ATLAS DCS

DCS Activity at Tilecal Calibration

Outline

- Testbeam organization.
- DCS Tasks
- Tilecal DCS requirements
- Setup
- Connection to external systems
- SCADA Application
- Example: Cooling Studies
- Summary

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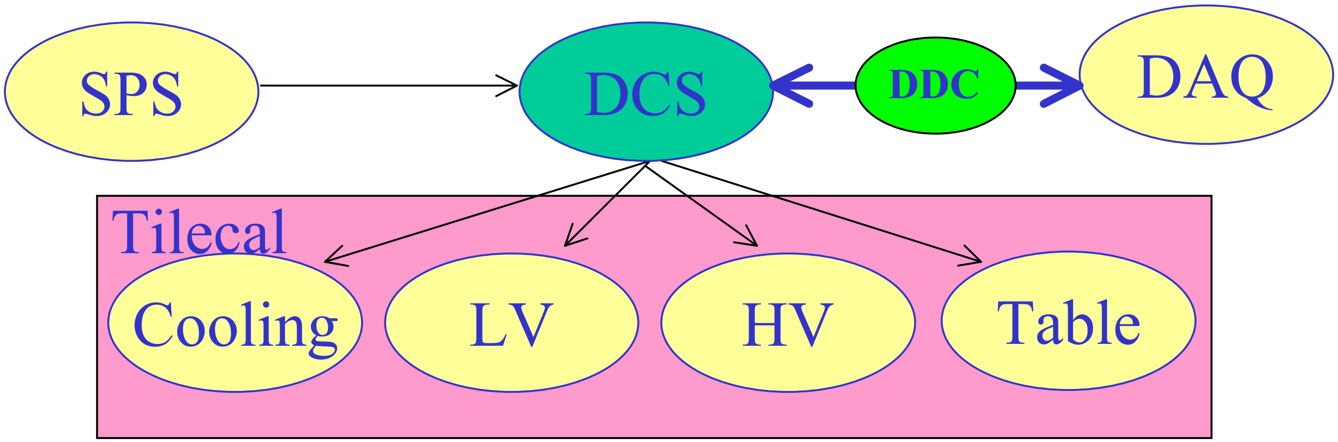
DCS Test-beam Activity at Tilecal

Scope

- Calibration of 12% of the Tilecal modules using particles.
- Integration of the different DCS subsystems of Tilecal.
- Introduce standard DCS tools in the Tilecal community.

Collaboration CERN/DCS and Tilecal group from Clermont-Ferrand

Systems:



DCS Tasks:

- Provide monitoring and control functionality to the different Tilecal subsystems
- Enable interface with the SPS.
- Allow for bidirectional data exchange with DAQ.
  - DCS -> DAQ needed for offline analysis of DAQ data
  - DAQ -> DCS, e.g. DAQ notifies start of run.

Tilecal DCS subsystems

Cooling & LV Systems:

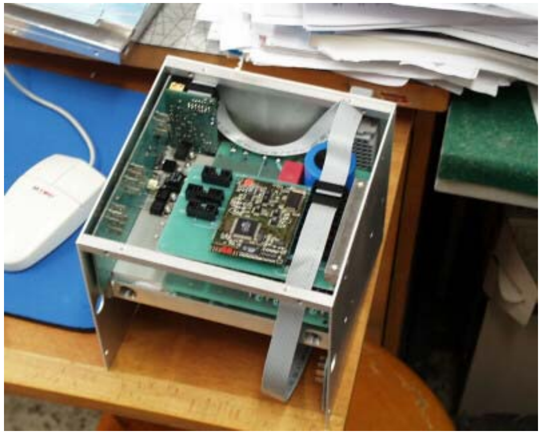
Requirements:

– Monitoring of 6 x 3 NTC probes (Temperatures outside the drawers & LV PS), states, alarm and temperatures of the different devices of the cooling unit: vacuum pump, temperature controller, flowmeter,…

– Monitoring and Control of the LV PS => Extend ELMB functionality (DAC)

– Automatic actions on the LV PS in case of overheating or overvoltage.

– Readout rates: Cooling ~20s, LV ~3s



How:

Control system using the ATLAS DCS vertical slice: ELMB - CANopen OPC Server - PVSS

(Cooling uses ELMB-MB for signal adaptation while LV directly plugs the ELMB onto their electronics)

HV

• VME-based control system already existing, developed in Bridge-View.

