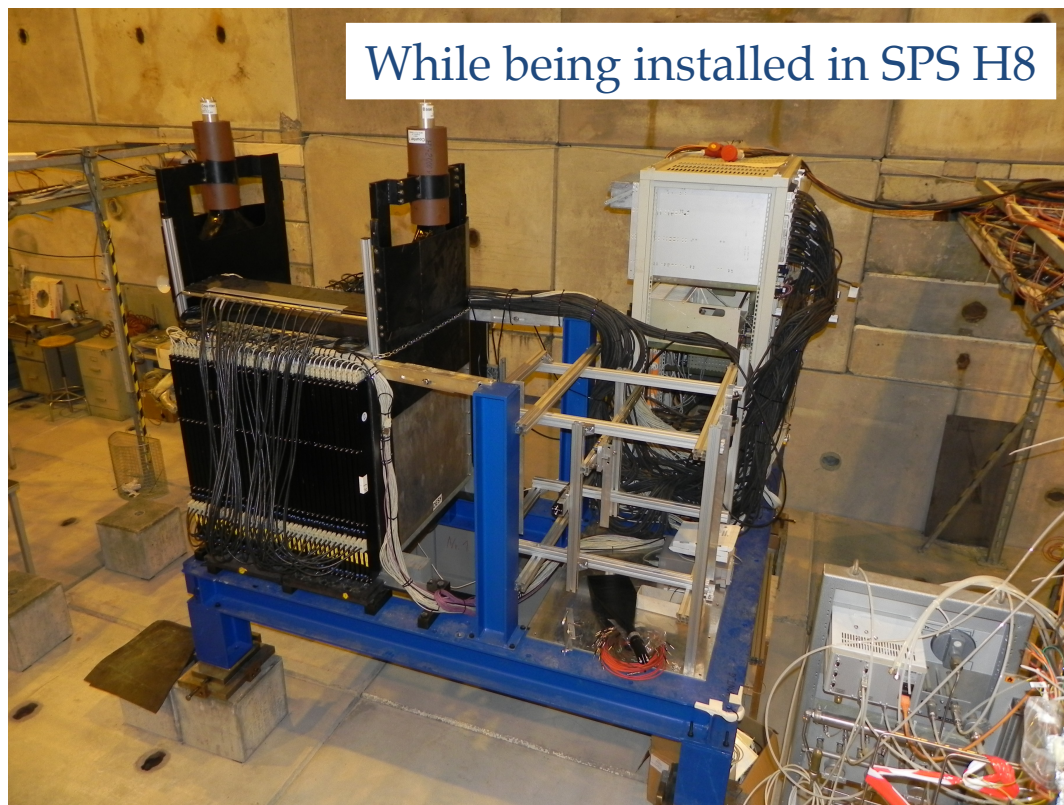
Main purpose: Validation of Geant4 simulation for hadronic showers in tungsten



Scintillator tiles 3x3 cm² (in centre)
Read out by SiPM

Scintillator will be replaced
by RPCs in 2012
→ WDHICAL

Current HCAL setup has 38 W layers.
Including active material this is $\sim 4.8 \lambda$



Whcal stack hosts also T3B counters

Overview on 2011 running with the WHcal

- Events taken in September run (all runs)
 - 11 M events in pion runs.
 - 2.2 M events in dedicated muon runs.
 - 1.1 M events in electron runs.
 - i.e. 2.38 M events /day (all runs)
 - **Kaon sample!!!!**
- All 2011: 3 runs or 20 days of run, all “good” runs
 - 26.2 M events in pion (mixed) runs.
 - 5.0 M events in dedicated muon runs.
 - 2.4 M events in electron runs.
 - i.e. 1.68 M events /day (only “good” runs)

Completed full 2011 programme

DAQ system overview

(Detector Unit : ASICs)

