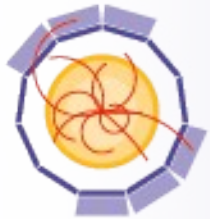

AIDA

Advanced European Infrastructures for Detectors at Accelerators

AIDA WP9.3 Thermo-mechanical infrastructure, CO2 plant, DCS

4th and final annual AIDA meeting

Marcel Vos (IFIC, U.Valencia/CSIC)

Nigel Hessey (NIKHEF), Susanne Kersten (Wuppertal) ,

Ivan Vila (IFCA), Igor Rubinskiy (DESY)

IFIC

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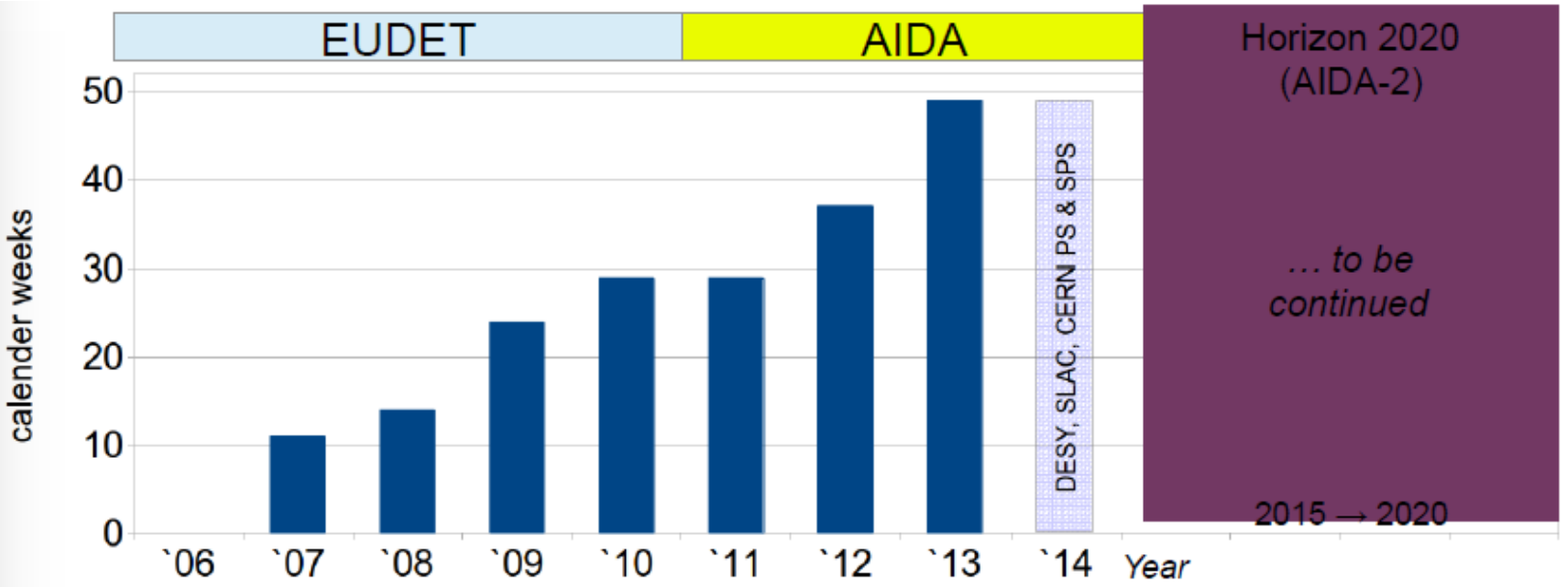

The EUDET telescope
– **Mimosa26 sensors**
CDS, ZS, binary, 18.4 μm square pitch

- the NI COTS readout system
introduced to replace VMEx64
and custom made electronics
to solve scalability issues

AIDA Single Arm Large Area Telescope

AIDA upgrades to EUDET telescopes
Trigger, DAQ integration, offline reco
→ *TLU, EUDAQ, EUTelescope*

CALADIUM (for Carlton, Canada) (at FNAL)
ACONITE (for ATLAS)
DATURA (for DESY)
ANEMONE (for Bonn) (at ELSA)

