First experience with EPICS under beam-time conditions

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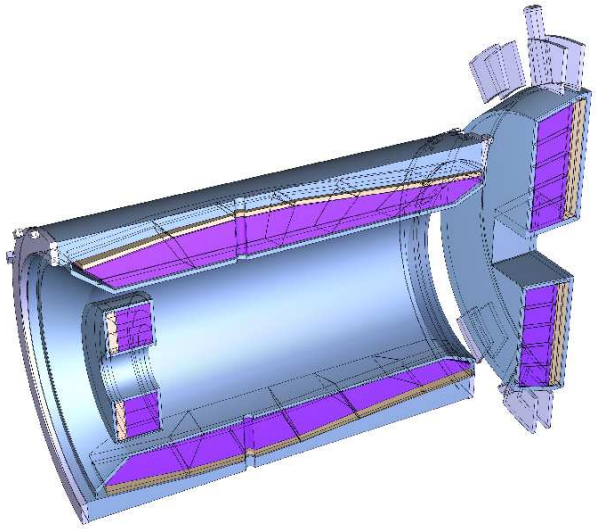
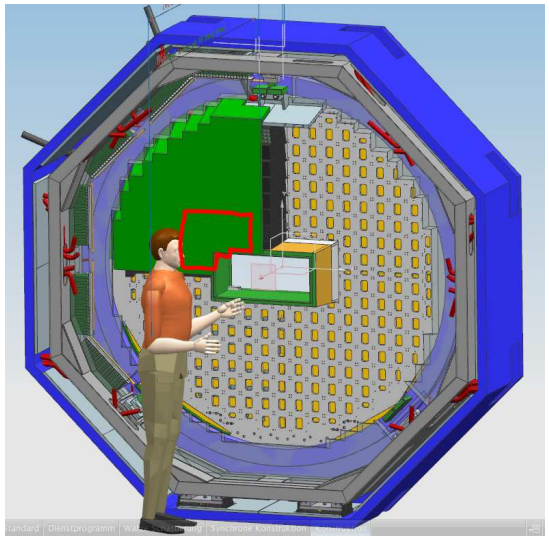
$\overline{\text{P}}$ANDA Electromagnetic Calorimeter and Proto192

- Electromagnetic calorimeter (EMC) of the $\overline{\text{P}}$ANDA target spectrometer consists of $\sim$ 16000 PWO crystals
- Designed as barrel with 2 endcaps
- Cooled down to $-25\,^{\circ}\text{C}$ to increase light yield of PWO by factor 4
- Proto192: Prototype of the forward endcap of the EMC consisting of 216 PWO crystals
- Beam tests with Proto192 at CERN (Aug.) and ELSA (Nov.)
- Prototype for PANDA (EMC) Slow Control





