

# Status report on ECAL construction

CERN TIM - 23 apr 2007

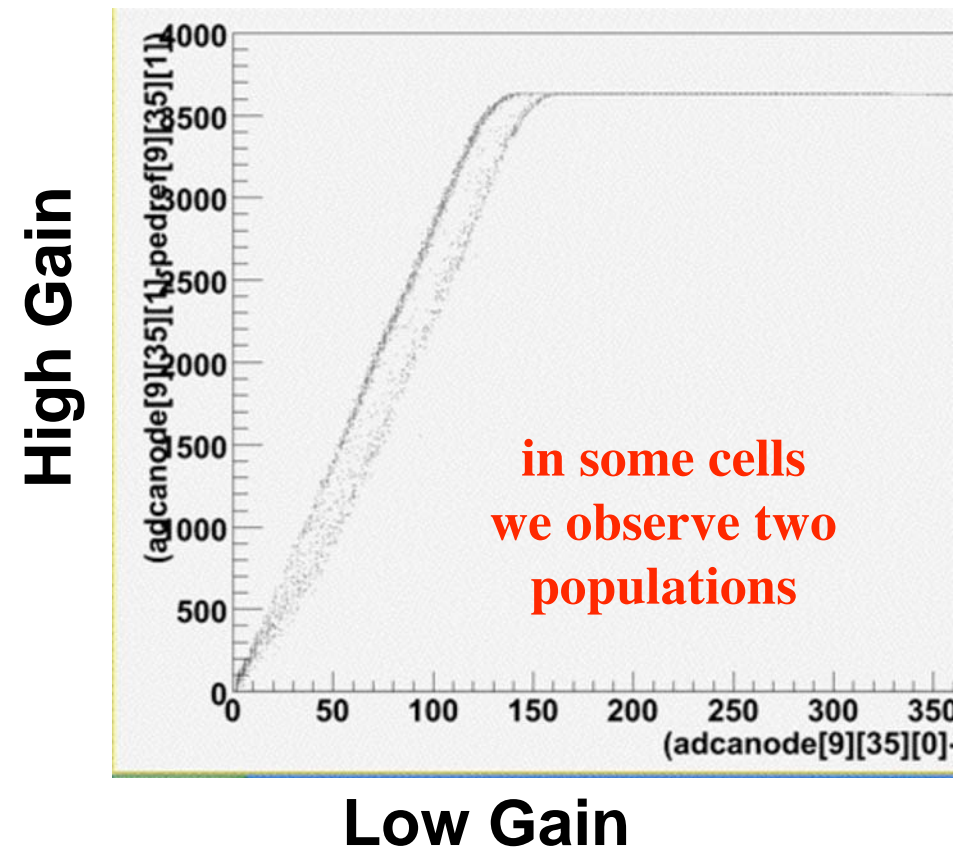
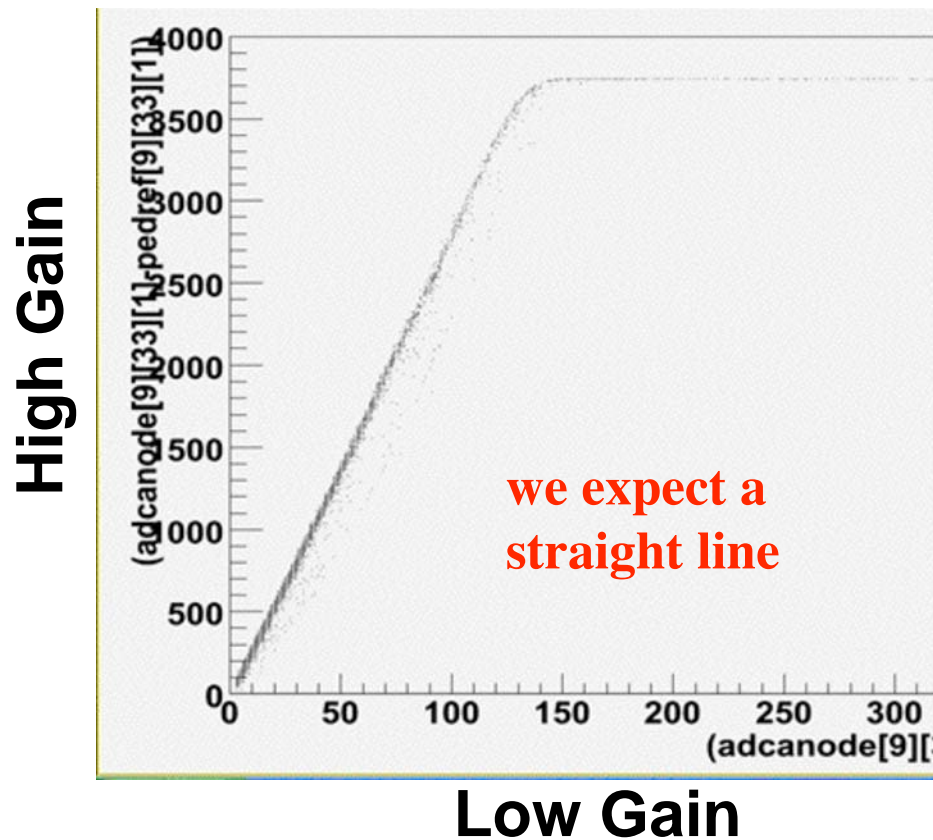
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for the ECAL group