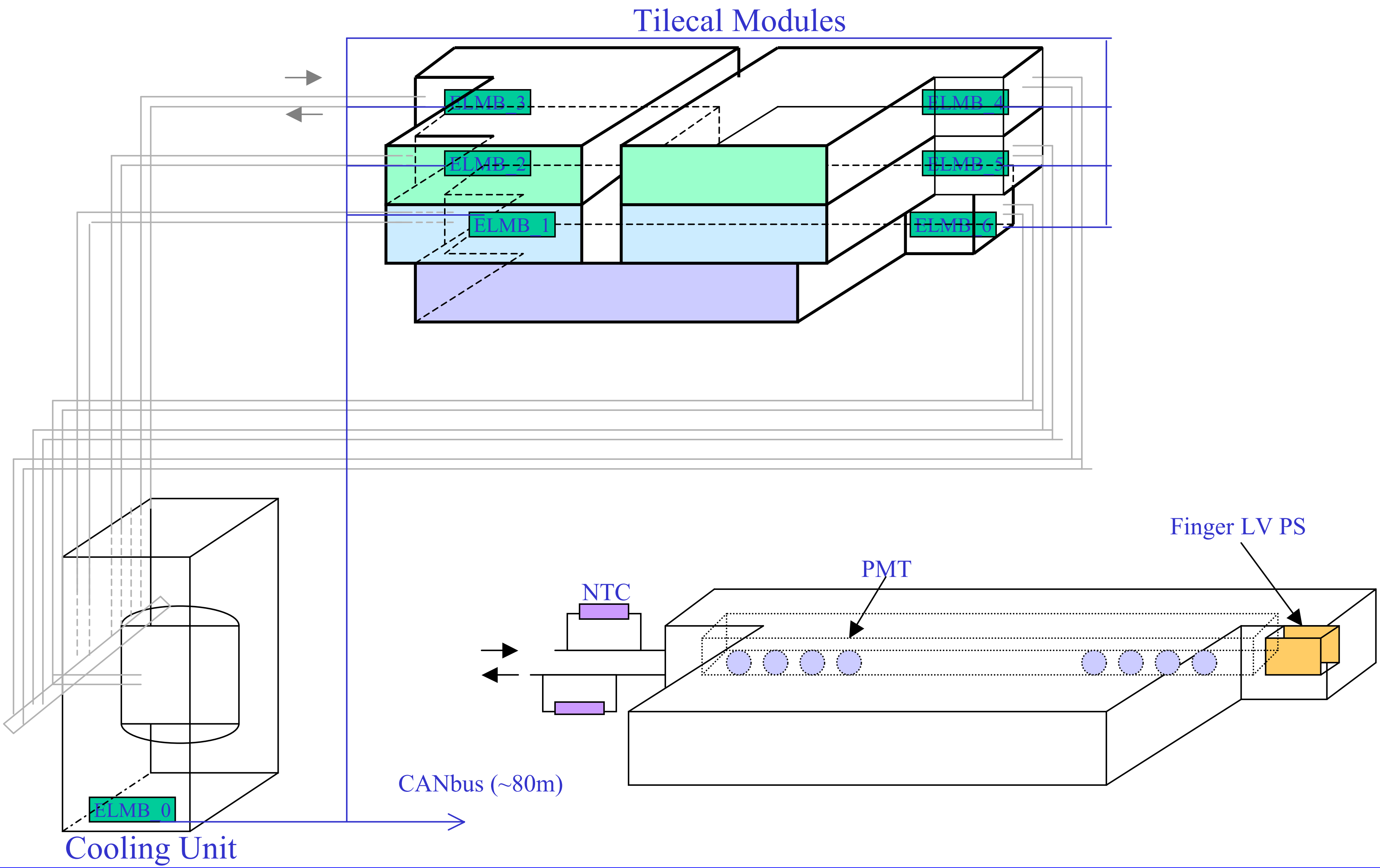
• Monitors and controls 6 x 32/45 PMT HV values, 6x7 temperatures, and 6 x 6 parameters from the HV power supplies.

• SW Interface to PVSS for data exchange.

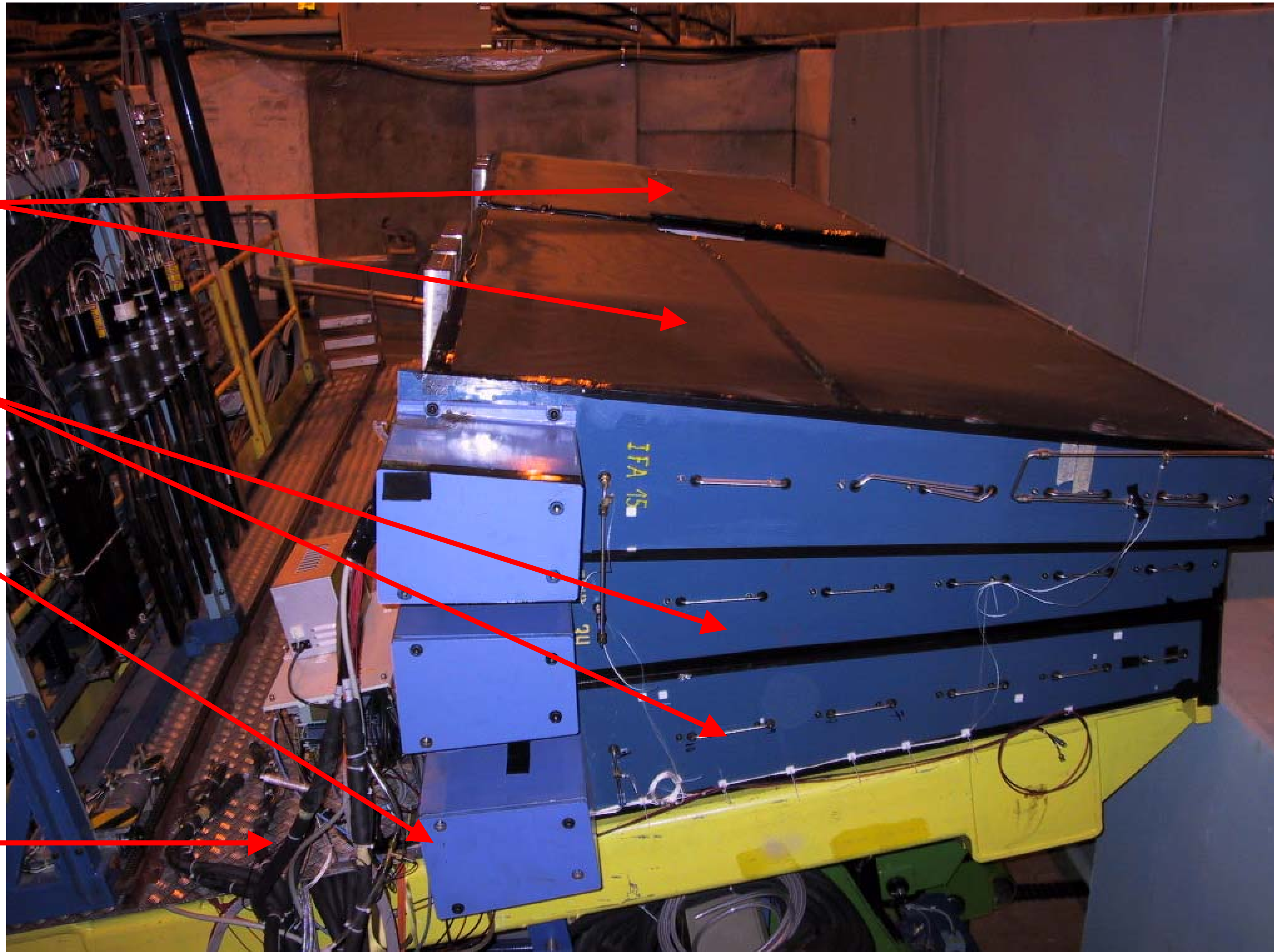
DLL accessing WNT shared memory by BV and PVSS.

