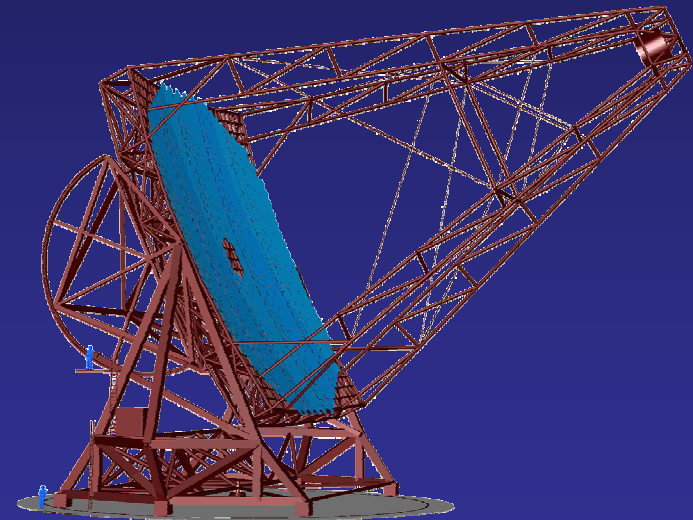


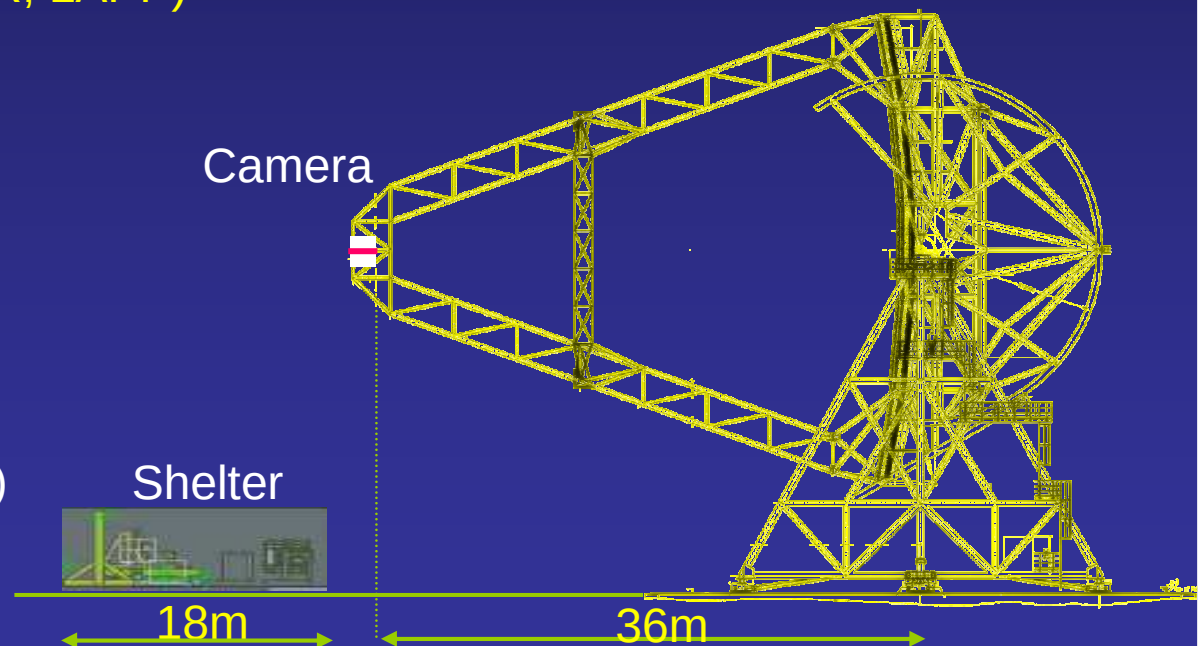
H.E.S.S. II Camera Status

- Overview
 - Mechanics
 - Electronics
- Conclusions

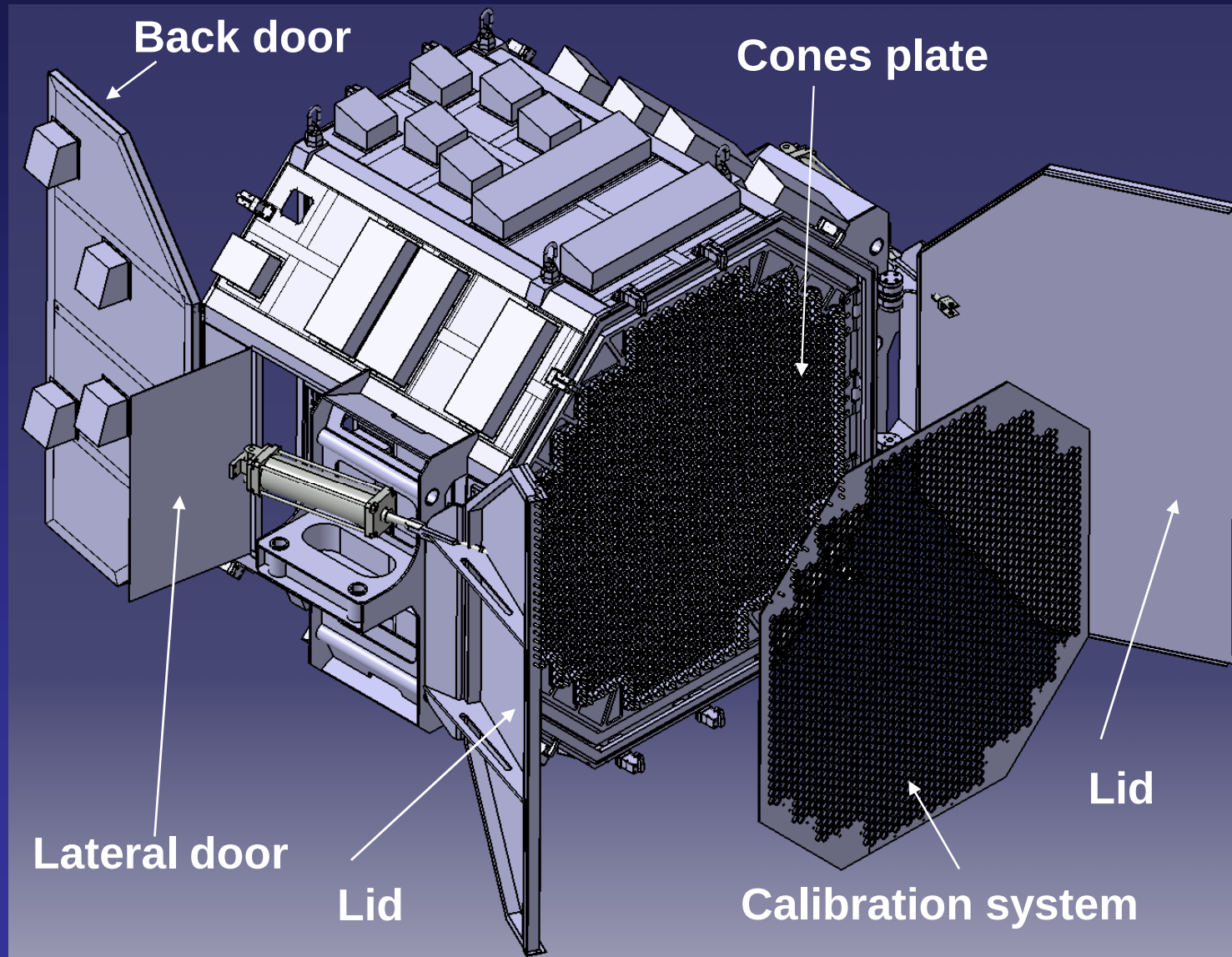


Overview

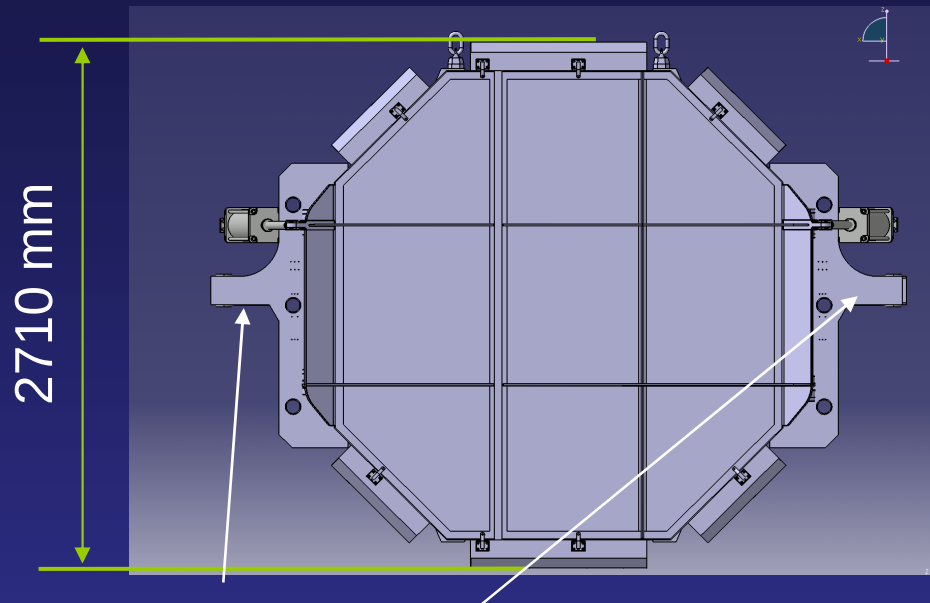
- Camera Mechanics
 - Structure (LLR)
 - Cones (APC)
 - Auto-Focus (LAPP)
 - Loading/Unloading (LAPP)
- Shelter (LUTH)
- Photo detectors (LPNHE, CESR, LAPP)
- Camera Electronics & DAQ
 - Front End (LPNHE)
 - L1 Trigger (LPNHE)
 - L2 Trigger (CEA)
 - DAQ (LPNHE)
 - Security (LAPP)
 - ASICs Test (LPNHE, LPTA)
- Calibration (LPNHE, LPTA)