DIF : Detector InterFace connects generic DAQ and services

LDA : Link/Data Aggregator fans out/in DIFs and drives links to ODR

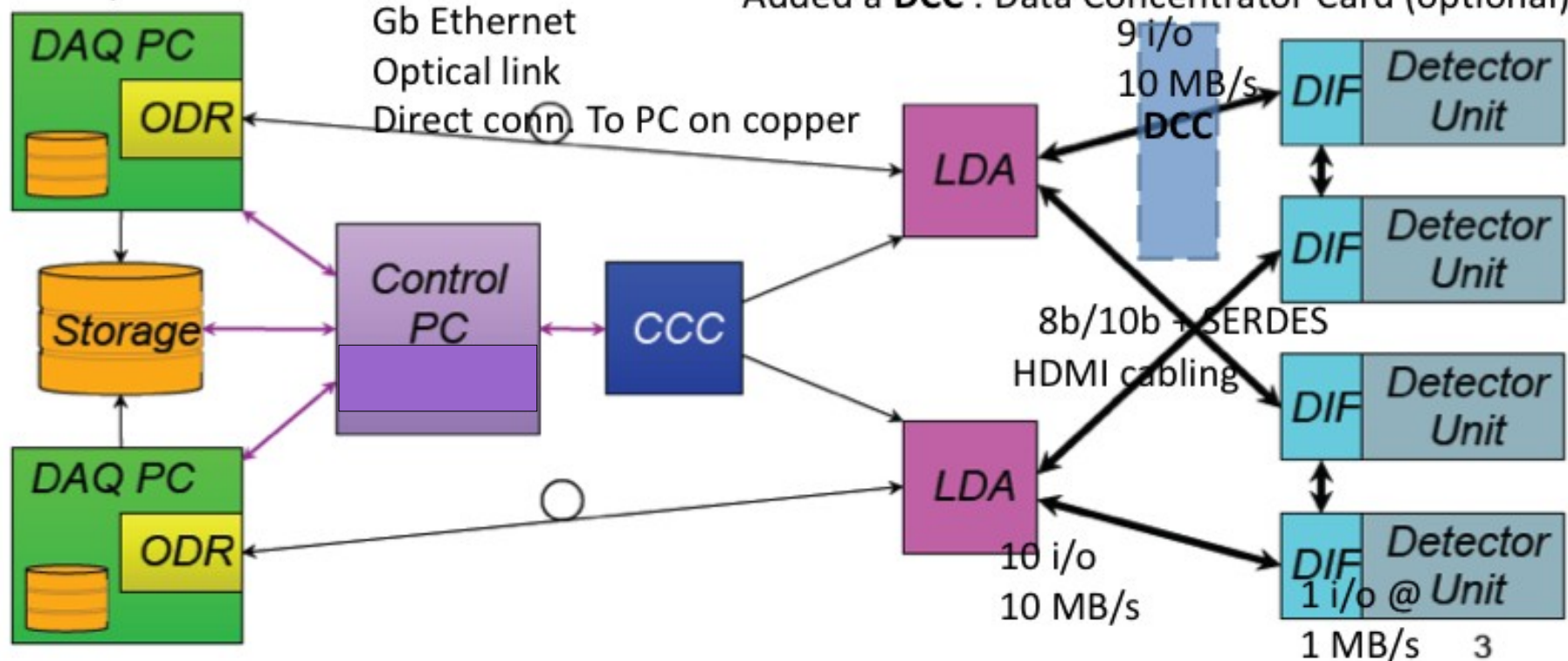
ODR : Off-Detector Receiver is PC interface

CCC : Clock and Control Card fans out to ODRs (or LDAs)

Control PC : Using XDAQ

200 MB/s on disk

Added a **DCC** : Data Concentrator Card (optional)



DAQ2 cont'd

- The DAQ2 could not be consolidated for the (SDHCAL) running in 2011
DAQ2 has been in a prototype state which required a lot of expert intervention and would have needed a lot of careful and coordinated actions

The DAQ2 was the central issue of the TB discussions during the last autumn winter

Thanks to Vincent for having been always ready to report to TB
This applies also to the engineers such as L. Mirabito, R. Cornat, C. Combaret