• Readout rate ~10 s

Tilecal Setup



Tilecal Setup



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Connection to SPS and DAQ

SPS:

- C-interface for beam line H8/SPS
  – Readout rate of Tilecal SPS non-standard-block: 2 min.
  – This file was directly imported in PVSS-II

Table:

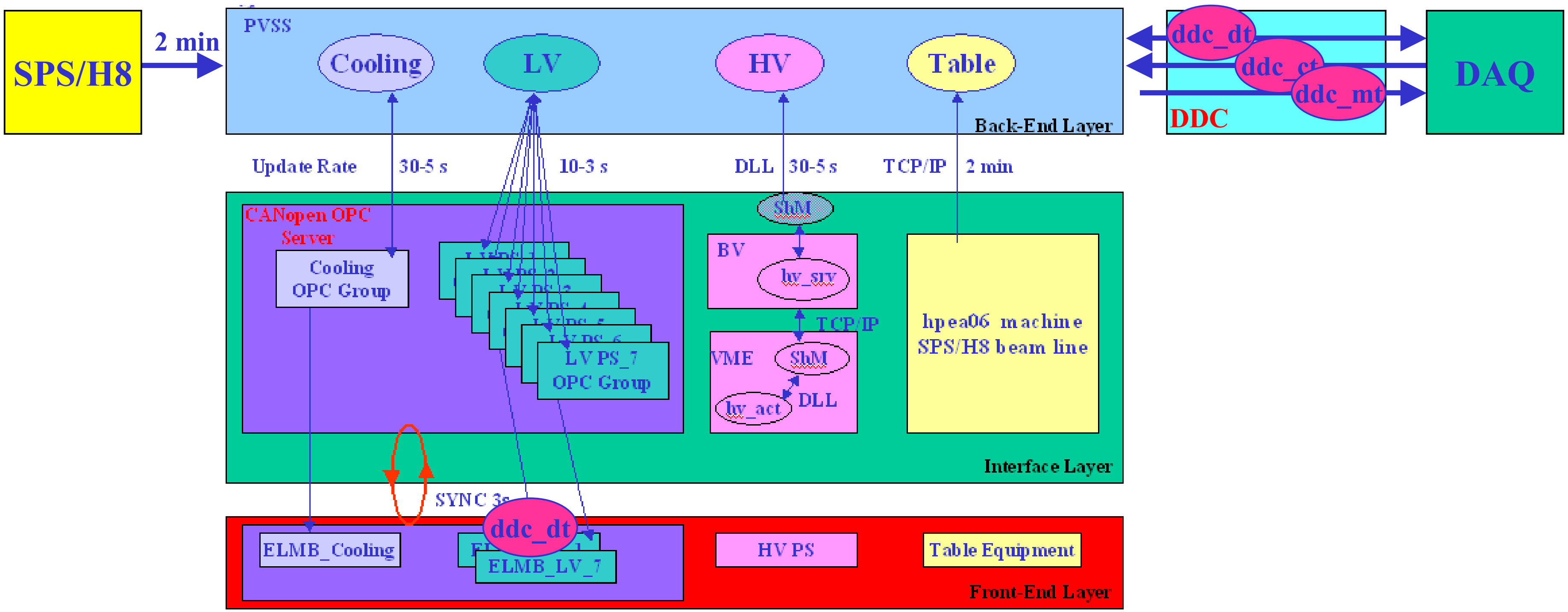
- Remote shell to hpea06 SPS machine
  - The table file is directly imported in PVSS-II every 2 min.

DAQ:

– Interfaced using DDC SW (V. Khomoutnikov & R. Hart)
– DDC is a PVSS API manager running in the DAQ linux cluster.
– Consists of: DDC_DT which connects to the IS, DDC_CT which connects to the Run Control & DDC_MT connecting to the DAQ MRS
– All relevant DCS parameters (Tilecal + SPS) for offline analysis will be transmitted to DAQ using DDC_DT.
– HV problems were reported to DAQ using DDC_MT
– Start and End of Run were notified by means of DDC_CT triggering respective actions in the DCS side.
– DDC transmits data only on change => PVSS implements data smoothing to reduce the data volume on the DAQ side.

First usage of the DDC SW in a real application

DCS Test-beam SW Architecture



System	Number of Channels	Update Rate (s)
Cooling	27	5 to 30
Low Voltage	220	3 to 10
High Voltage	384	10 to 30 s
Table	20	120
SPS/H8 Beam Line	256	120
	Total = 907 (820 transferred to DAQ)	

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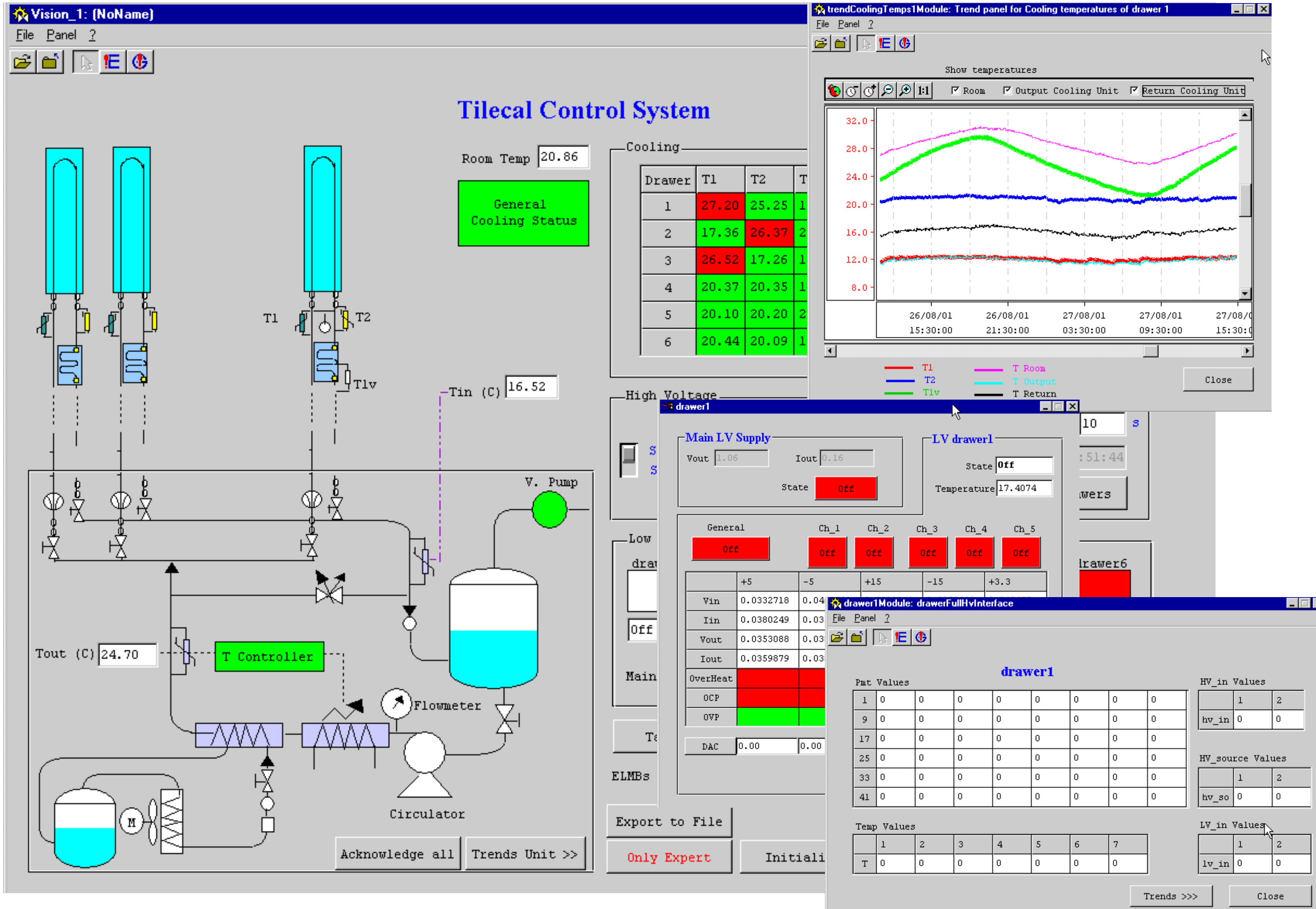
Test-beam Operator Panels