Camera Mechanics



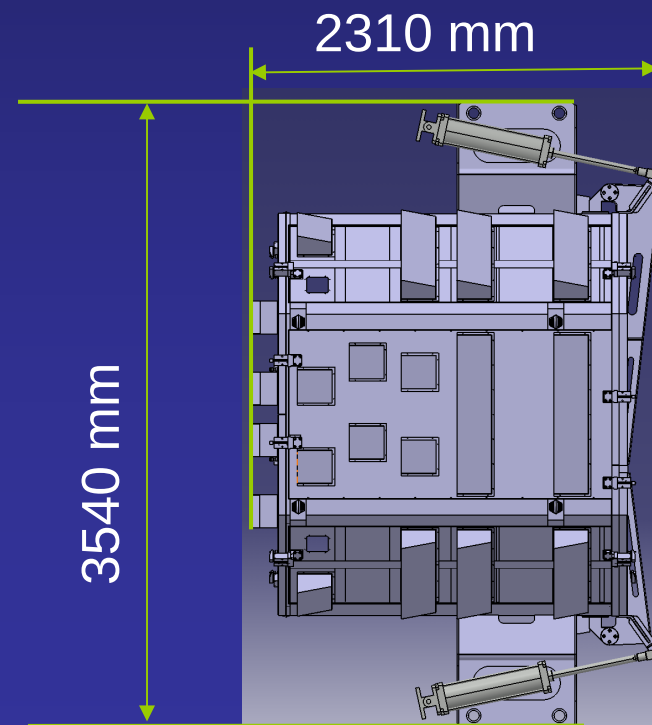
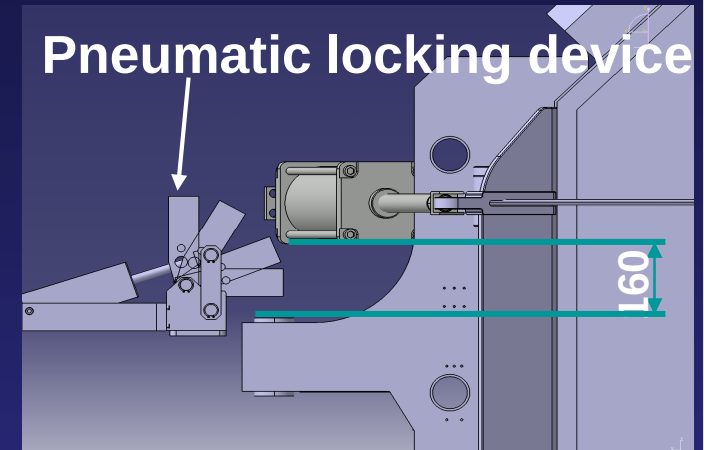
Camera Mechanics



Auto-focus (Winglets)

2 identical structures:

- The Camera
- The Dummy Camera



The Auto-Focus System

Self blocking
air clamp
(2.5 tons)

The linear guides are
screwed on the mobile
green piece which is linked
to the camera through the
pneumatic clamping device

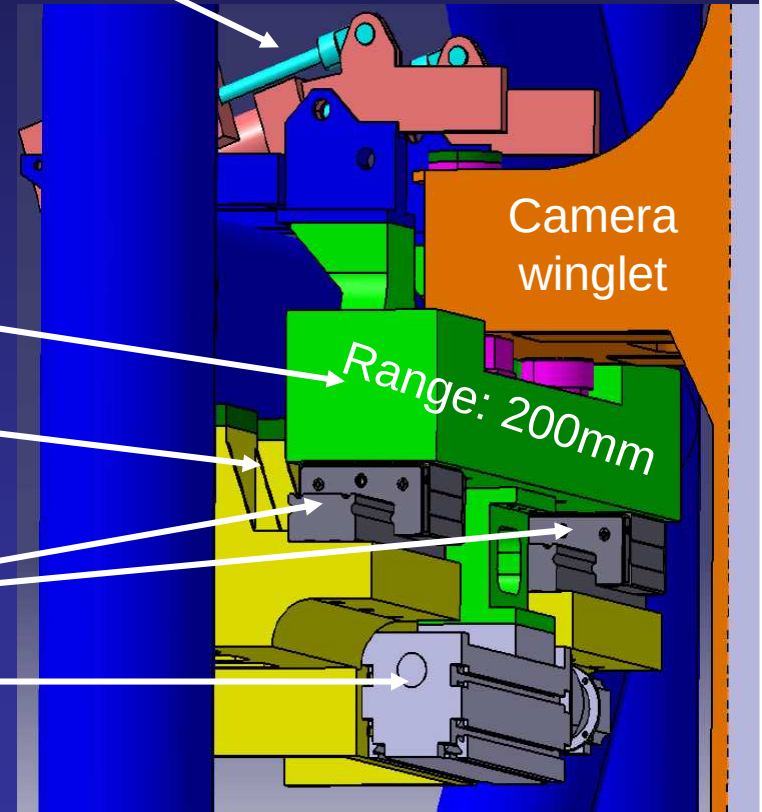
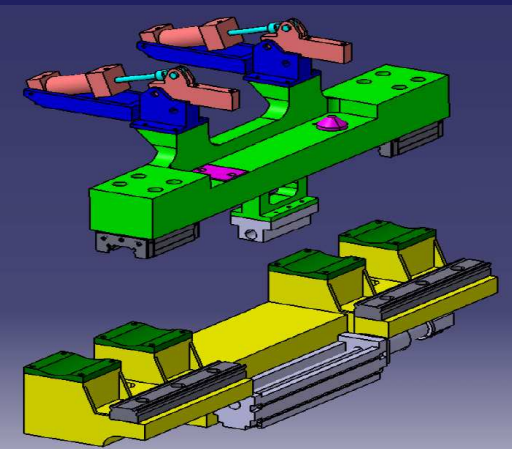
The bottom yellow part is
screwed on the telescope

Rails

linear actuator

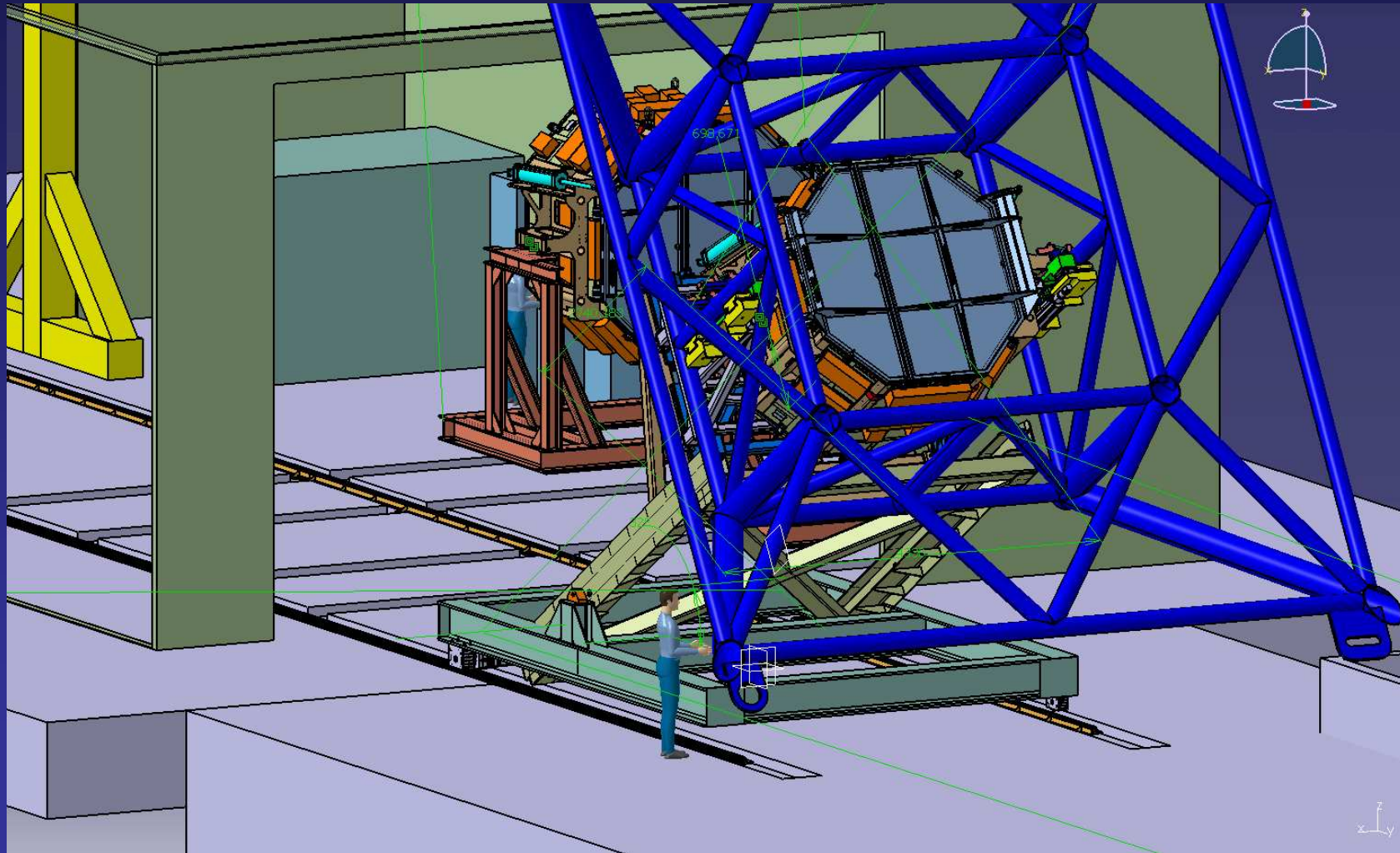
Camera
winglet

Range: 200mm



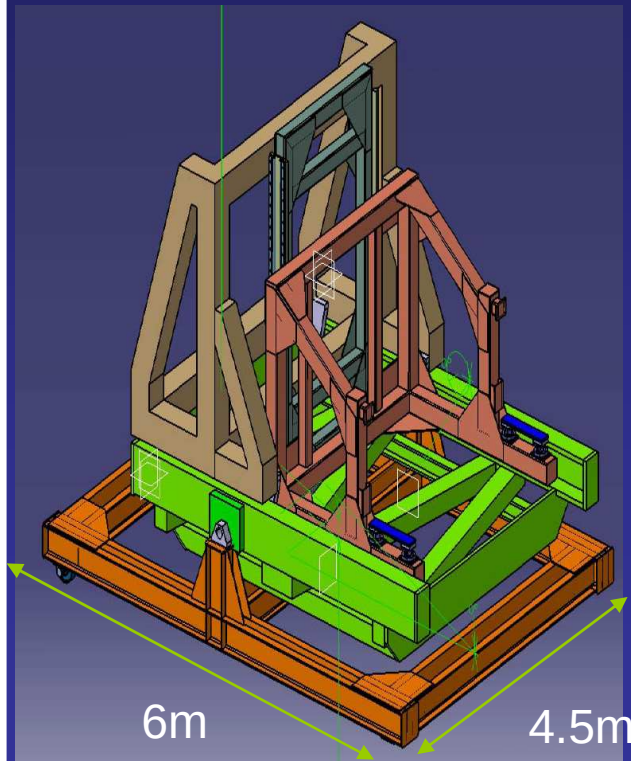
Range of auto-focus: 0 / +200 mm for
adjusting the focal Length with the elevation
(Precision required 10mm, achieved <1mm)