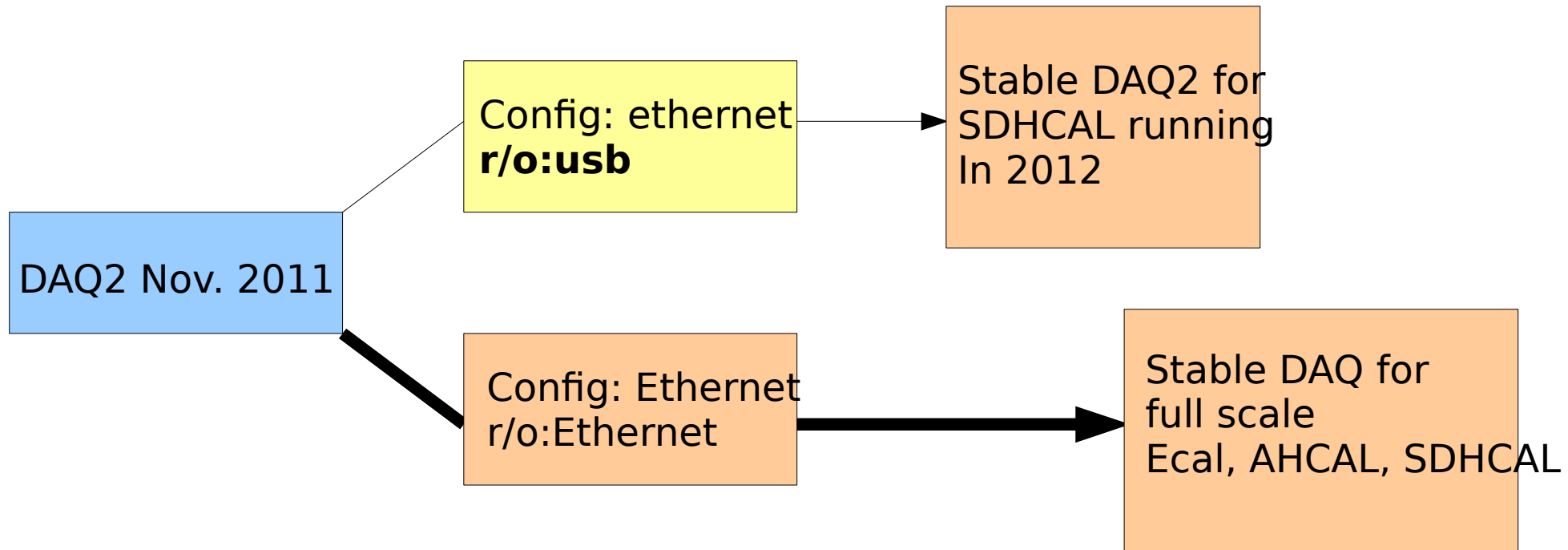
November 2011 was used to draw conclusions from the experience in 2011

Two meetings: '**DAQ days**'