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Application features

- Powerful GUI
- Modularity, i.e. dedicated panels for each subsystem
- Alert handling
- Trending
- Archiving
- Data Smoothing
- Flexible Web Interface for remote SQL queries.

http://pcatlas206.cern.ch:2001/

DCS History: SQL Queries to the PVSS Database

This interface enables SQL queries to the PVSS-II databases for a particular run number. DCS Information archived from the start of run until the next run has been initiated is stored in an ASCII file which can be downloaded to your local hard-drive. This information can be limited to a particular DCS subsytem and Tilecal Module.

Hints:
Type a run run number, select a DCS subsystem and then Tilecal module (for Cooling, HV and LV) you are interested in and press the "SQL Query" button.

Only valid for September testbeam period starting from run 120360

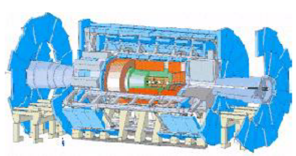
Run Number: 120360

System cooling Drawer 1

SQL Query

Questions or suggestions to: Fernando Varela

Tilecal DCS Web Site: Testbeam Summer 2001



Welcome

Welcome to the Tile Calorimeter Detector Control System (DCS) web site. This page gives you the link to all available DCS info, which is related to the
present and future calibration activity for the Tile calorimeter modules at the SPS/H8 beam line, at CERN, Prevessin.

Below are two links to the data for the Tilecal Testbeam. The first link, "DCS Online Info" allows for the visualization of the present values and states of the different DCS subsystems, namely, Cooling, High Voltage (HV), Low Voltage, Beam and Table, i.e. online information directly from the testbeam installation.
The second link "DCS History" enables SQL queries to the PVSS-II database in order to retrive the history of the DCS channels. Queries may be performed per DCS subsystem and Tile module. Results of these queries are stored in an ascii file which may be downloaded to your local hard drive for offline analysis.

DCS Online Info	DCS History	notReadyYet

Send feedback to: Fernando Varela

Document: Done

Tilecal Testbeam Cooling Data

Below are the readings for the Cooling system of the Tilecal Testbeam. The test was conducted at CERN, Prevessin during in August 2001

The Cooling Unit Information...

Device	Status (mA)	Date/Time Stamp
Vacuum Pump	Off	05.10.2001 15.29.37
Temperature Controller	OK	05.10.2001 15.29.37
General Alarm	OK	05.10.2001 15.29.37
T Room	21.0012	05.10.2001 16.54.16
T Output	16.382	05.10.2001 15.29.36
T Return	16.7498	05.10.2001 15.29.26
Flow	0.00193153	05.10.2001 15.29.27
Pressure	-249.508	05.10.2001 15.29.27

Temperatures outside the modules...

Drawer	TcIn	Date/Time Stamp	TcOut	Date/Time Stamp	Tlv	Date/Time Stamp
1	16.3979	05.10.2001 16.54.03	16.912	05.10.2001 16.54.08	22.7412	05.10.2001 15.29.36
2	22.4817	05.10.2001 16.54.09	16.3889	05.10.2001 16.54.09	21.3785	05.10.2001 15.29.36
3	16.3499	05.10.2001 16.54.11	22.5644	05.10.2001 16.54.11	23.004	05.10.2001 15.29.36
4	16.4835	05.10.2001 16.54.12	16.9326	05.10.2001 16.54.12	20.7657	05.10.2001 15.29.36
5	21.4436	05.10.2001 16.54.13	21.6097	05.10.2001 16.54.13	21.3931	05.10.2001 15.29.36
6	21.5361	05.10.2001 16.54.14	21.3238	05.10.2001 16.54.14	20.7191	05.10.2001 15.29.36