The Loading/Unloading System

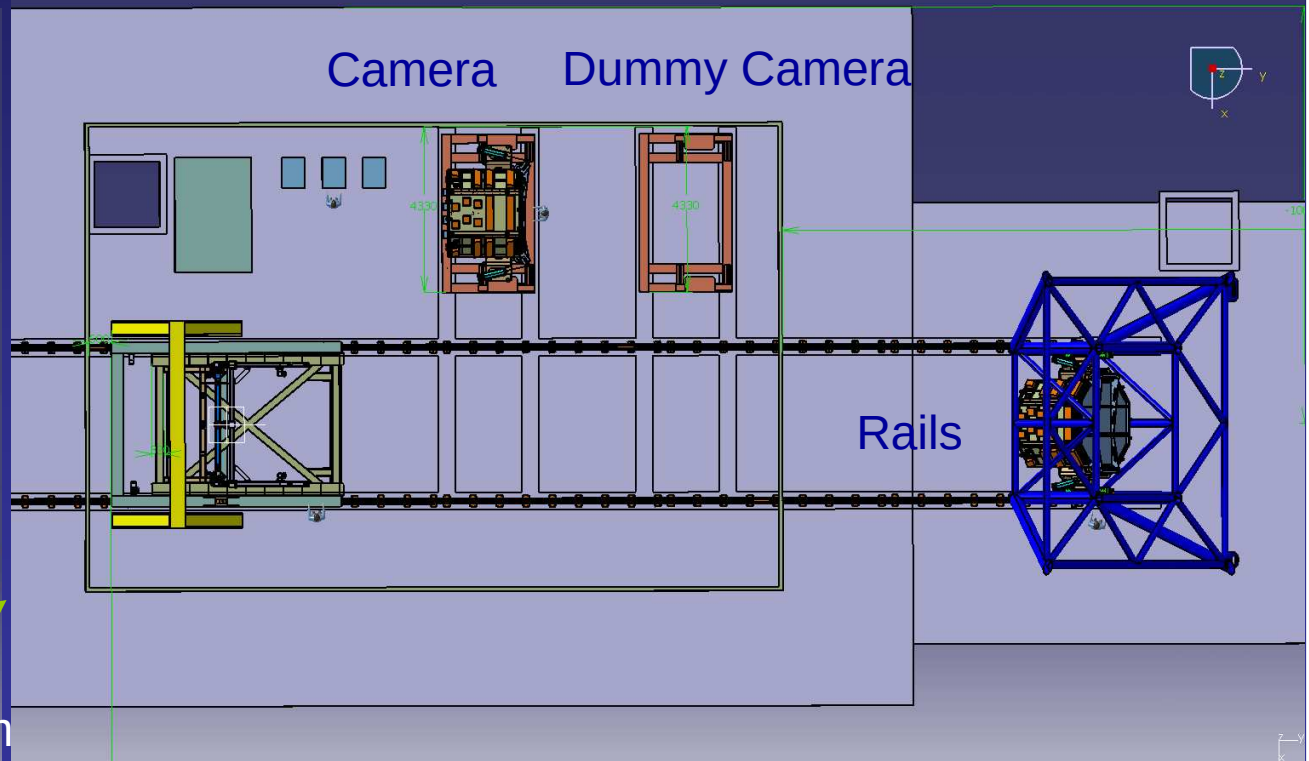


The Loading/Unloading System & the Shelter

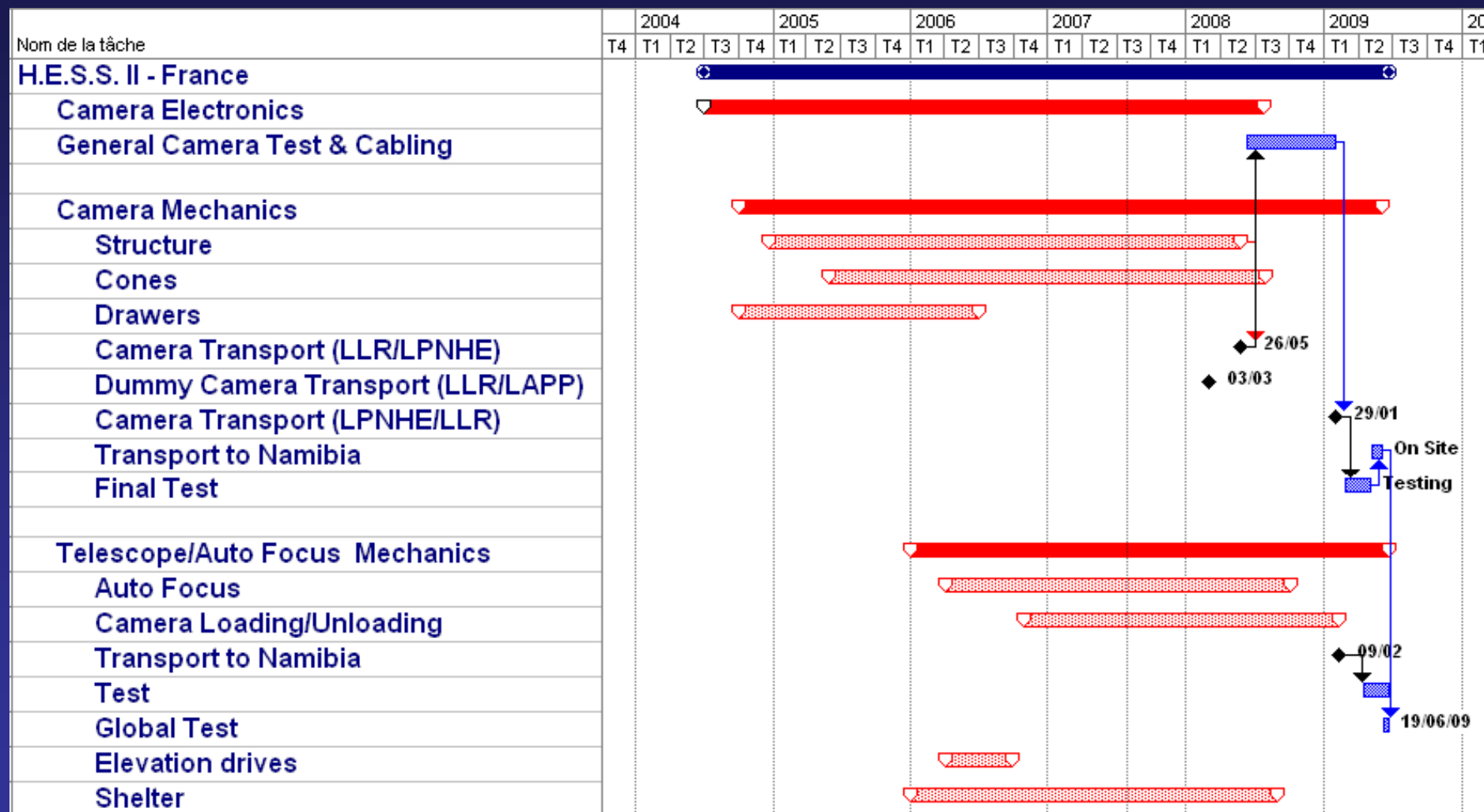
The Forklift



Shelter (18.2x12.2x5.75) Top View



Mechanics Status

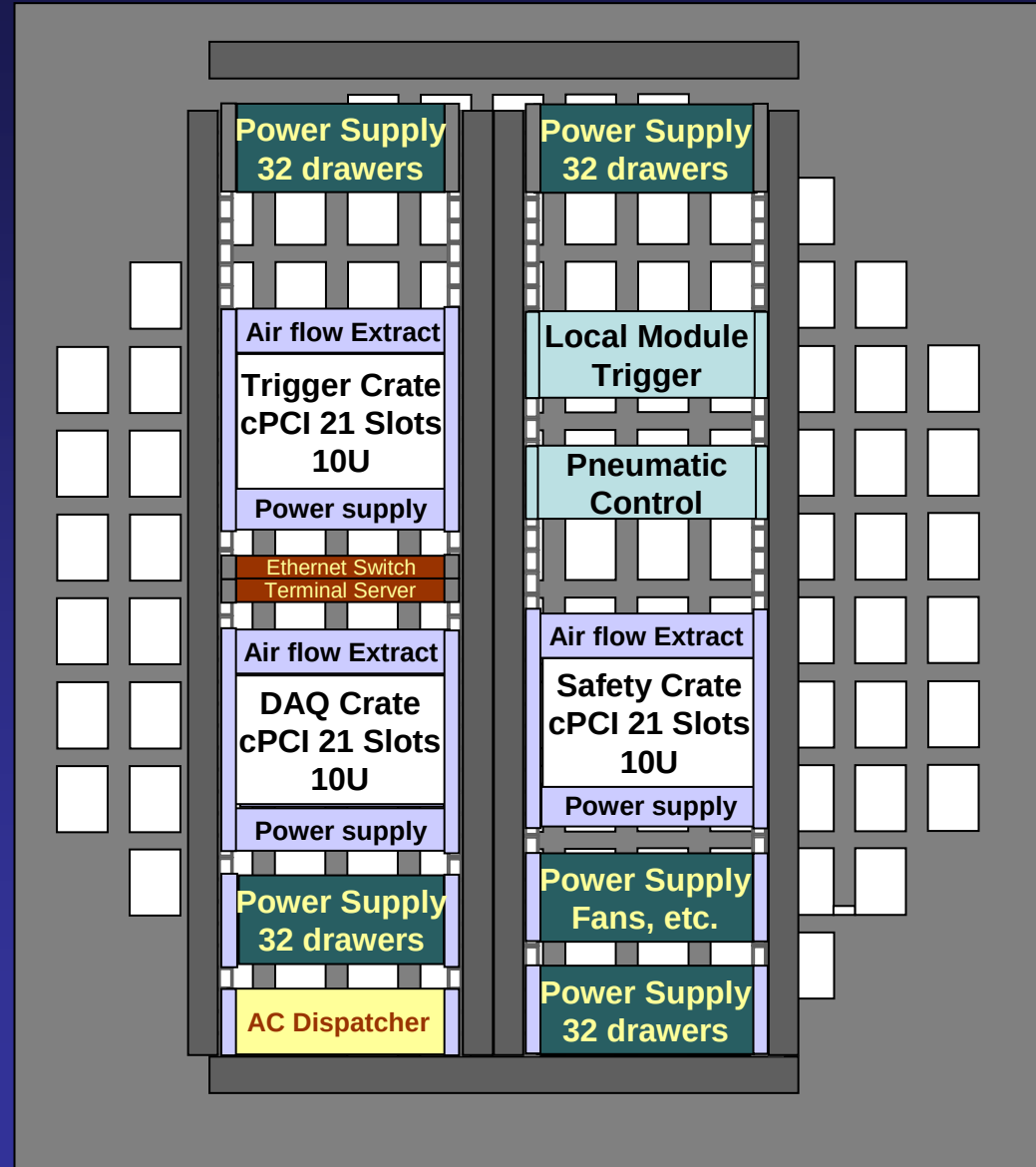


Electronics inside the camera

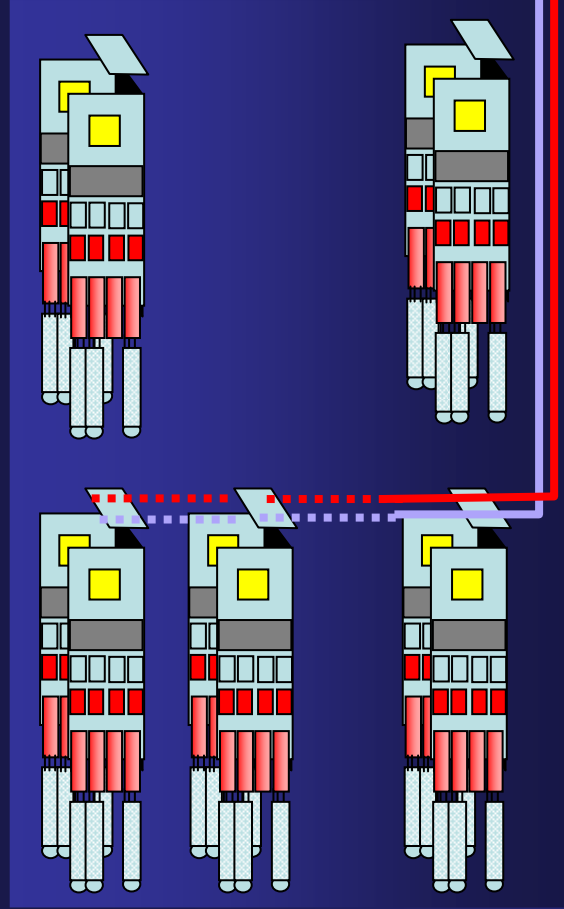
128 Drawers (128x16 PMTs)



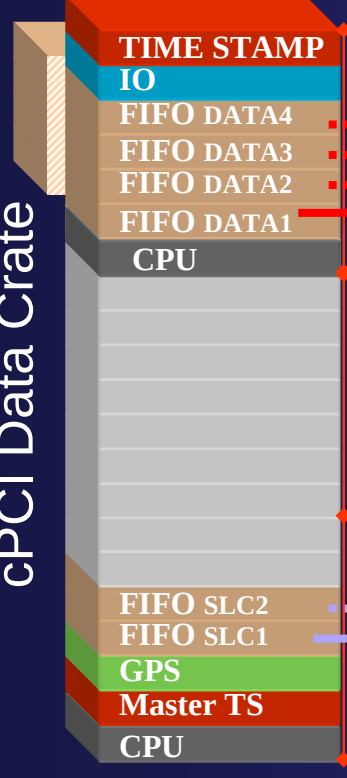
Racks



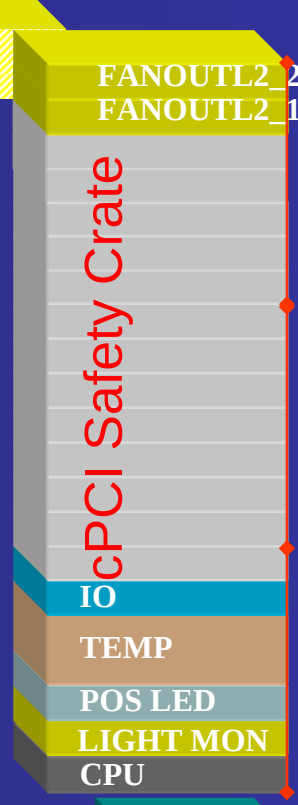
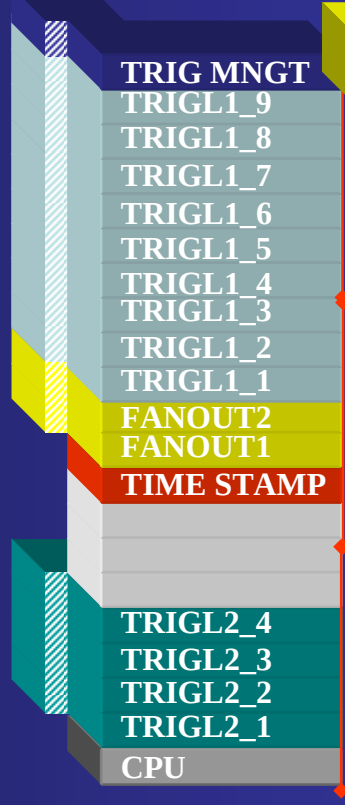
General Camera Schematics