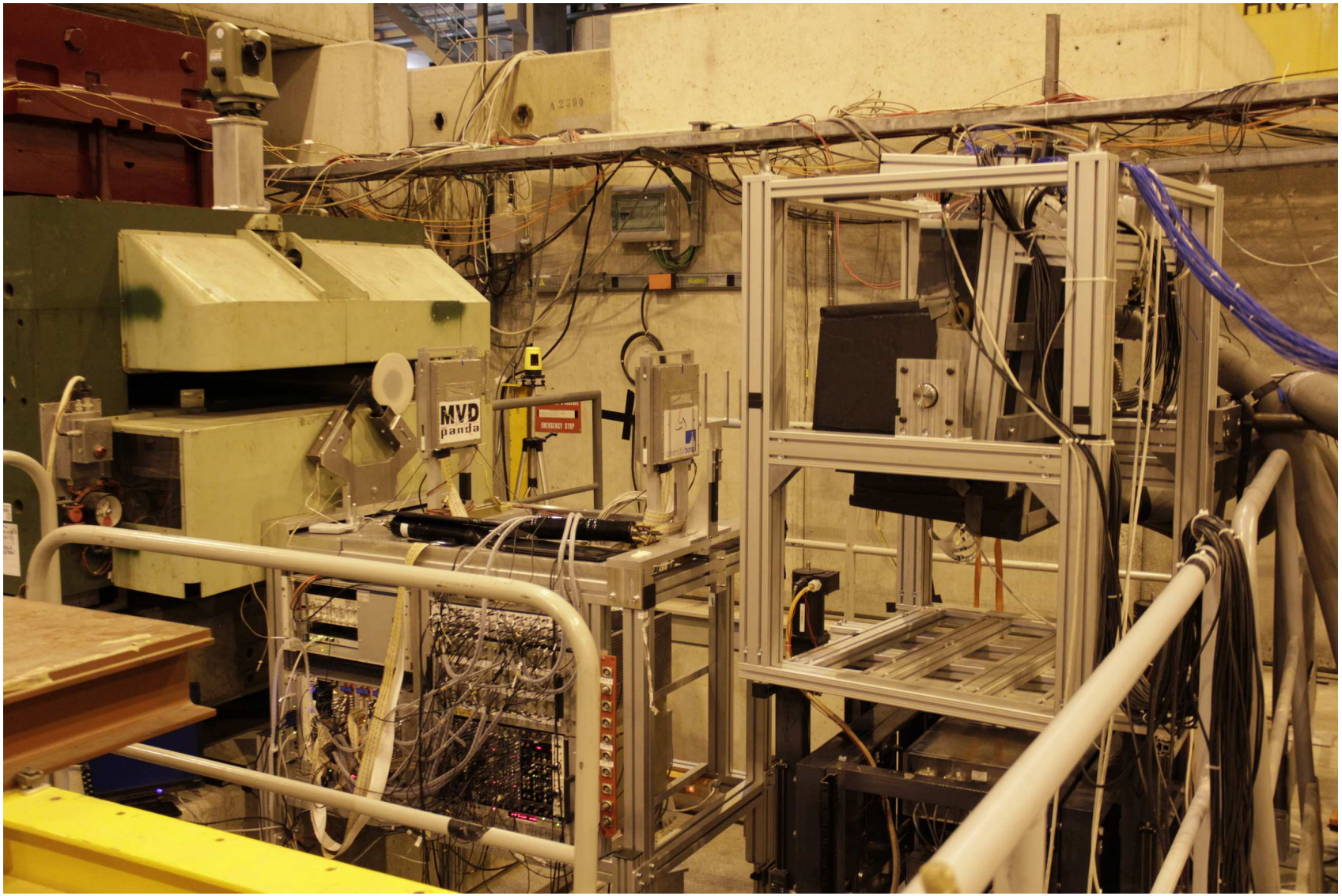
Overview of the Slow Control for EMC Proto192

- Monitoring temperature, humidity and pressure
  Temperature and Humidity Monitoring Board for $\overline{\text{P}}$ANDA (THM$\overline{\text{P}}$)
  Custom hardware with CAN interface
- Controlling light pulser for monitoring radiation damages and transmittance of the PWO crystals
  Custom hardware with CAN interface
- Controlling of VME crate by Wiener via CAN interface
- Controlling power supplies:
  ISEG EHS 8 620p-F and EHS 8 210p-F modules with ECH238 controller with CAN interface
- Controlling chillers (LH47 and FP50 from Julabo) via RS232C interface
- Used HadCon from HADES group (M.Traxler) for CAN communication

Beam Tests at CERN

- 22nd - 29th Aug 2011 at SPS
- Tertiary beam parameters:
  - 10 GeV positrons, beam diameter $\approx$ 2 cm
  - 15 GeV positrons, beam diameter $\approx$ 2 cm
  - 150 GeV muons, beam diameter $>$ 15 cm
- Tracking station from Bonn placed in front of Proto192 (scintillating fibres + 2 prototype components of MVD)
- Used X-Y-table to scan each crystal

Beam Tests at CERN



Setup of Slow Control at CERN

PC (Quad-core, 2.83 GHz, 8 GB RAM)