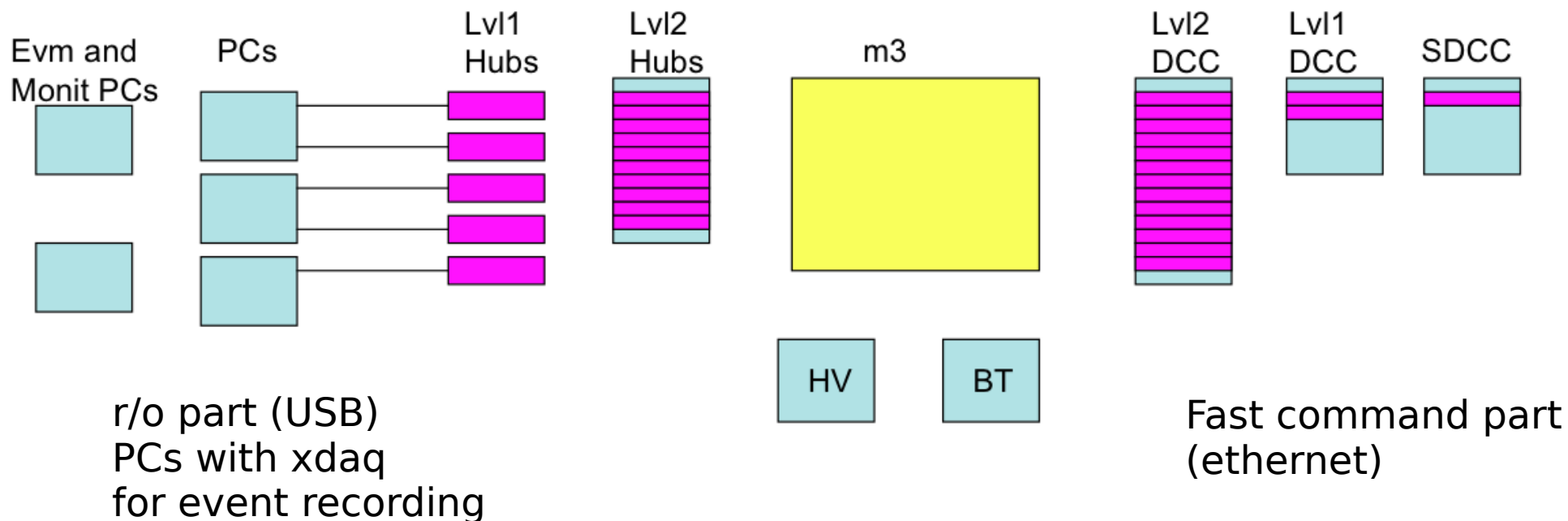
- One among experts/actors of the SDHCAL runs for a critical review
- A second one CALICE wide for the mid-term/long term planning

Conclusion of DAQ2 days

- DAQ2 had to be considered as well as a prototype!
Ok for small setups, less optimal for large setups
- LDA has been spotted as weakest piece of the chain
Mechanical instabilities lead to failures
- Due to pressure for success a number of interventions were uncoordinated
- (Temporary!!!) split of DAQ2 development in order to assure success of SDHCAL running in 2012



Intermediate DAQ2 and SDHCAL preparation



- Agreement within TB:
In spring 2012 SDHCAL will be equipped with 48 GRPC + 2 Micromega chambers
- Status as of 15/2/12 (Date of a DAQ review)
39 GRPC chambers integrated into DAQ, stable running over days
Data quality → see later
- DAQ2 will be operational also for Micromegas
- Full system test (48+2) planned for 15/3/12 (=1 month before start at PS)

DAQ2 Running modes

A major source of misunderstanding, therefore here once and for all

FEE and DAQ are rather conceived for ILC matters and less for beam tests

1) ASIC keep data in memory with depths of
127 for HARDROC/MICROROC
15/16 for SKIROC/SPIROC

2) The buffer is emptied on

a) Arrival of external trigger (Pulser or scintillator) - **Beamtest mode**

b) Acquisition start at beginning of spill - Acquisition end at end of spill
Buffers are flushed upon RAMFULL (of at least one ASIC) - **ILC mode**