cPCI Data Crate



cPCI Trigger Crate



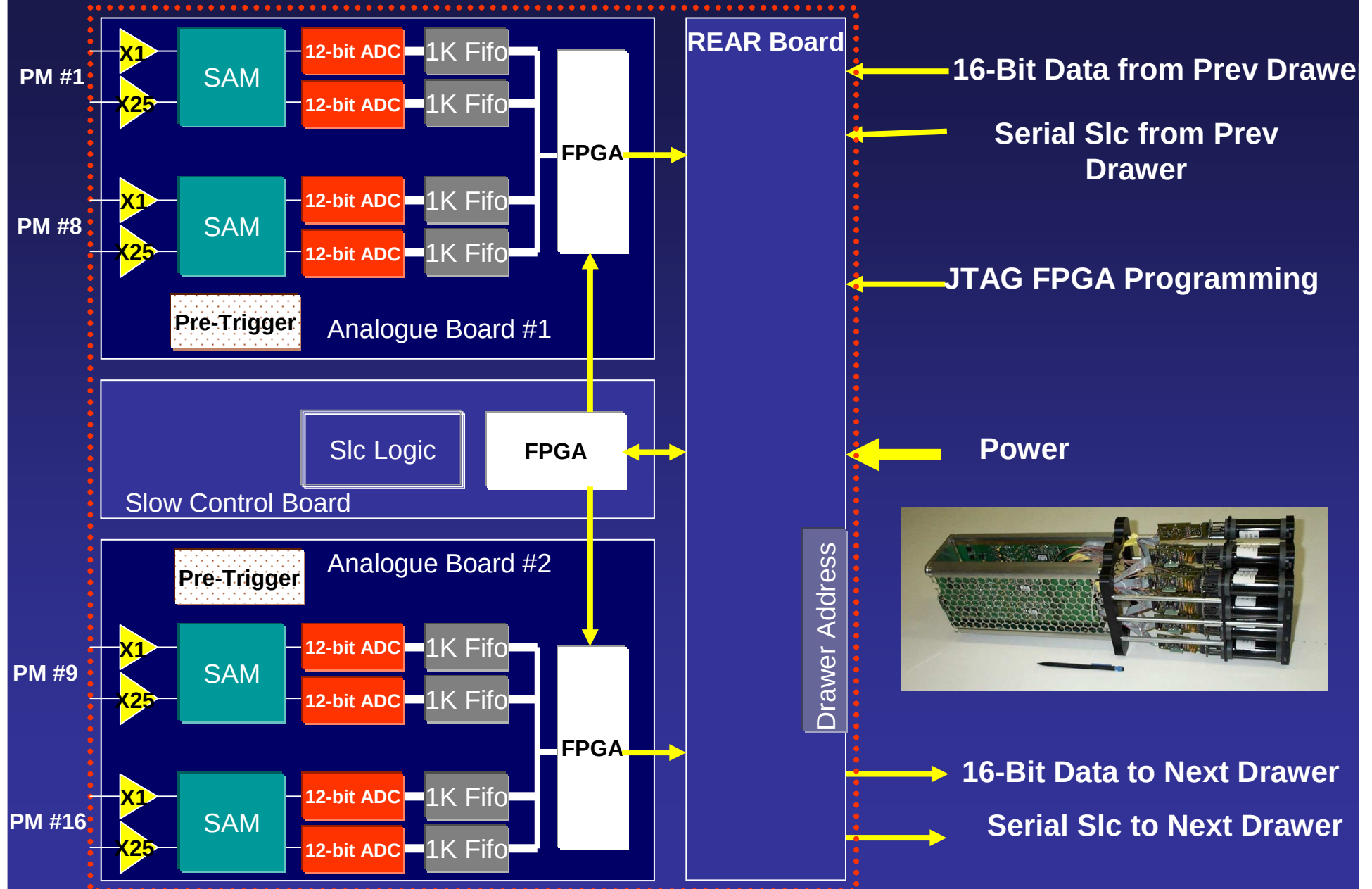
-128 Master Drawers

- 16 // Data Buses

- 8 Serial Slow Control Buses



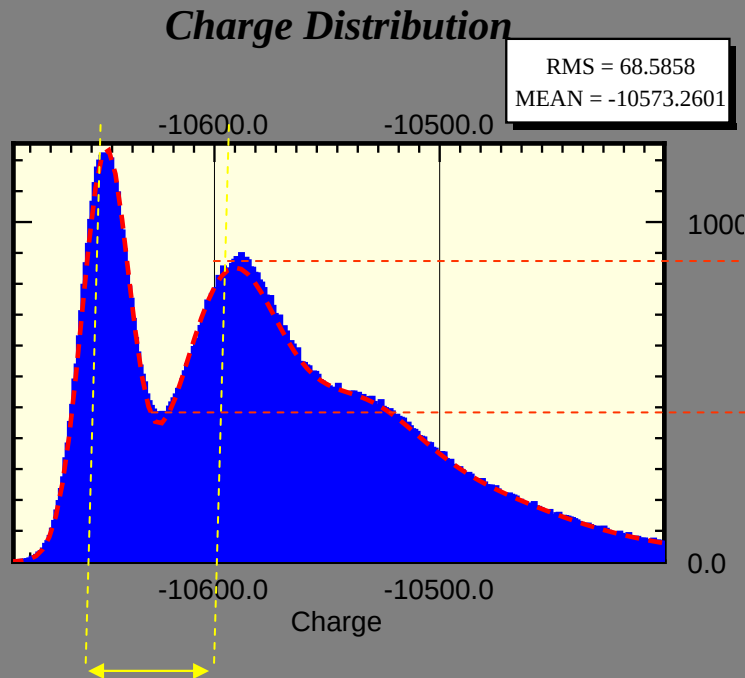
Drawer Architecture



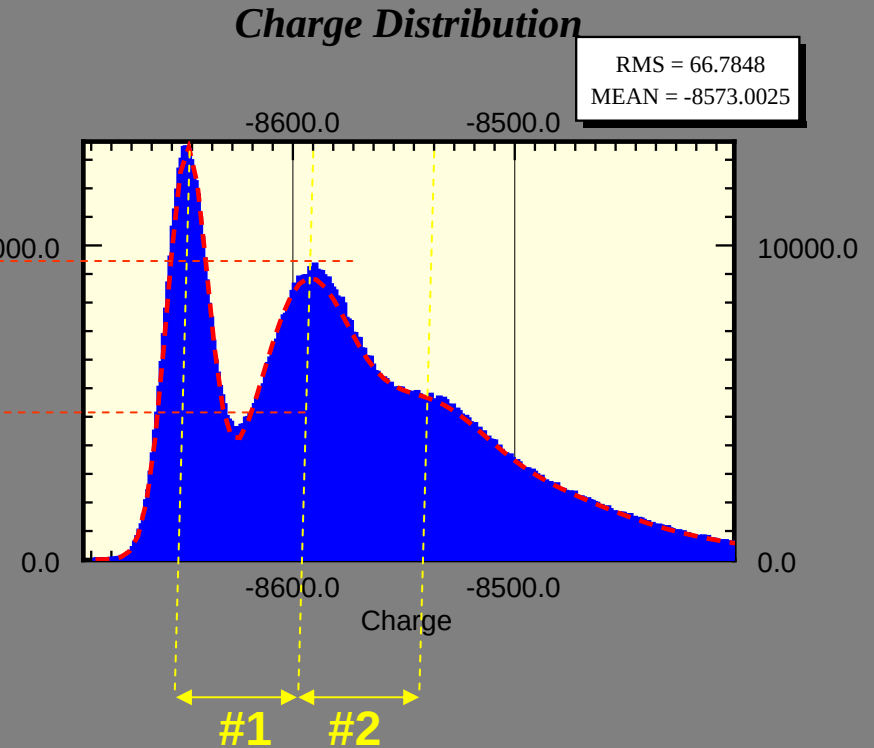
Drawer Performances

- Test of the prototype Drawer with a PMT $G=2.10^5$ SAM sampling $\text{Clk}=1\text{GHz}$

Reading window $N_f=16$

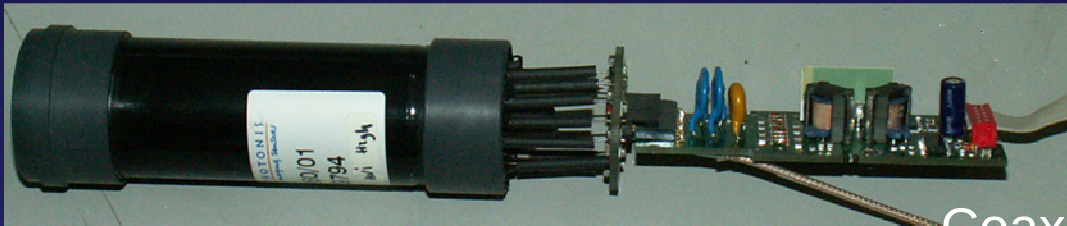


Reading window $N_f=13$