## News from ECAL wrt last TIM (Houston - jan 07)

1. Found a bug in control signals exchange between Front End and Readout Electronics : fixed and tested with cosmic rays BUT ... problems in using electron data from oct 2006 Test Beam ⇒ need new TB (details in next slides)
2. Delay in procurement of thermostats for High Voltage systems in LUSS (i.e. EHV and RHV) ⇒ delay in flight electronics availability (details in next slides)

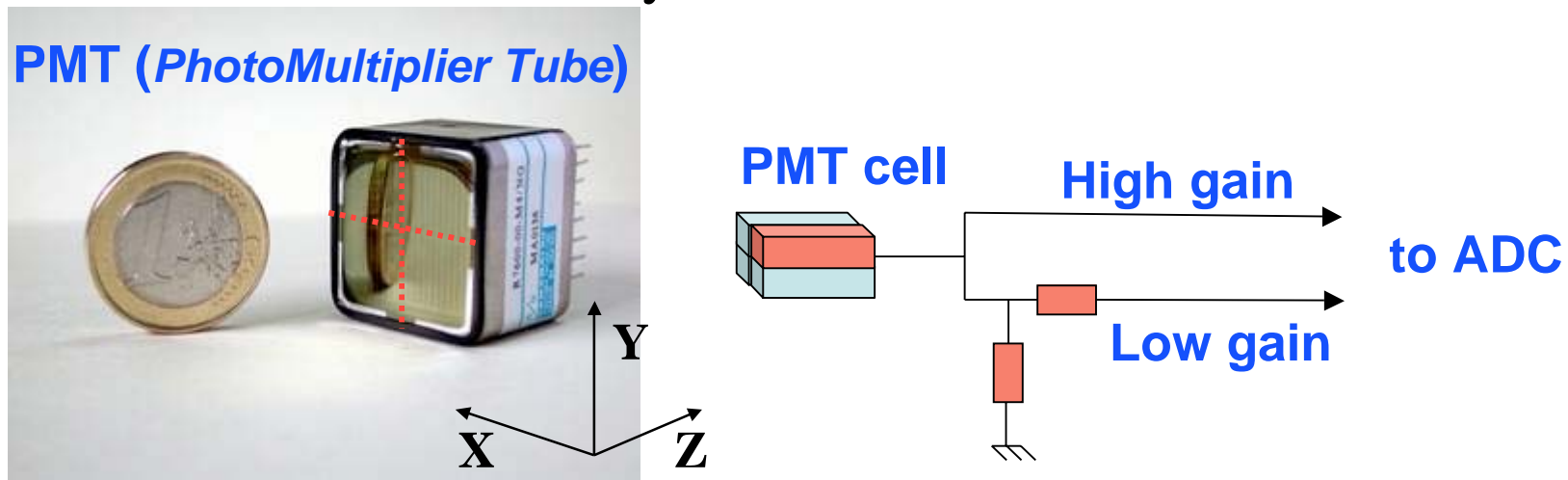
# 1 - bug in firmware

- While analyzing electron data, we found a strange distribution in High Gain vs Low Gain plot (second last slide of last TIM):



## Low vs High Gain: a reminder

- The light, produced by energy release in ECAL, is collected by multi-anode PMTs
- Electrons can release, in a given cell, an amount of energy which can be **several thousands larger than that protons**