Upon every detector readout a number of good events can be expected

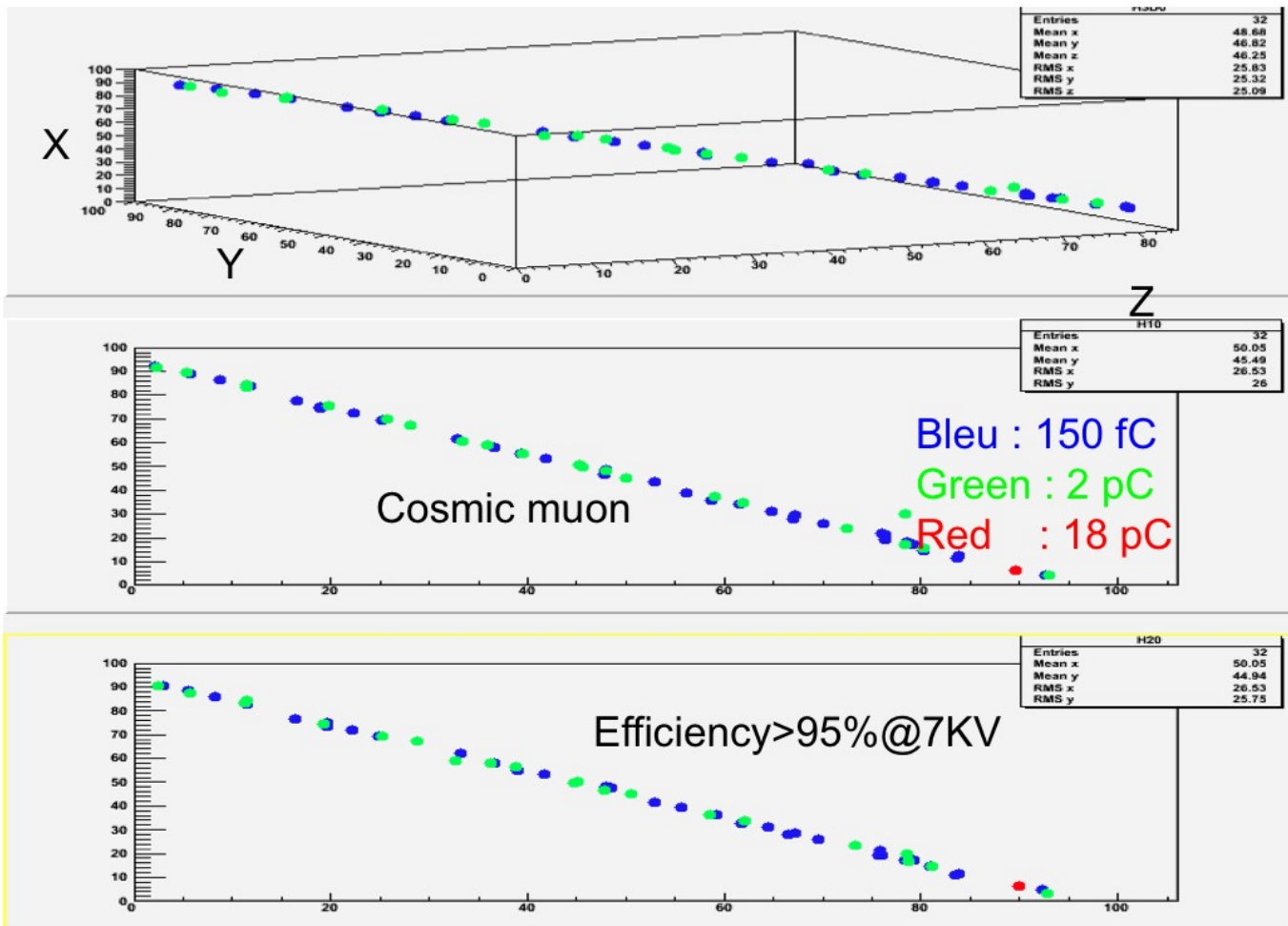
It is therefore more appropriate to speak of a **success rate** instead of a trigger rate

- Buffers are also filled (and emptied) due to noise

If $f_{\text{noise}} \gg \text{infinity}$ we read out noise => small success rate

If $f_{\text{noise}} \rightarrow 0$ buffers are filled with 'good events' => high success rates

SDHCAL - Data quality, Trigger rates and success rates



Clean cosmic tracks recorded with 39 chambers At IPNL

- Three thresholds Present

- Interesting Observation in Shower events
→ (S)DHCAL session

5
Z

- Situation of 15/2/12: Readout with pulser at 5 Hz
About 5 good cosmic tracks/readout => "Success rate" ~ 25 Hz
- (After optimisation of noise and thresholds)
Expect around 1500 events per 10 s. spill at SPS