- Running EPICS IOC, archiver, MEDM
- Controlling three chillers

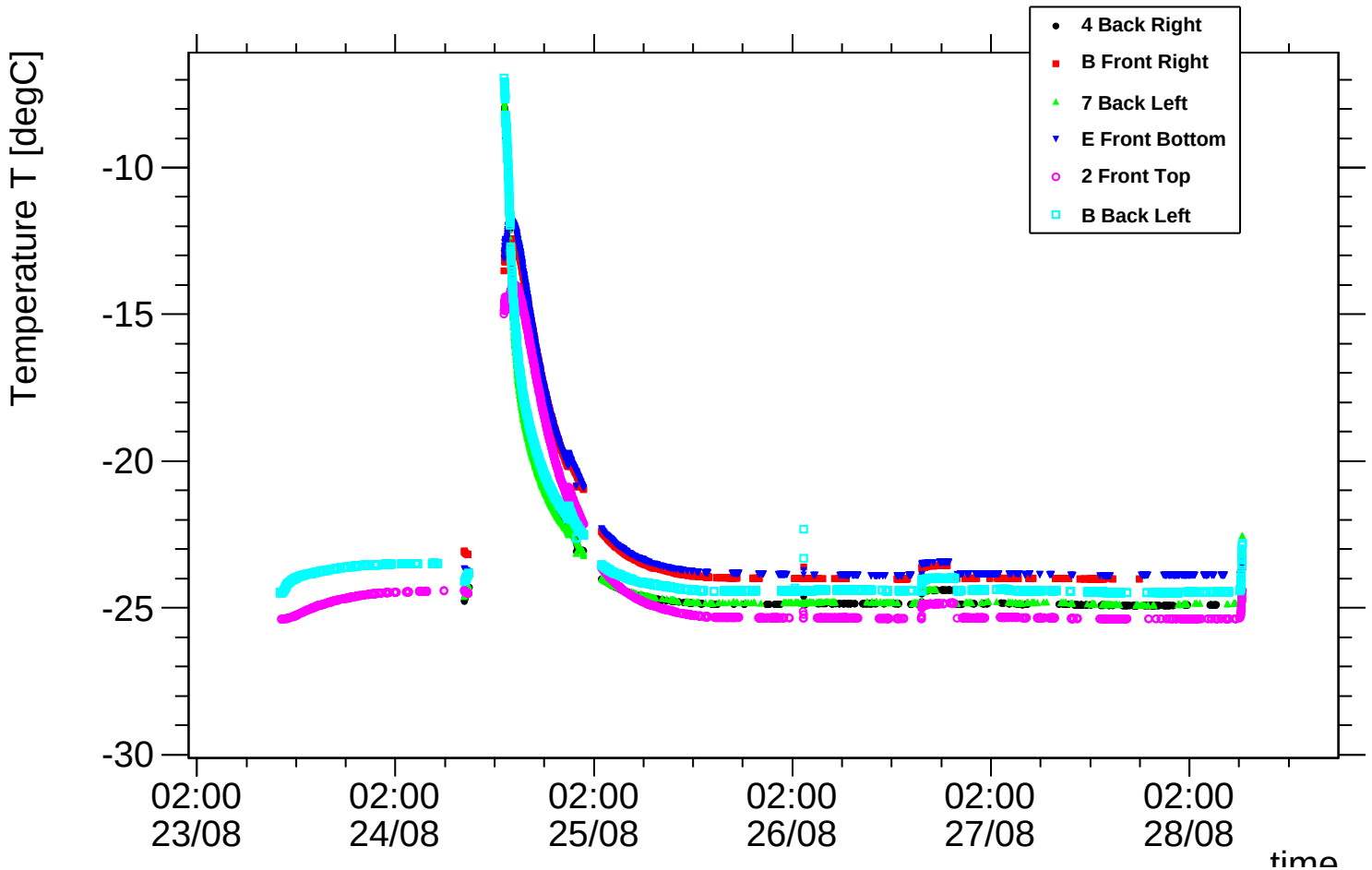
HadCon

- Running EPICS IOC
- Controlling three THMPs
- Controlling one VME crate
- Controlling one light pulser
- Controlling the HV power supply