- In order to cover the full energy range, the signal is split in 2 and 1 branch is divided by a **factor  $\sim 33$**  before ADC



## Finding the bug

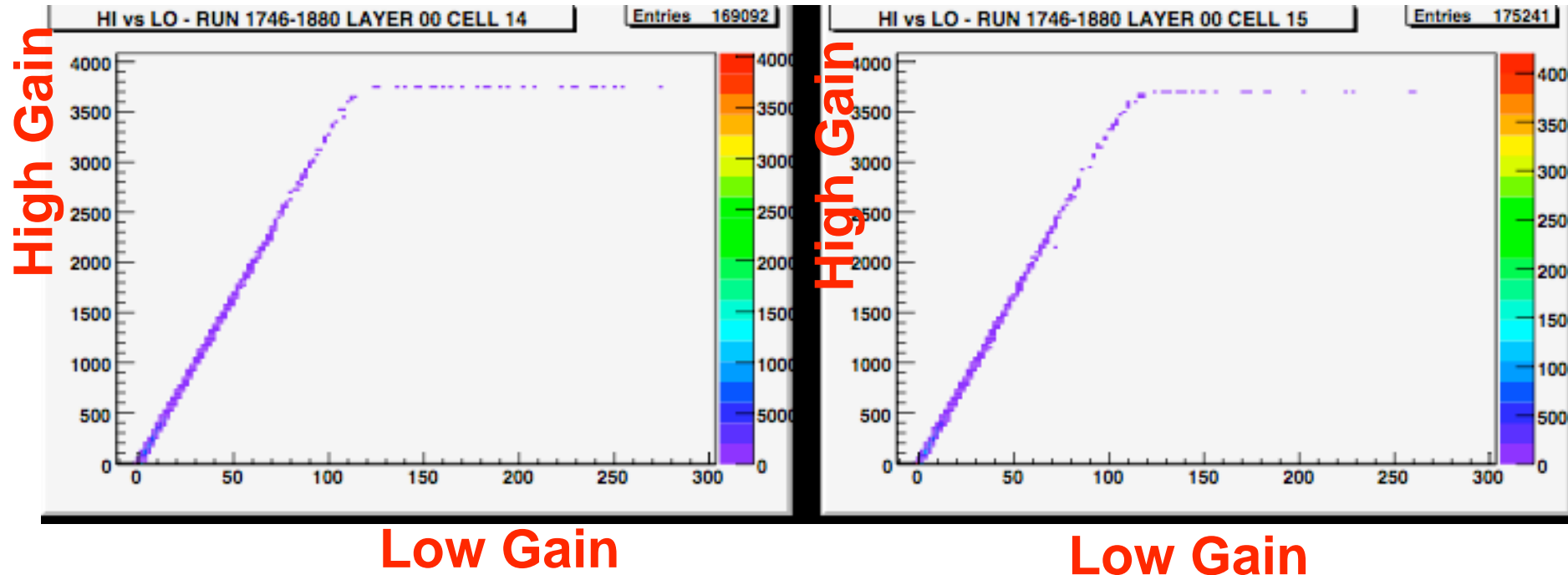
- The behaviour of the “ghost slope” has been reproduced in Pisa: it is due to a crosstalk between anodes inside a PMT, induced by a *reset* signal sent from EDR (Data Reduction) to EFE (Front End) with the wrong timing;
- in particular, **if a HighGain (HG) channel saturates** (i.e. more than  $\sim 2\text{GeV}$  of energy deposited) **the LowGain (LG) channels of the same PMT have a shift corresponding to 5-20 ADC counts** ( $\sim 330\text{MeV}$ );
- this effect has been observed at TestBeam, and not in previous tests, because of the presence of the JLV1 (trigger) board .