The PMTs

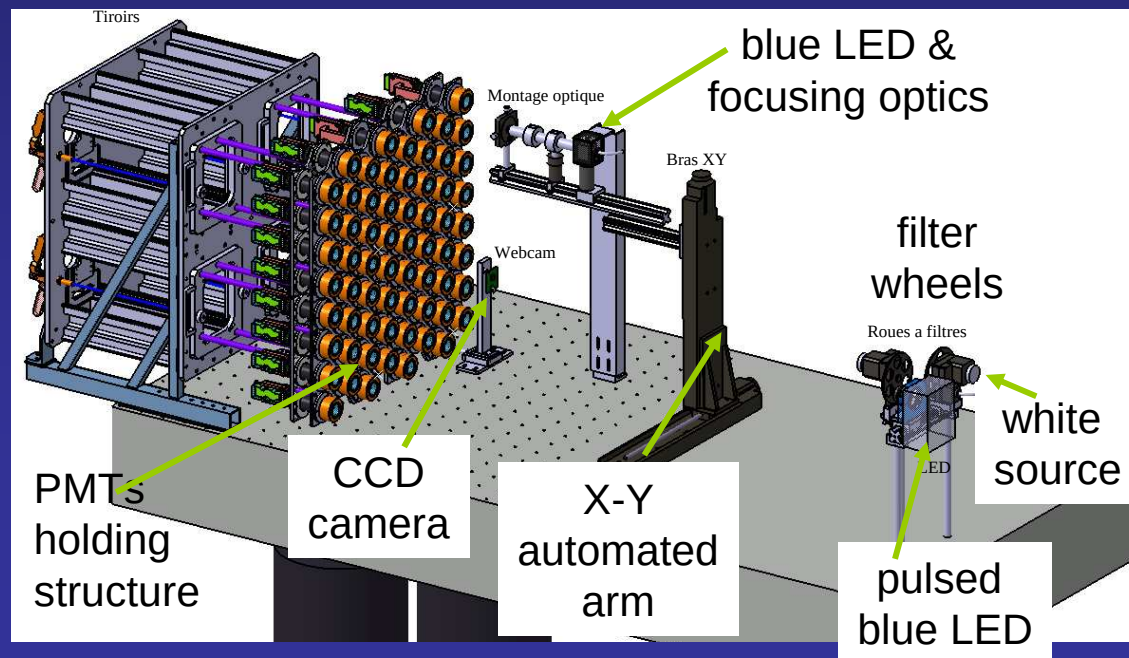
The H.E.S.S. I version (XP2960)



Coaxial cable for the signal

Dynode Chain with current protection

The H.E.S.S. II version will be a little shorter (flying wires)



L1 Trigger principle

The 2048 pixels are divided into 99 sectors

Temporal and Sectoral

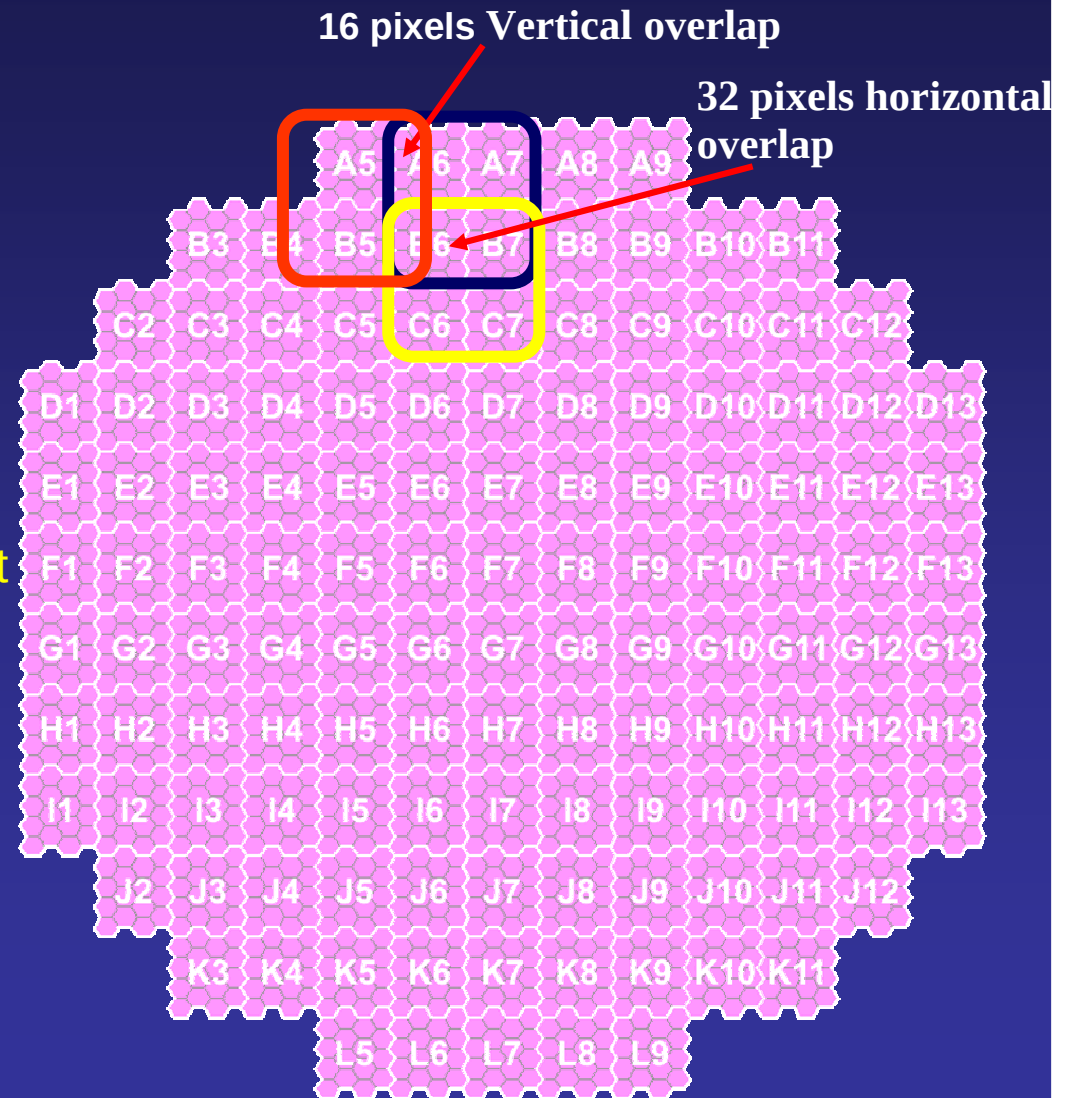
Very fast logic timing

Sliding Windows

...and expect a minimum energy deposit

So we program:

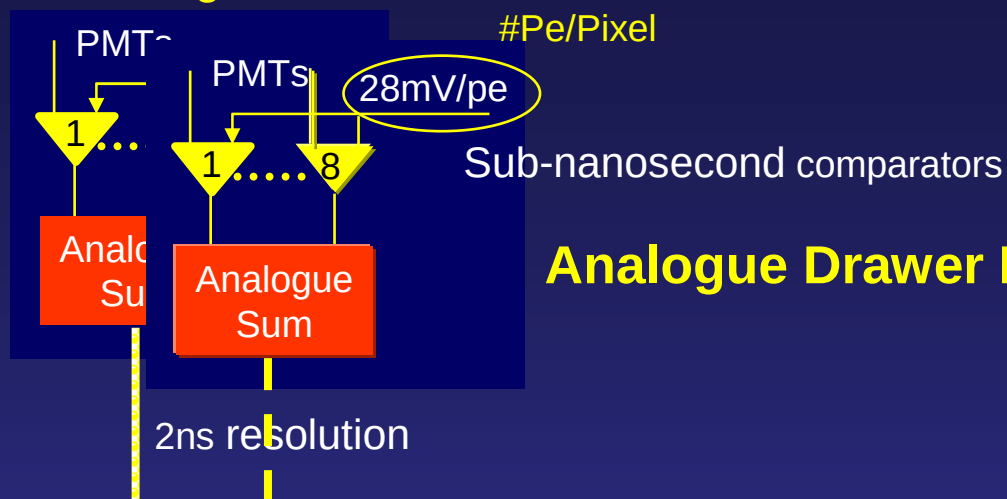
- **#pe/pixel** (Analogue Boards)
- **#pixels** in sectors



L1 Trigger principle

256 Analogue Boards

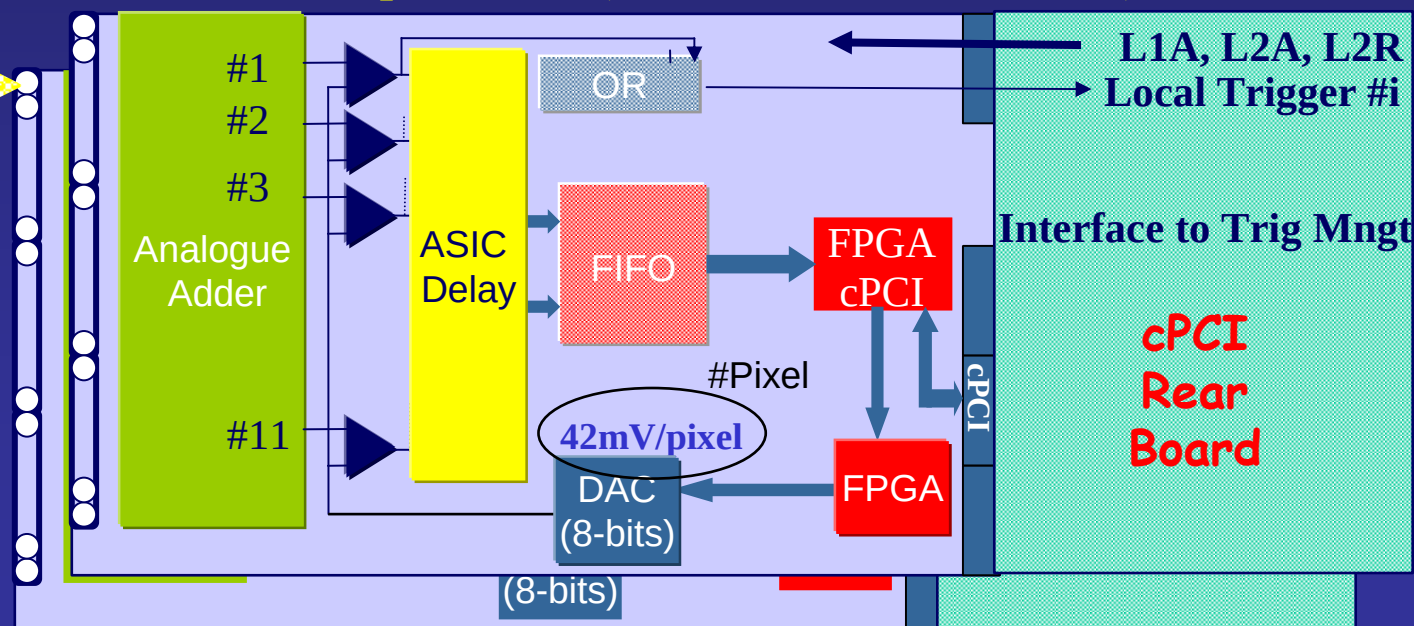
Same technique as H.E.S.S. I



Analogue Drawer Boards

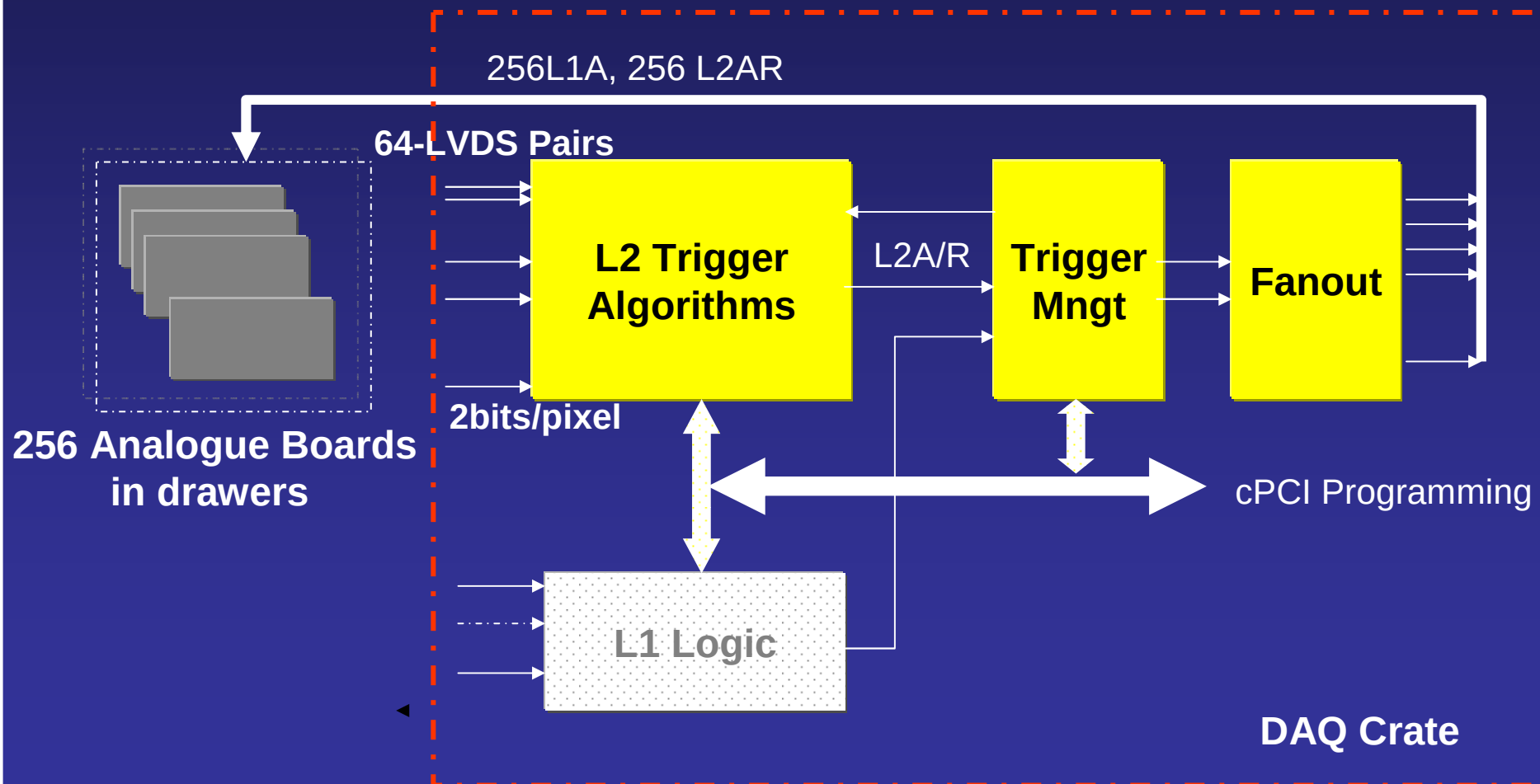
11 sectors per board (11 X 9 boards=99 sectors)

cPCI Boards in DAQ crate



L2 Trigger Processor

- Mean Input Rate < 5KHz (200 μ s)
- 4 Pre-L2 Asic multiplexed over each of 64 LVDS (serial data)
- Possibility of Different Algorithms



L2 Trigger Algorithms

Input to L2:

- 1 binary image above the L1 threshold
- 1 binary image above the L2 threshold

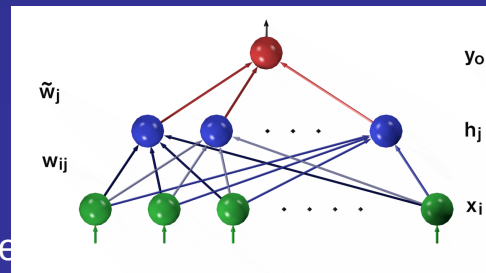
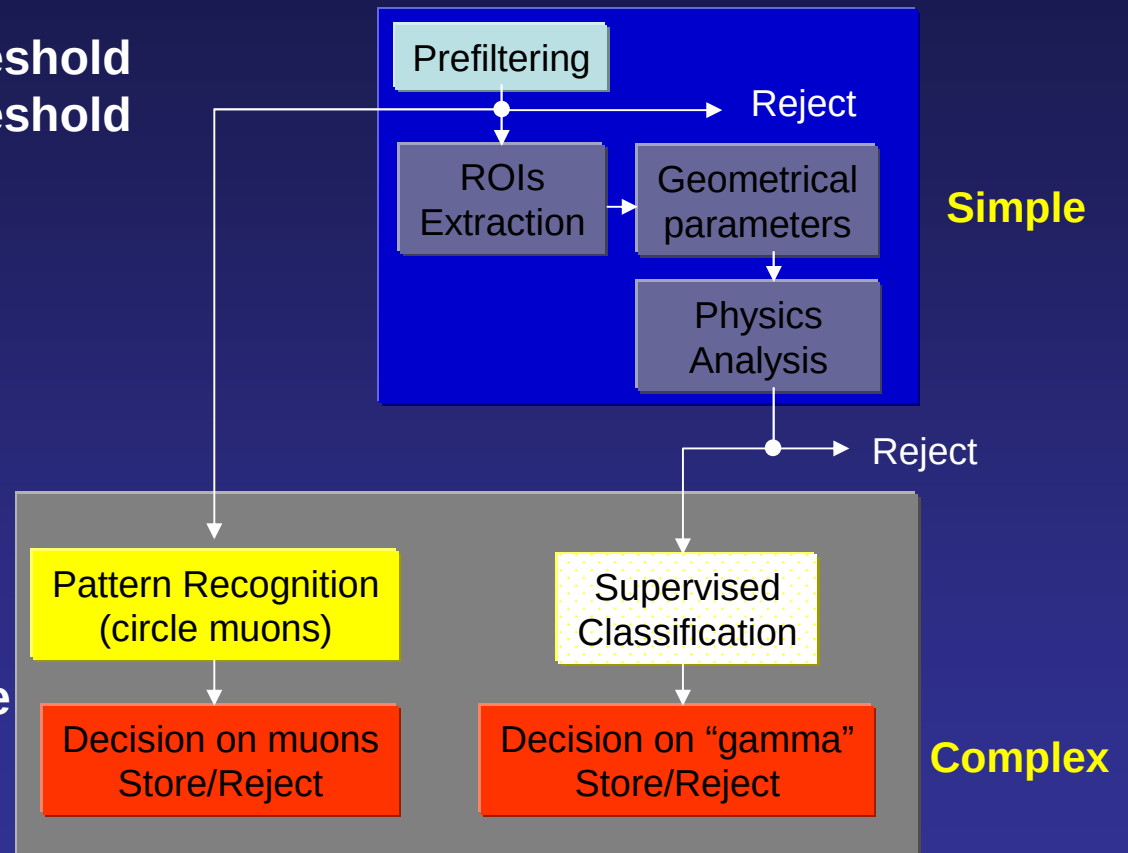
Simple Algorithms

- L1 image **clustering** (NSB)
- Comparison of clusters in the 2 binary images (muons)
- **Hillas**: **L/S** (muons)
scaled width (hadrons)
 α plot (for point sources)

A rejection factor of ~ 2 is possible

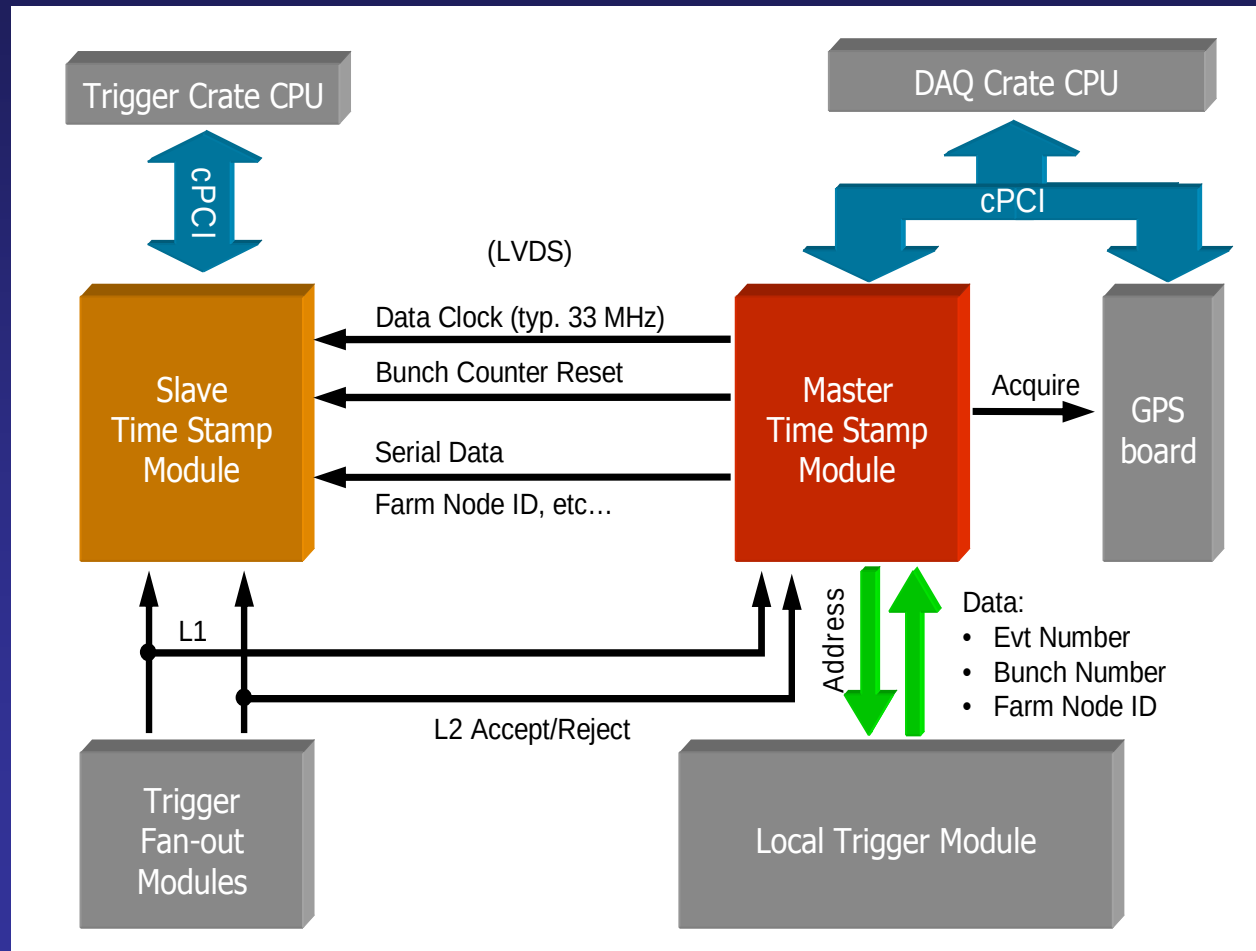
Complex Algorithms

Neural Networks

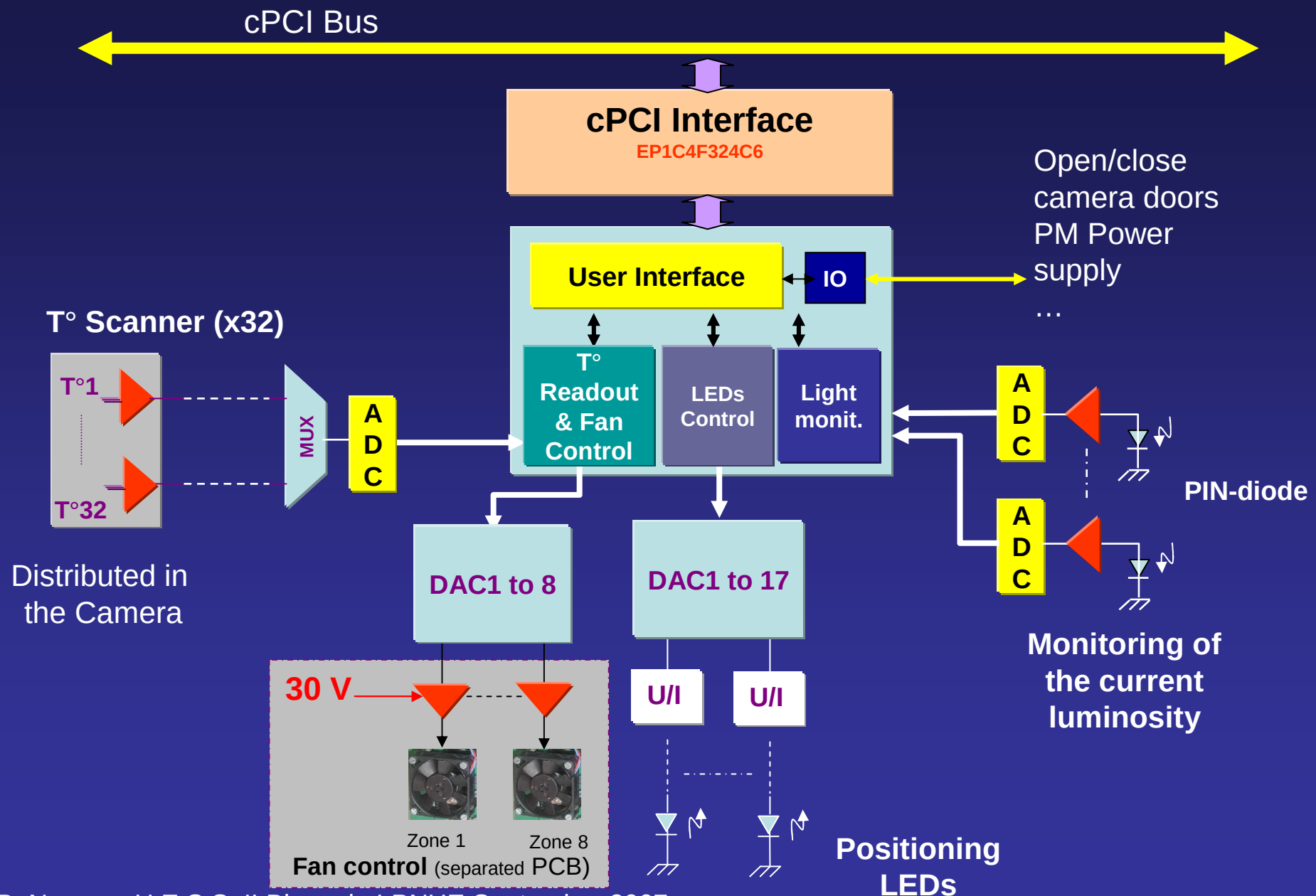


Time stamp

- Used to synchronize the Trigger and DAQ events



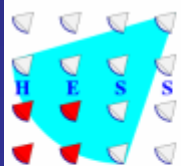
Camera Security



Quality Procedures

From the PMT to the DAQ boards:

- To each relevant element a Database Form (MySQL) is filled out during:
 - . the test phase
 - . The maintenance phase
- Direct Access by code bar
(on PMTs, Asics, boards, drawers, etc...)
- Full documentation on CPS (Collaborative Portal Server)



Welcome to the French Collaboration Server

Vous pouvez avoir une version française du site en cliquant sur le drapeau français à droite

Public Section

HESS-I Collaboration

HESS-I Labo

HESS-II Labo

HESS-II Collaboration

Help

Member Areas

HESS-I

HESS-II

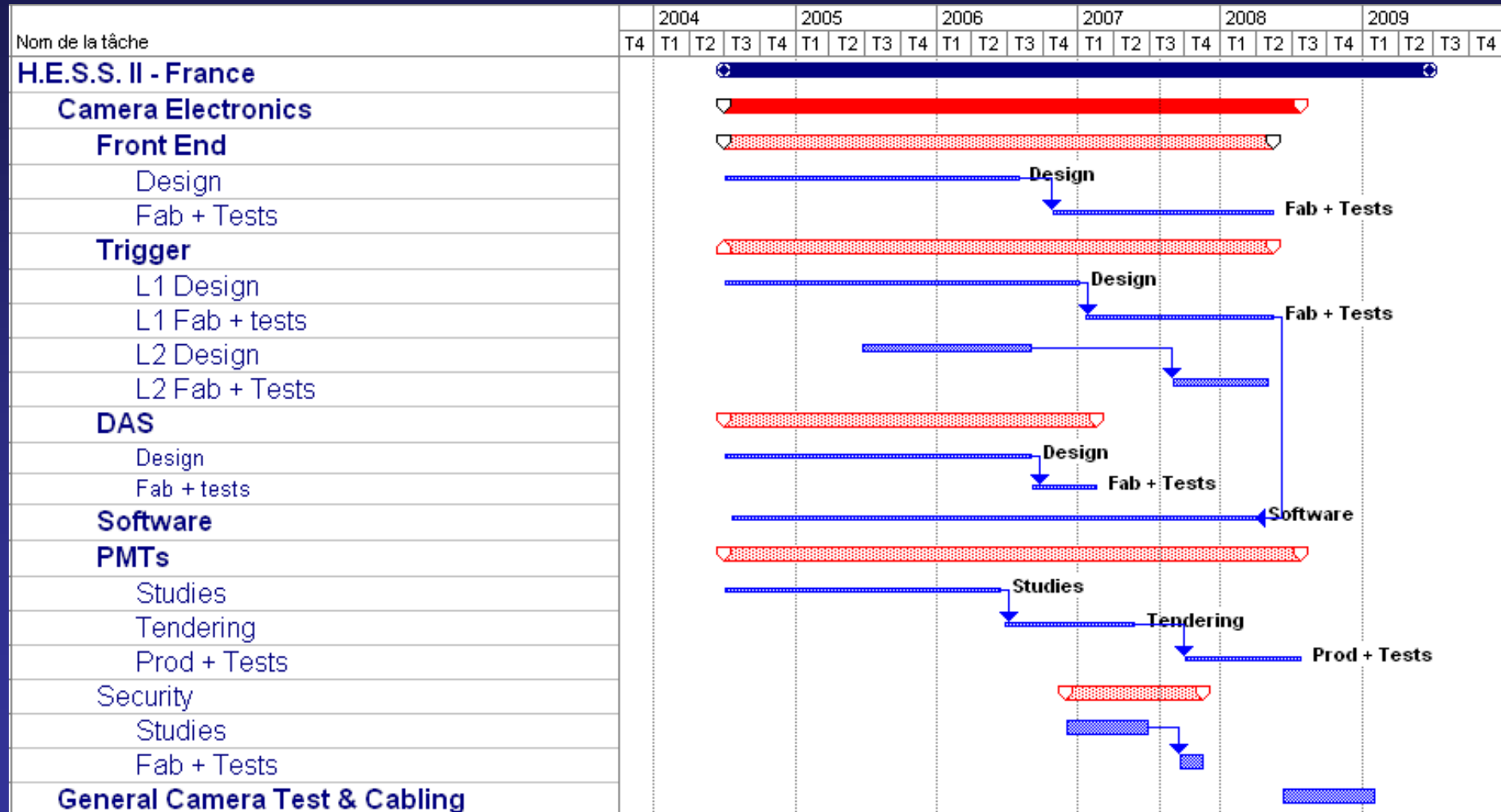
Gamma-Rays Astronomy

+

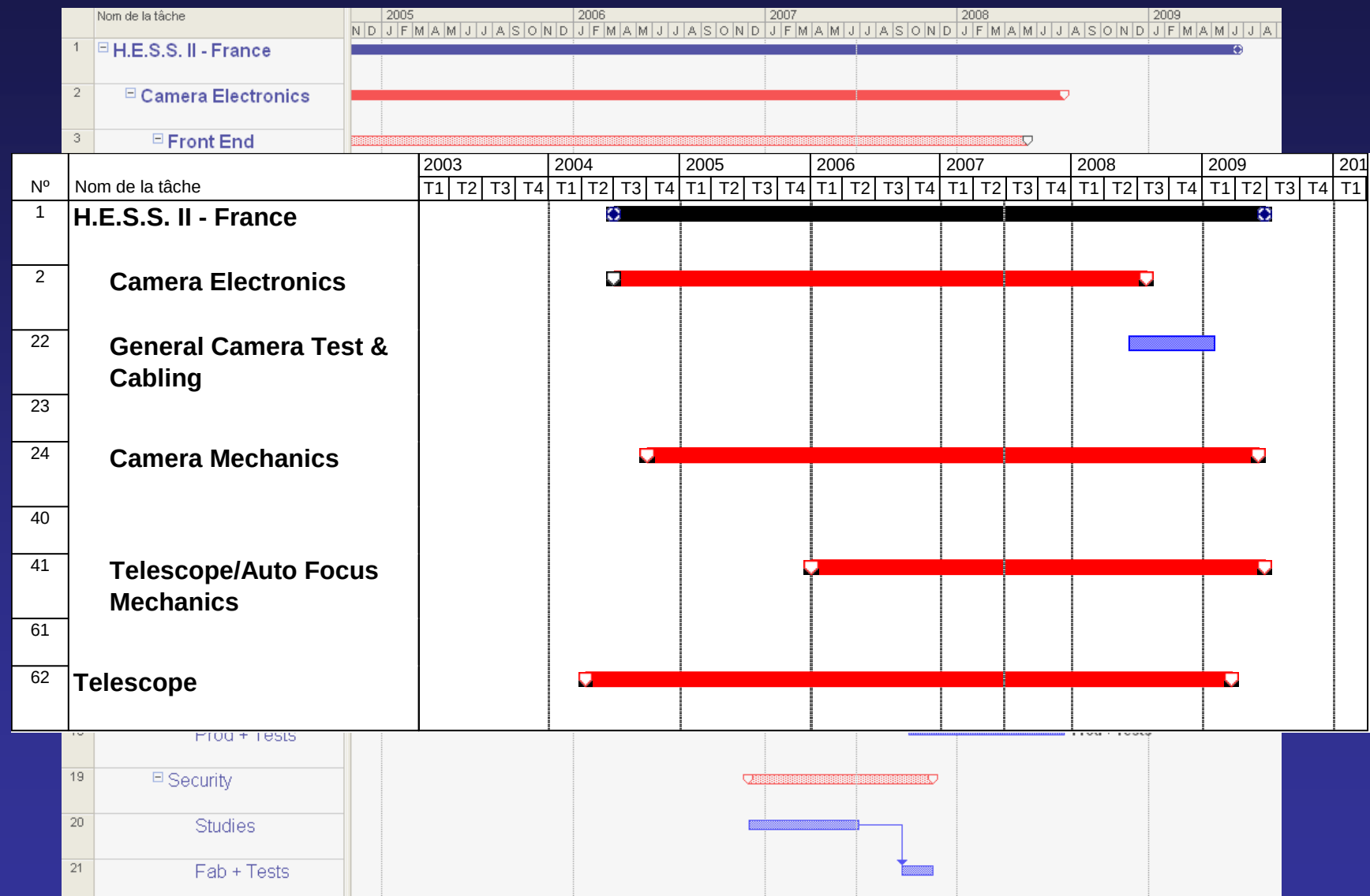
The PMTs Story

- October 2006: (incomplete) answer to the tender by *Photonis*
- Proposed price: 238 € /PM
- (tube 175 € +base 58€ + rings 4€)
- Negotiations led to **-3 € on the HV base** (April 12, 2007) ✓
- **Total price: 585000€**
- **Ordering done end of May 2007** ✓
- **2500 PMTs should be received between Oct 07 and May 08**

H.E.S.S. II Electronics Status (continue)



General Planning (HESS II)



Risks Assessment & Conclusions

- **Interfaces** (Mechanical, Trigger, DAQ/Software) possible risk of delay
- **Planning** (last tests for non-prototypal e.g. loading/unloading part, pneumatics, etc...) possible risk of delay
- **Transport** (Boat + trucks)
 - Not a probable risk but a catastrophic loss!
- **HESS-II will be ready to run in June 2009**