First time all devices were connected together

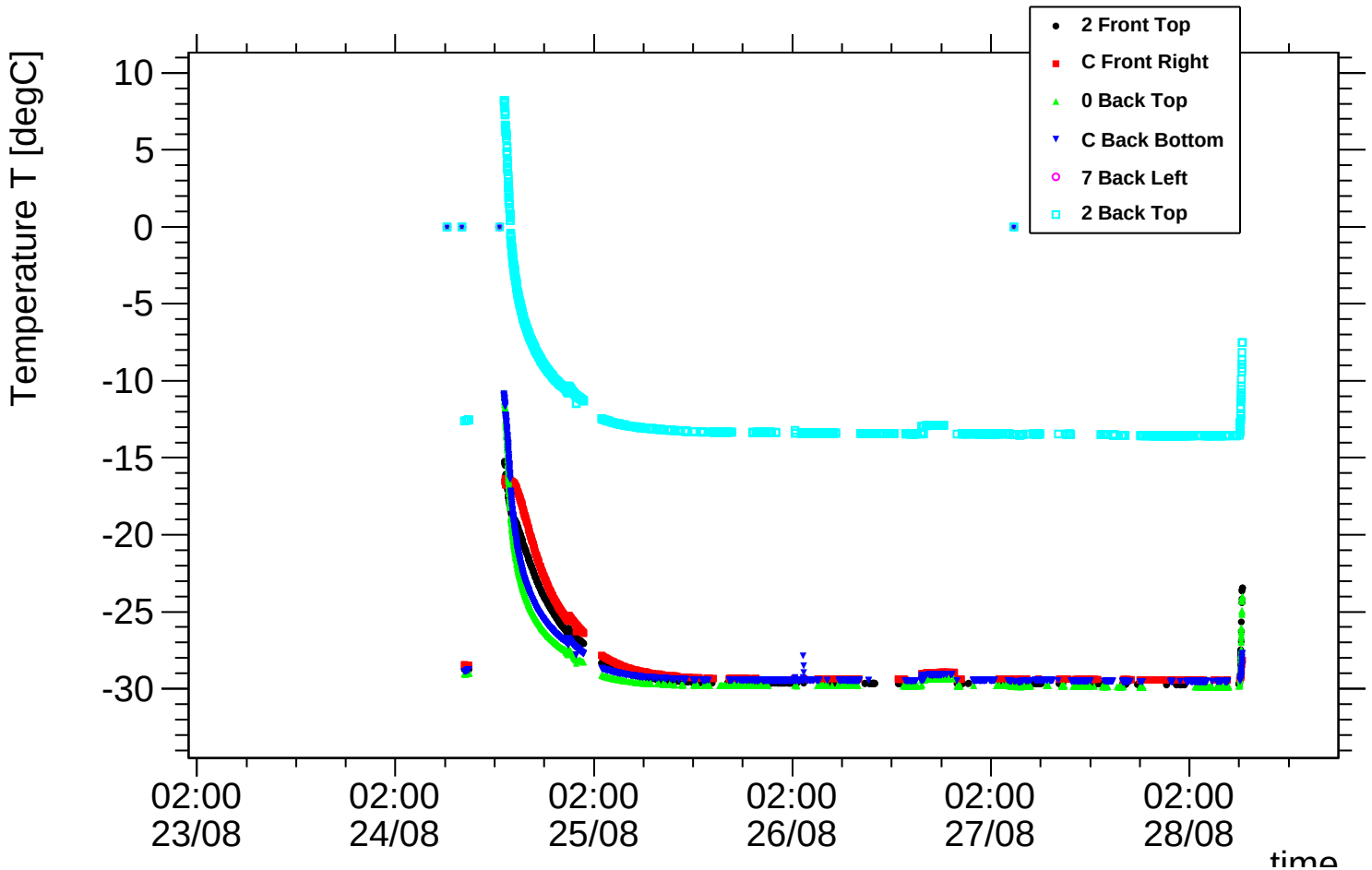
Temperatures inside the Proto192

Temperature inside alveole 1-X4Y2



Temperatures inside the Proto192

Temperature inside alveole 1-X4Y4



Slow Control at CERN

Problems

- Some temperature sensors did not work
- Problems with CAN communication:
  no response of devices (values did not change for hours)

Slow Control at CERN

Problems

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- Problems with CAN communication:
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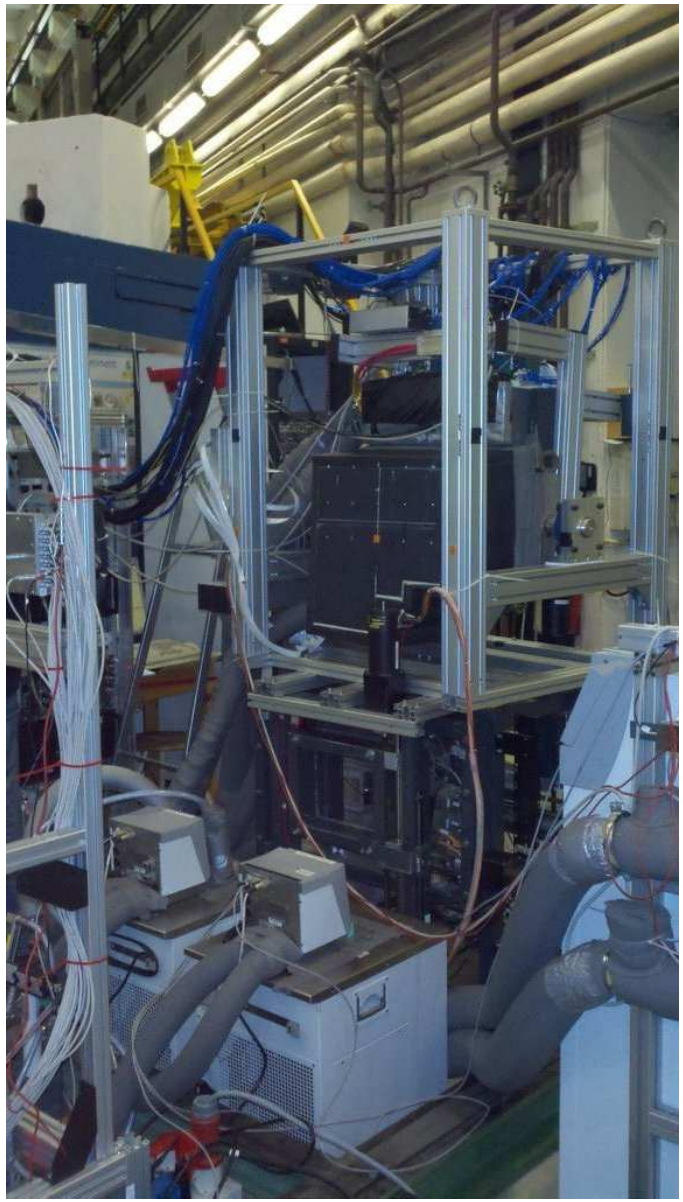
CAN Bus