## (semi)technical slide: effect of JLV1

- the *reset* was (wrongly) sent at the event start, immediately after the *LVL1* reached the EDR;
- the signal is sampled at a time  $t_{\text{EDR}}$  after *LVL1* ;
- the *reset* causes a spurious spike of lifetime  $\sim 1 \mu\text{sec}$ , collected by the hold capacitor;
- in previous tests  $t_{\text{EDR}}=2.4 \mu\text{sec}$ , so the effect of reset was negligible;
- in TB, JLV1+JINJ+JINF introduce  $\sim 1.5 \mu\text{sec}$  of additional delay, so  $t_{\text{EDR}}=0.9 \mu\text{sec}$  and the effect of reset became relevant .

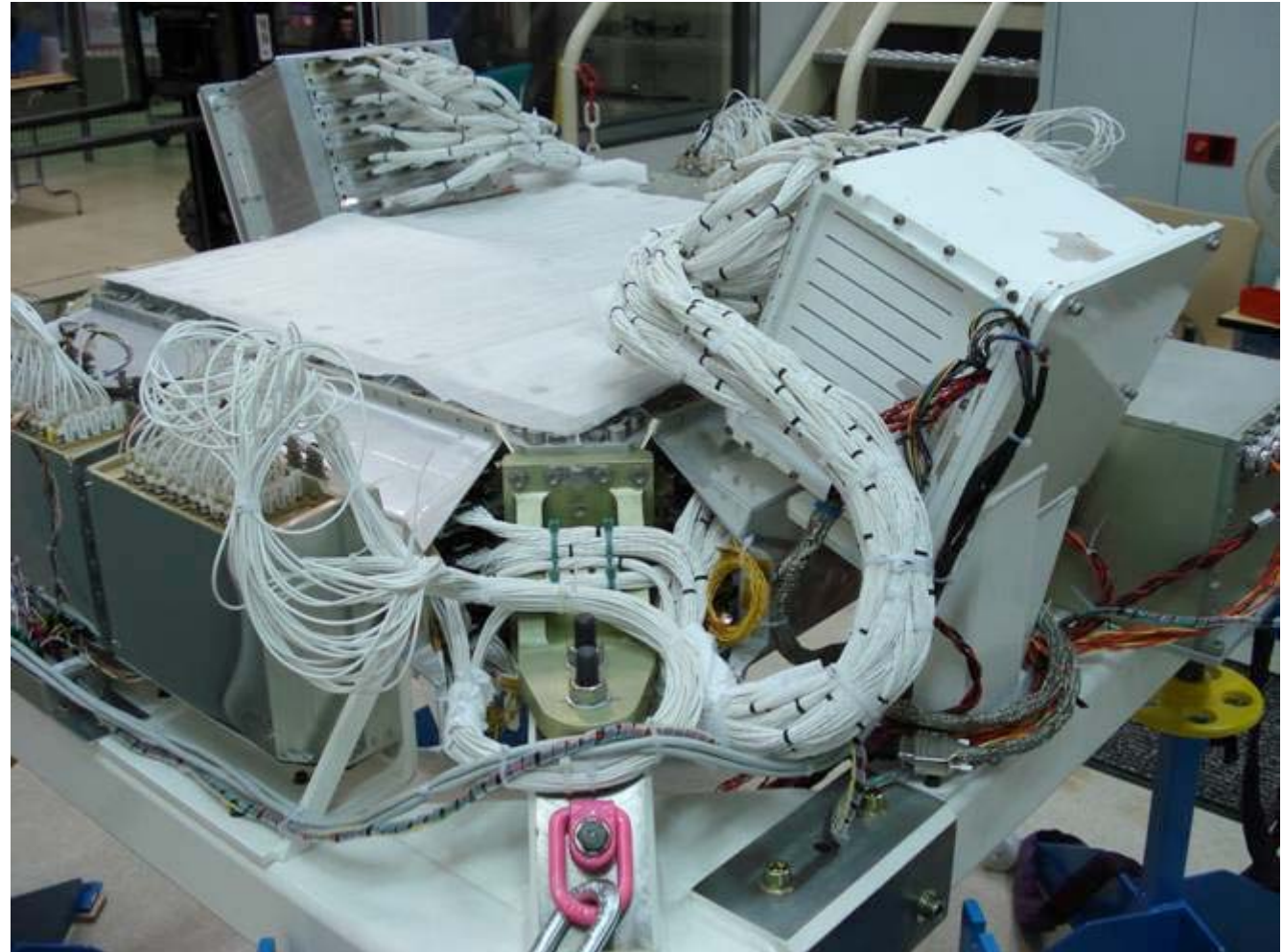
## Fixing the bug

- The firmware of the EDR FPGA was modified by Koutsenko and the new code successfully tested at the Cosmic Rays Test Stand (see next talk) ;
- however part of TB electron data cannot be used to study ECAL performances.



## 2 - delay in HV system

- As presented in the last TIMs, EHV flight modules are ready, except for thermostats and heaters;
- we requested their procurement to CGS few months ago (4 jan 2007)



## current status

- Based on previous contacts, we expected ~ 4months for procurement ;
- at ~mid march CGS informed us (ECAL+RICH) that the *delivery time for the thermostats is 25 weeks!*
- With the current schedule, thermostats will be mounted on EHV and RHV ~mid september ;
- adding ~2 months for SQ tests, **the HV system for LUSS will be available for mounting November 15 .**

