

# **CMS HCAL Detector Controls Overview**

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**D. Lazic / J. Elias**

# **CMS HCAL Control Tasks**

1. Monitor readout box temperatures and voltage  
(132 boxes, 12 values per box)
2. Monitor rack mounted electronics  
(26 crates, maybe not needed)
3. Control and monitor high voltage supplies  
(2000 PMT's, 500 HPD's)
4. Control and monitor front end electronics supplies  
(132 units)
5. Control and monitor laser calibration operations  
including data acquisition and processing
6. Control and monitor radioactive source calibration  
operations including data acquisition and processing
7. Download and readout of electronics  
(15000 channels)
8. Control and monitor test beam equipment and  
devices
9. Control and monitor quality control equipment in  
Bat. 186 assembly facility

# **HCAL DCS Phases 2001-2005**

## **A. Test beam and Building 186 Phase 2001-2002**

Basic task - quality control of the assembly. Minimal number of channels (one 36th of the whole HB), no final electronics, no TTC...

- 1) System prototypes already used in the test beam
- 2) Second generation to be made PVSS compatible while keeping all the functionality

*Learning phase!!!*

## **B. Electronics Burn-in at Point 5 Phase**

TTC, limited number of wedges, more realistic conditions, HB+, HB-, HE+, HE- ...

- 1) Calibration systems integrated with DAQ system.
- 2) Local DAQ development
- 3) Some degree of integration with the global DCS

*Test and integration phase!*

## **C. Accelerator Operations Phase**

*Full integration with CMS DAQ and DCS system!*

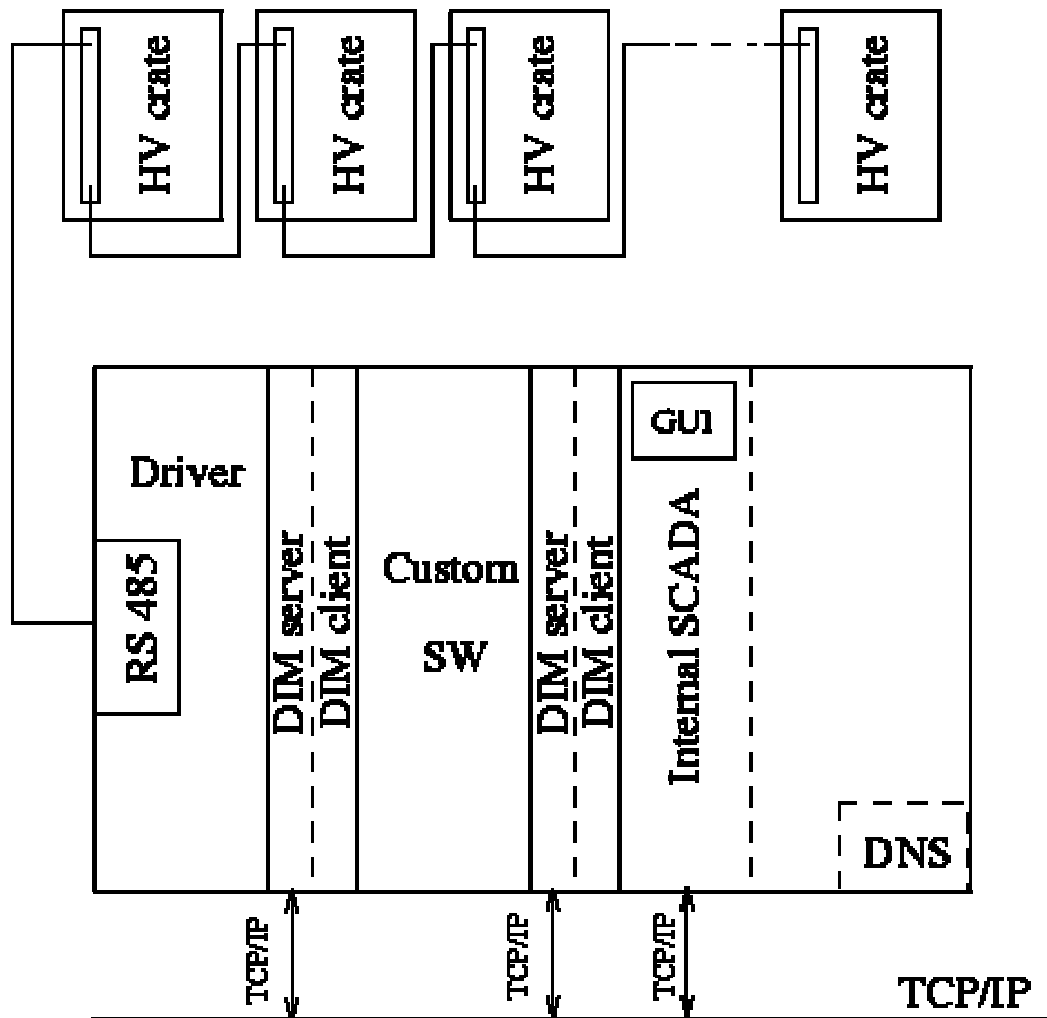
# **HCAL Process Level Control Systems in 2001**