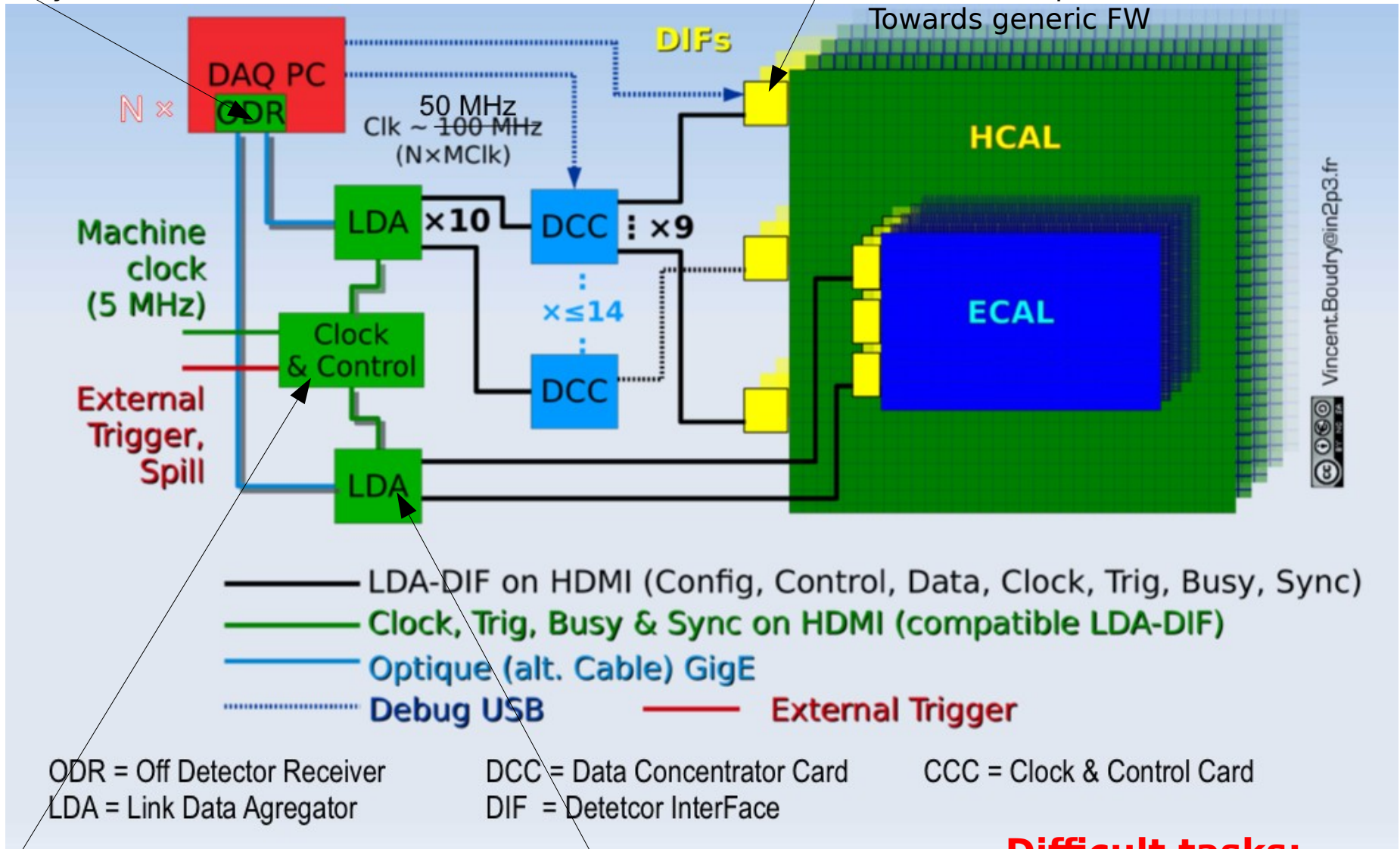
DAQ2 - 'Main' trunk

ODR:

Stability of data transfer in network

DIF:

Continous improvement of FW
Towards generic FW



CCC:

Revision of system level features
Firmware

LDA:

Replaced by **GigaDCC**

**Difficult tasks:
Only small number
Of people!!!!**

Beam tests 2012

To be taken into account :