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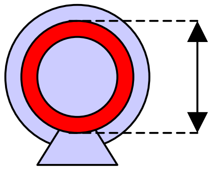
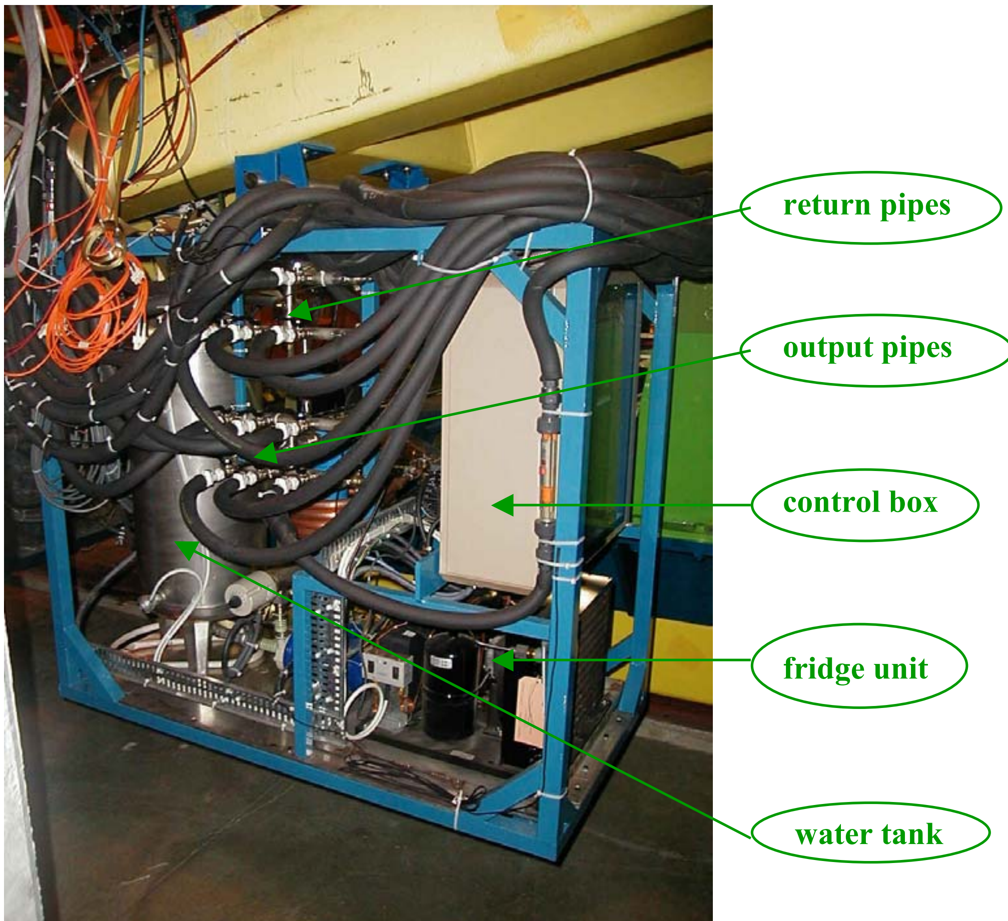
Cooling Studies



Real size system → ΔT ~ 4 ºC

Need to study the response of the modules as function of the temperature of the cooling liquid



Tests:

1- System Performances and Stability

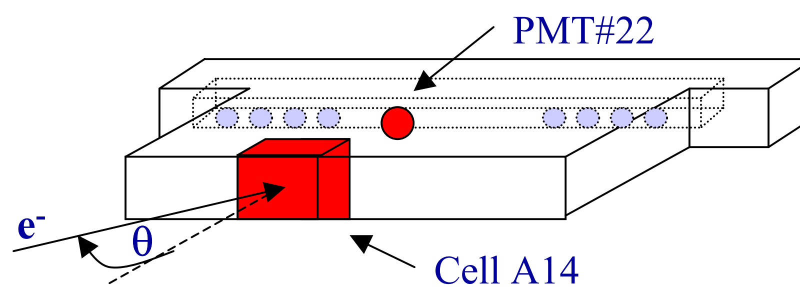
2- variation of the water input temperature

→ PMT gain variation with particles (180 GeV electrons shooting in cell A14, CIS and Laser System)

→ drawer temperatures variations

3- variation of the water flow

→ drawer temperatures variations



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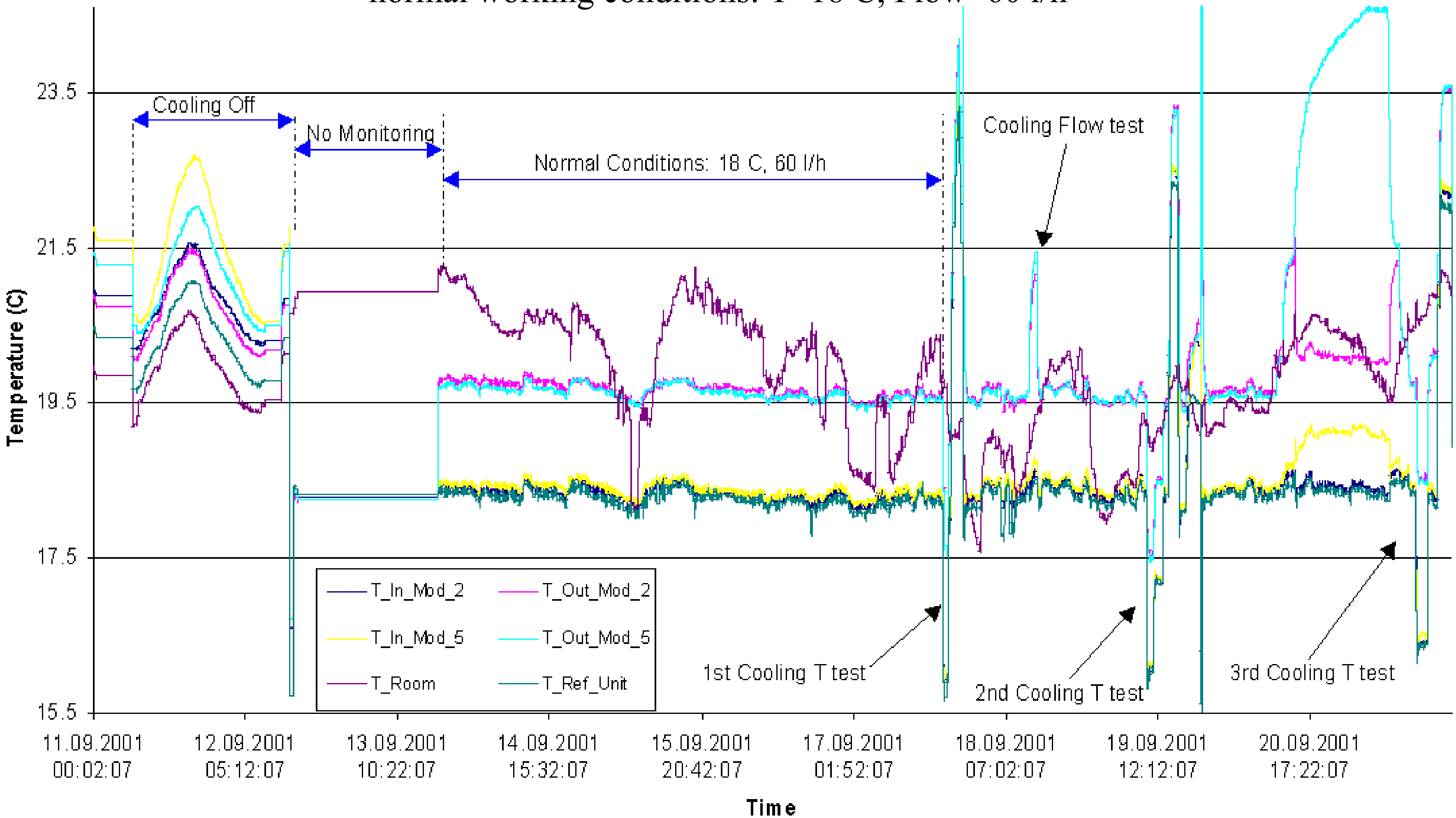
Cooling Studies (II)