Assembly of HB- wedges in Bat. 186 and their quality control. Needs:

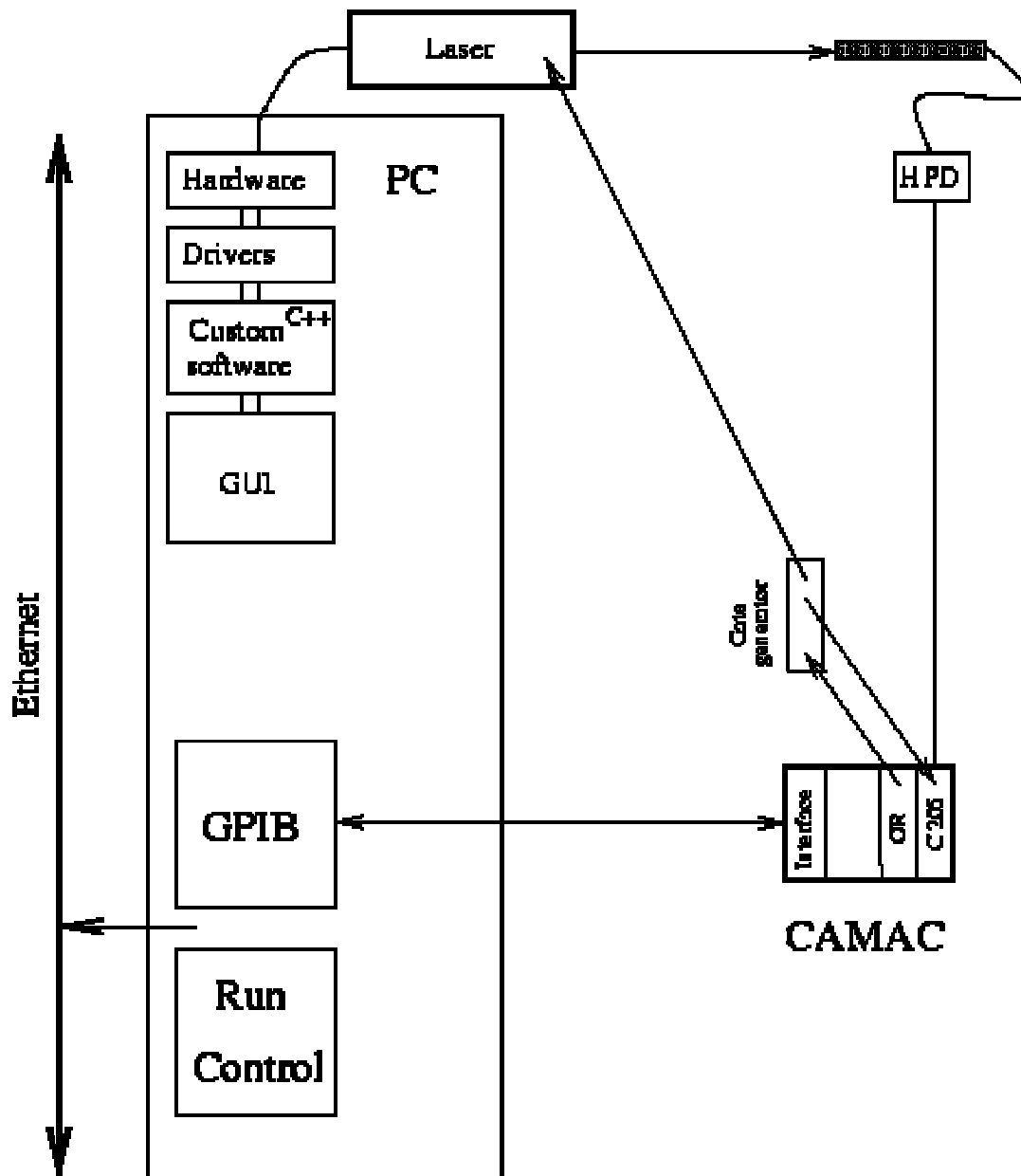
- High voltage control
- Source calibration
- Laser calibration