- Three THMPs $\Rightarrow$ 195 CAN messages
- One VME crate $\Rightarrow$ 12 CAN messages
- Seven ISEG HV modules
  8 CAN messages per channel (status, current, voltage)
  additional 6 CAN messages per module (status, temperature)
  $\Rightarrow$ 490 CAN messages
  Each module sends "Status disconnected" message every second
- Overall $>$ 700 CAN messages every 10 seconds
  $\Rightarrow$ Too much for one HadCon!

Beam Tests at ELSA

- 31st Oct - 4th Nov 2011 at ELSA (Bonn)
- Measured with tagged photons between 556 MeV and 3100 MeV
- Triggered on photons with 900, 2100 and 3100 MeV
- Beam diameter $\approx$ 2 cm
- Used X-Y-table to scan crystals



Setup of Slow Control at ELSA

PC (Quad-core, 2.83 GHz, 8 GB RAM)

- Running EPICS IOC, archiver, MEDM
- Controlling three chillers

HadCon 1

- Running EPICS IOC
- Controlling the HV power supply

HadCon 2

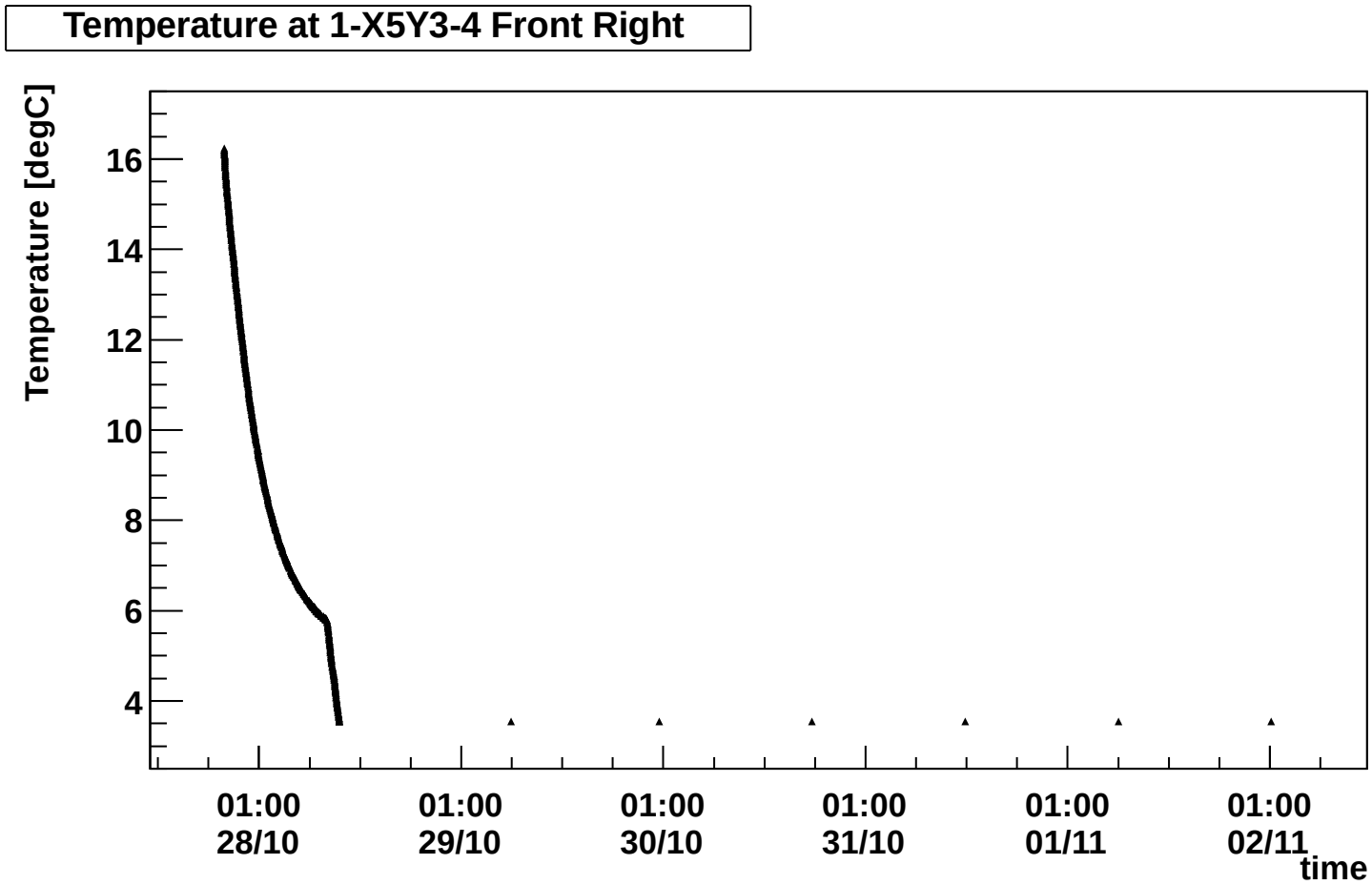
- Running EPICS IOC
- Controlling three THMPs
- Controlling the VME crate
- Controlling the light pulser