Temperature Outside the Modules

normal working conditions: T=18 C, Flow=60 l/h



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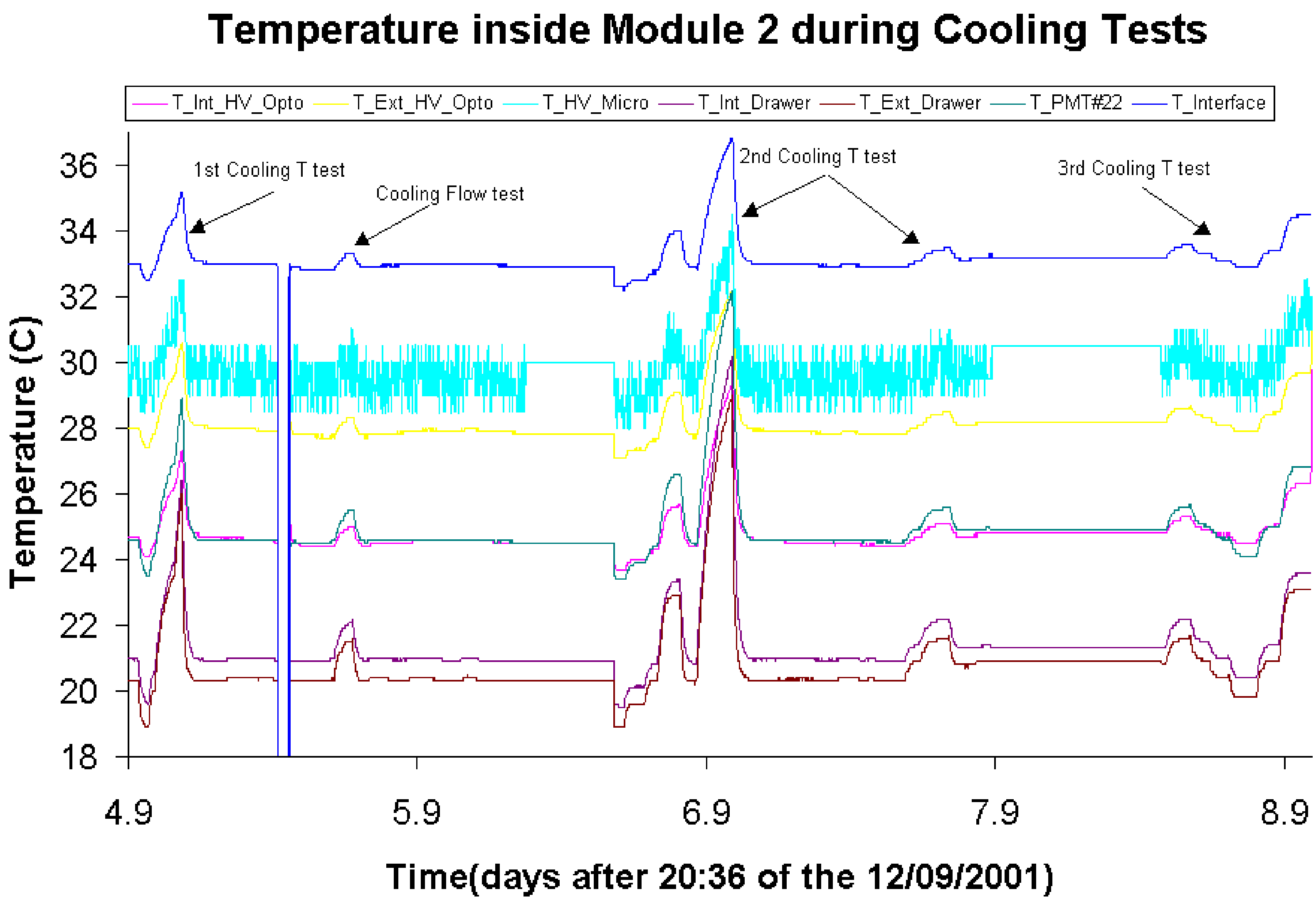
Cooling Studies (III)