- **FNAL** shutdown (officially) 5/12 - 2/13

See <http://www.ppd.fnal.gov/MTBF-w/schedule.html> for MTBF schedule

- **CERN:**

- Start of PS program on 16/4/12
Ions to PS starting from middle of July
 - Start of SPS program on 7/5/12
Long period with ions in Sept. 2012 !!!
Split proton period in autumn 2012 (interrupted by another ion run)
Can we live with ions ?
 - End of SPS/PS program 3/12/12
 - Shutdown 2013 - 2014 (?)
-
- **DESY** available all the time and flexible (Ideal for tests with small setups)
However due to CERN shutdown can expect run to DESY in 2013

Funding of beam tests possible through AIDA (also for the non-European groups)!!

CALICE requests for 2012

	PS request	SPS request	Comment
WDHCAL	3 weeks in T9	2x3 weeks in H8	PS in spring 2012 SPS in late autumn
SDHCAL GRPC	2-3 weeks in T9	2x3 weeks in H2	Current request includes no secondary devices (e.g. Mmegas) PS in late spring 2012 (April) SPS in spring 2012 (May) SPS in autumn 2012
Micromegas	-	1 week	Autums where steel stack is, parasitic running with GRPC

- Submitted on 19/12/12 as individual requests with accompanying letter written by R.P.
<<http://cdsweb.cern.ch/record/1407906>>
- PS Schedule published mid of February
SDCHAL 16/4/12 – 30/4/12, WDHCAL 14/5/12 – 24/5/12
- SPS not yet published but sneak preview did look alright

Ecal :

- Two periods
26/3/12 – 6/4/12 at T24 small SiW Ecal setup 1-3 layers

More details → See Ecal session

21/7/12- 3/8/12 in T21 with SiW with up to ten layers including Alveolar structure of 700kg,
1 T Magnet available for 2nd period
Integration of ScintEcal into 'summer program' ?

Beam test visit/inspection on 8/2/12
TA via AIDA to be prepared !!!!

Analogue Hcal : 'Permanent' user at DESY

Reminder on CALICE criteria on 'Technologie readiness'

- **Established performance:** energy resolution, linearity, uniformity, two particle separation
- **Validated simulation:** longitudinal and transverse shower profiles, response, linearity and resolution, for electrons and hadrons
- **Operational experience:** dead channels, noise, stability, monitoring and calibration
- **Scalable technology solutions:** power and heat reduction, low volume interfaces, data reduction, mechanical structures, dead spaces, services and supplies
- **Open R&D issues:** analysis and R&D to be completed before a first pre/production prototype can be built, cost reduction and industrialization issues