Slow Control at ELSA

- No problems with CAN communication
- All values were updated every 10 seconds (scan interval)
- Control of HV power supply worked (No missing response)

Slow Control at ELSA

BUT archiver did not work:



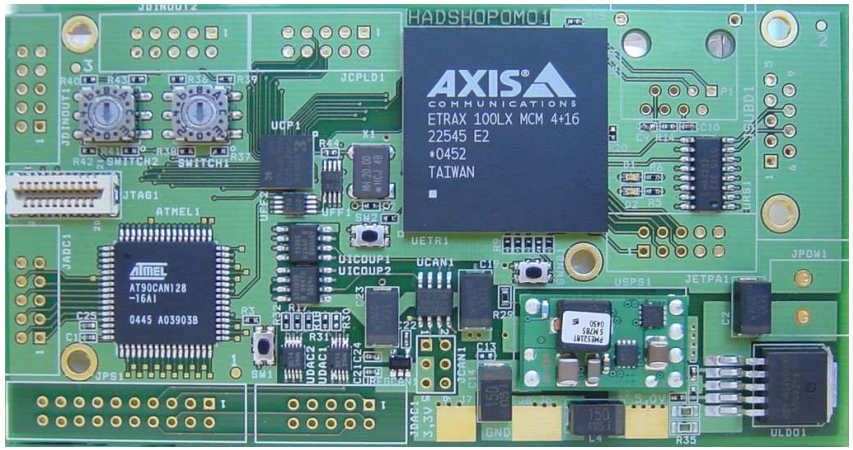
Conclusion and Outlook

- Problems with CAN communication at CERN were fixed with second HadCon
- Strange behavior of temperature sensors
  $\Rightarrow$ Six sources of errors found and fixed
- Archiver didn't store all values
  Reasons still unknown
- Replace ALH, MEDM and EPICSarchiver by CSS (c.f. my next talk)
- Replace HadCons with new hardware base

BACKUP

HADCon

- HADControl from HADES group (M.Traxler)



- ETRAX 100LX embedded CPU running EPICS
- Microcontroller AT90CAN128 with CAN interface connected via serial interface
- CPU with 100 MHz and 16 MB RAM

EPICS Overview

Used modules/extensions:

- EPICS base 3.14.12
- Asyn 4.13
- StreamDevice 2.4.1
- SEQ 2.0.12
- MEDM 3.1.5
- EPICSarchiver 1.2.0

EPICS Overview