The stand alone systems exist: we need to integrate them and make the transition to CMS DCS / PVSS II as smooth as possible.

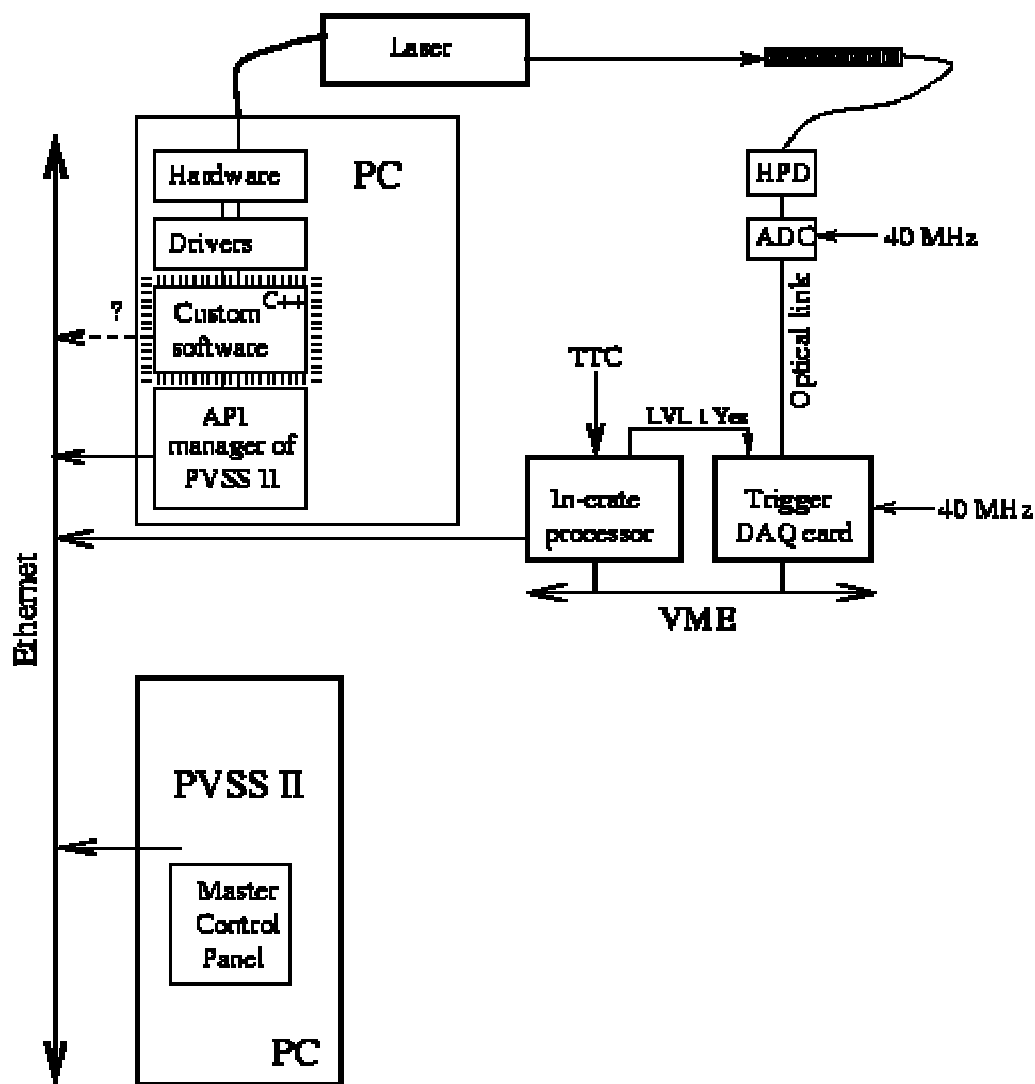
High voltage control system (PVSS II) under development:



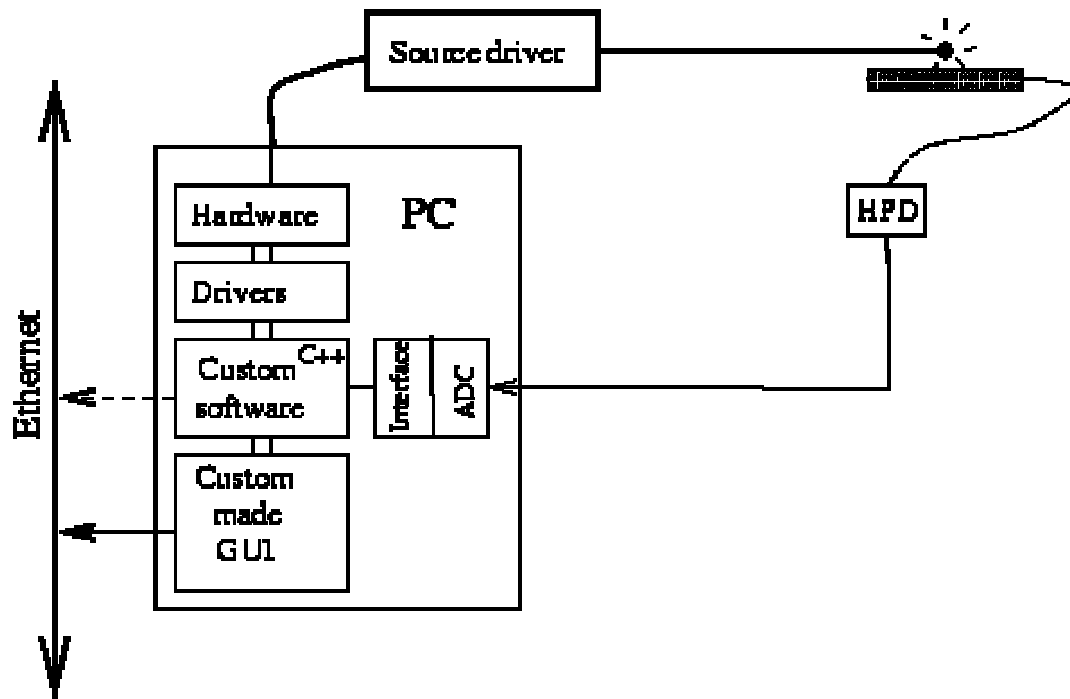
Stand-alone laser calibration system:



An example of the CMS-like laser calibration system:

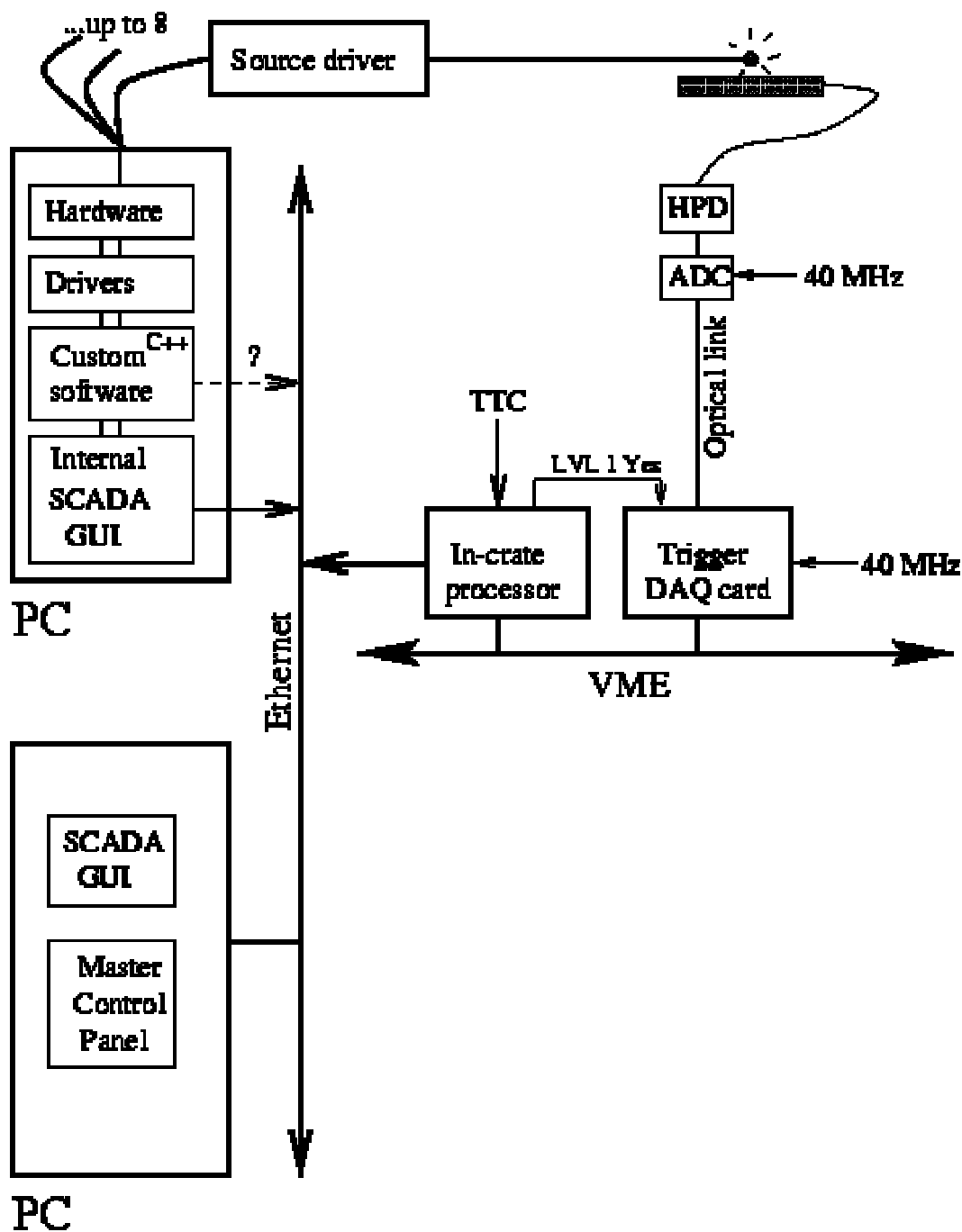


Stand-alone source calibration system:





An example of the CMS-like source calibration system:



# SUMMARY:

HCAL DCS systems will gradually evolve from their stand-alone version to an integrated system which will eventually be fully compatible with CMS DCS. In order to achieve that goal we have to:

- start early
- reuse the existing code
- decouple building blocks
- learn from others and share our experience