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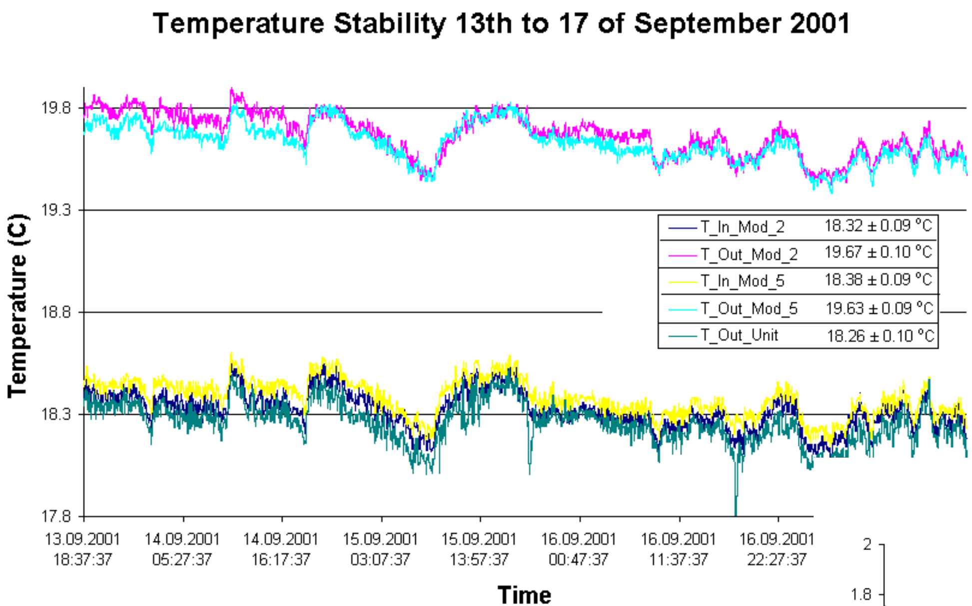
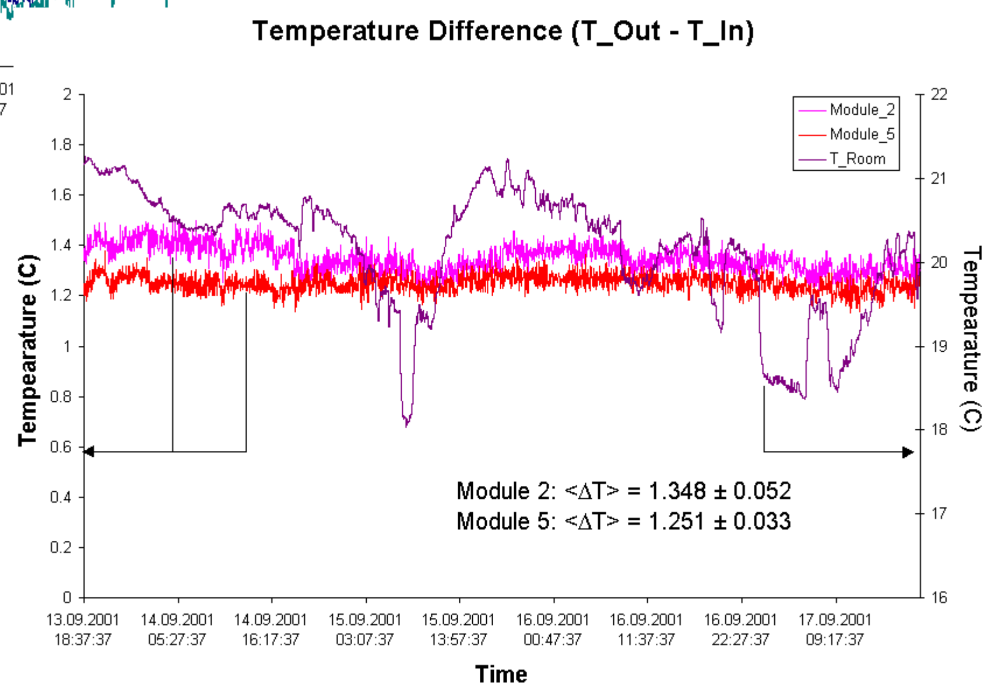
Cooling Studies (IV)





Cooling Studies (V)

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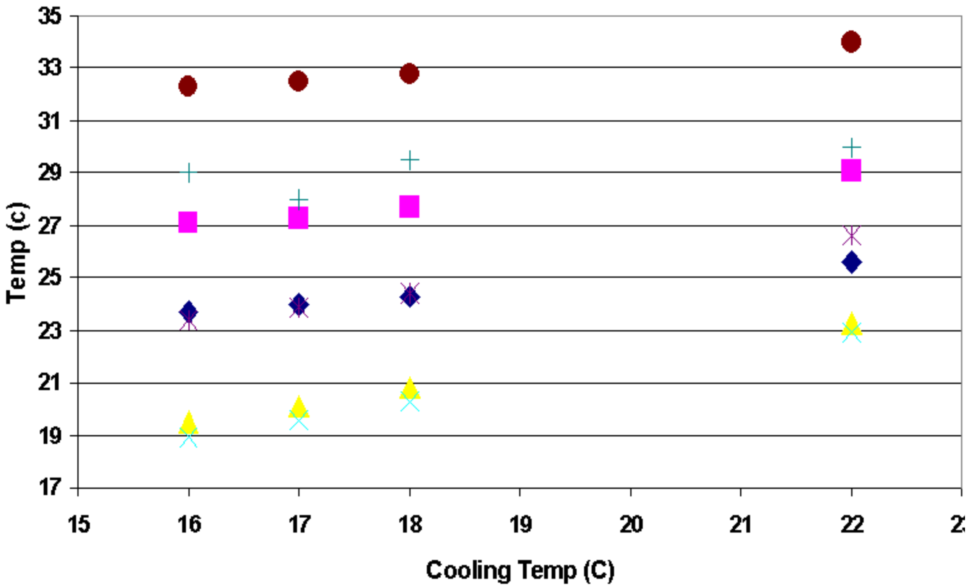
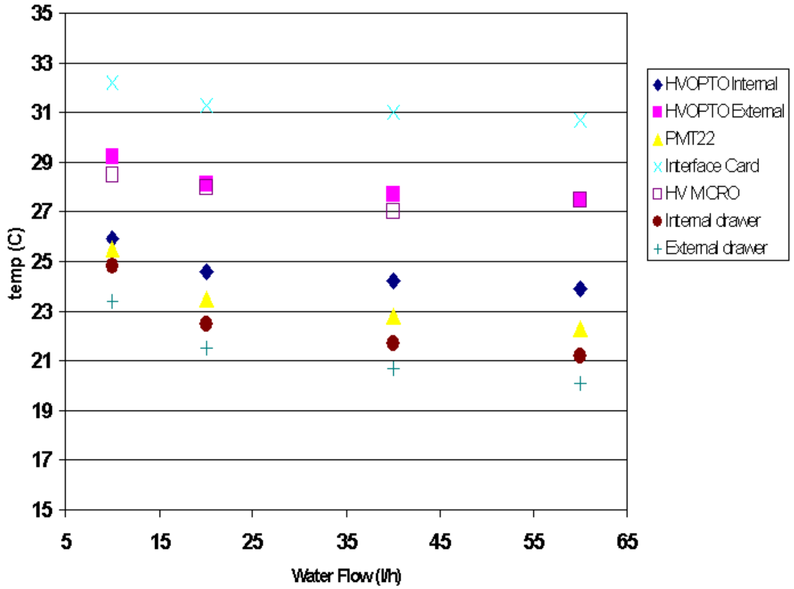
Drawer temperatures variations