This meeting will be decisive on the CALICE input for 2012 docs

Summary and outlook

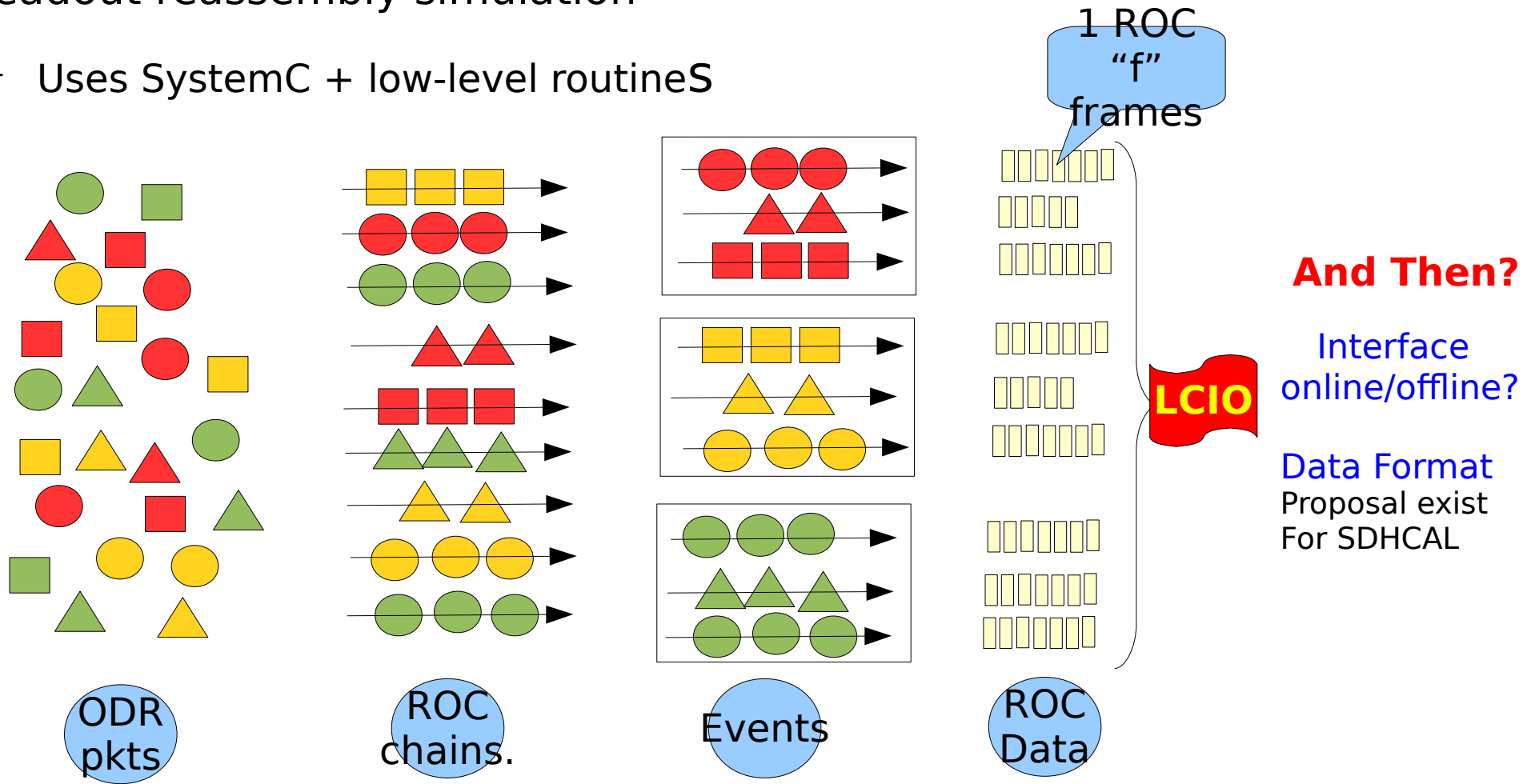
- Autumn/winter discussions were marked by DAQ reviews
- ... and preparation of 2012 beam tests
- Promising status of SDHCAL before 2012 campaigns at CERN
- Slow but steady progress with 2 generation prototypes
Ecal, AHCAL towards small scale beam tests
Will benefit from stabilisation of DAQ2
- DBD preparation should move into focus of activities

Backup

Towards s/w for Technological Prototypes

- Readout reassembly simulation

- Uses SystemC + low-level routines



Scheme by D.Decotigny (LLR)

Needs tight communication between DAQ team, CALICE Software Team and ILC Core software Team

CALICE specific: Gerald Grenier to collaborate with s/w coordinator for SDHCAL

Other detectors

Usage of CALICE database?

CALICE Collaboration Meeting March 2012

CALICE Software

- Software coordinator Shaojun Lu
- Contacts for subdetectors:
 - SiW Ecal: ???, R.Poeschl
 - ScintEcal: Cotera
 - AHCAL: Angela, Shaojun
 - (S)DHCALS: Gerald Grenier
 - TCMT: K. Francis?
 - Tracking: P. Dauncey, D. Jeans
 - Simulation/Mokka: G. Musat
- All physics prototypes are implemented in Mokka
SDHCAL GRPC as well
- Data processing:
 - Support by M.S. Amjad, D.Jeans, A. Kaplan, K. Krastev, N.Feege, L. Weuste and S. Lu
 - Data processing on request
- CALICE s/w needs to be put on broader basis
Efficient s/w group is essential for publishing physics results