## impact on Ecrate

- less serious, since 4 thermostats are on stock and we can get them plus the 2 heaters end of june - beginning of july 2007

## Assembly schedule

- We propose to modify the sequence of LUSS assembly:
  - current sequence: ECAL (det), Ecrate, ERHV, RICH (det), LTOF
  - proposed sequence: ECAL (det), RICH (det), Ecrate, ERHV, LTOF . Ecrate can be mounted as soon as RICH is ready, and detectors can be (partly) tested with an external power supply system and a specific patch panel.

# Status of flight Ecrate elements

## Ecrate: mechanics

- parts ready and sent out for surface treatment with Alodine 1200;
- next week. parts will be sent to France (Pamiers, close to the boarder with Spain) for the second surface treatment required by CGS: white paint
- 3 weeks foreseen for the job
- End of may: Ecrates mechanics **ready** .

## Ecrate: electronics

- All EBP + EDR + EPSFE mounted at CGS and tested in Pisa:  $\sim 1/2$  of them needed reworking;
- waiting for ETRG boards (2FM + 1FS);
- FM electronics (except for ETRG) currently mounted inside QM crate and continuously under test.
- After tests  $\rightarrow$  coating at CGS  $\rightarrow$  end of Msy
  
- What is missing to complete flight Ecrates:
  - 2 flight JINFs (produced at CSIST)  $\rightarrow$  ?
  - 2 heaters and 4 thermostats (from CGS)  $\rightarrow$  July(?)

## next ECAL milestones

- complete Ecrates july/august 2007
- test beam 11-19 july 2007
- ready for ECAL (det) assembly : September 2007
- ready for Ecrates assembly : October 2007
- ready for EHV assembly : December 2007