Drawer 2 - Flow = 60 l/h



Water flow variations

Drawer 2 - T = 18 C

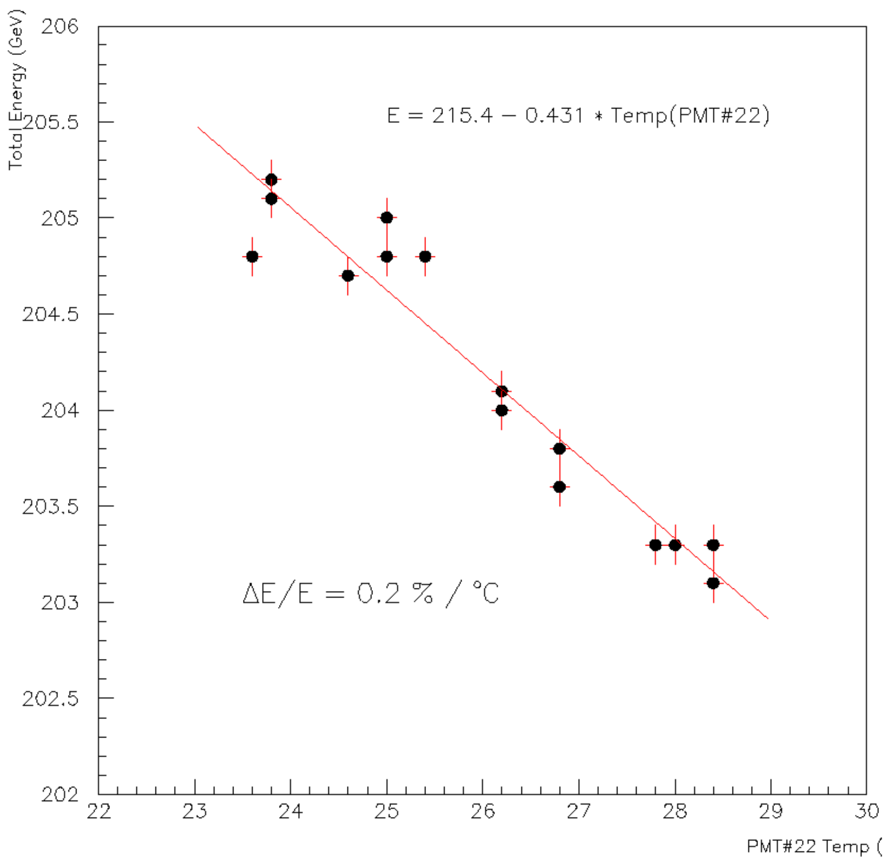


Cooling Studies (VI)

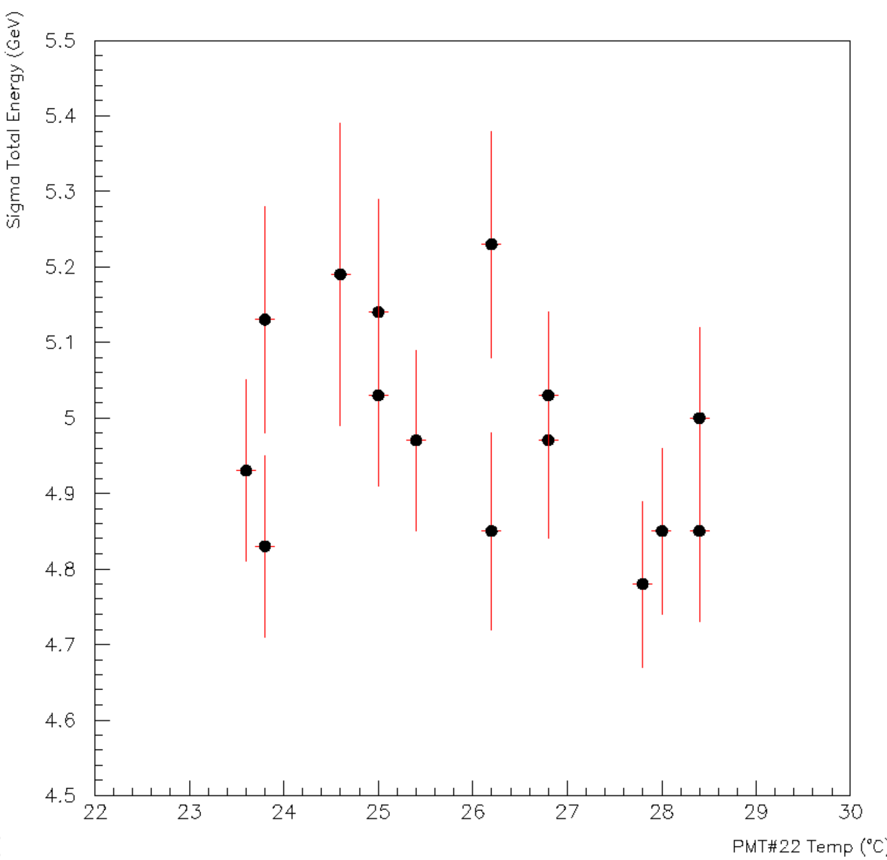
total energy deposited versus temperature in PMT#22

$\Delta E/E = 0.2\ \%\ /C$ (as expected)

Energy



resolution



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Summary

• 4 Extended and 1 barrel modules were calibrated in the 3 beam periods.
• ATLAS DCS vertical slice has shown to be flexible, robust and easy to extend.
• The SCADA application is performant, reliable and easy to maintain.
• The web interface has shown to be very useful for offline analysis.
• Some PVSS-II short-comings were identified: Trending, archiving...
• ELMB steering of LV system successfully tested but only the last day in July finding several problems -> PS must be redesigned
• Interface to the HV system also ok but too indirect => PVSS relies on BV and the later on a C program running on the VME.
• Cooling tests showed excellent performances of the system.
• The response of the modules as function of the cooling temp was found to change $\Delta E/E$ = 2 %/C
• ddc_dt, ddc_ct and ddc_mt satisfactorily tested although some issues were found and reported to the authors.
• Data volume and update rate are neither a problem for DDC nor for the DAQ DB.
• ddc_dt handling ~820 values=> Necessary to define the relevant DCS parameters for the offline analysis.
• Need for a clear definition of the requirements before the testbeam.
• Need for a naming convention (?) to be followed by the different subsystems within a subdetector.