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Continue & extend telescope

- Development of a versatile beam telescope able to characterize detector prototypes, satisfying the demanding requirements in terms of cooling infrastructure, read-out speed and precision
- Development of an off-beam infrastructure for the evaluation of thermo-mechanical properties of Vertex Detector prototypes

Deliverable Design Report 9.4 month 37

Task 9.3.1 Telescope

- Builds on the telescope **infrastructure** developed as part of the EUDET
- A versatile and modular pixel telescope is to be built using state-of-the-art pixel devices (**Timepix, ATLAS FE-I4 → F. Huegging, and Mimosa → A. Perez,** to meet the requirements of a broad user community (LHC-speed response and time-stamping)
- Common Offline Analysis Tools (EUTelescope based on ILCSoft/Marlin → E. Yilmiz)
- CO2 cooling plant (N. Hessey
- DCS system

Task 9.3.2 Thermo-mechanical infrastructure

- Development of an infrastructure that allows to evaluate the thermo-mechanical performance of fully integrated detector prototypes under a realistic power load.

Deliverable 9.1 month 33

Final deliverable: D9.X telescope report + overall infrastructure usage

Detector Control Station

Build a Detector Control System for support of AIDA testbeam activities

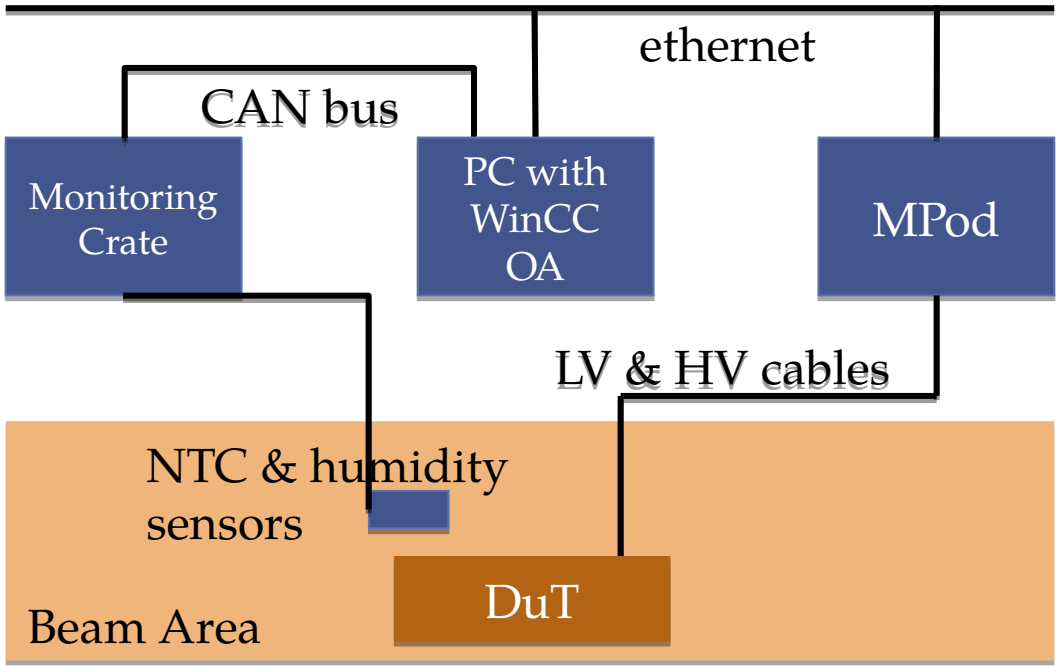
Supply HV + LV for DuT
Provide monitoring of:

- Environment
- Properties of DuT

Remote control/monitoring:

- Raise alerts
- Archiving of data

Transportable
Easy installation and configuration



AIDA HV and LV system

- Individually floating 8 **HV** channels/module
- Channel control completely independent

Iseg HV module	Max. values	Resolution I ≥ 20 µA	Resolution I < 20 µA
EHS 8220n-F	2 kV 4 mA	4 nA	50 pA
EHS F2 05n-F	500 V 10 mA	10 nA	50 pA

MPV 8008LI Low voltage

- **LV** each up to 8V/5A, 8 floating channel
- Channels control completely independent

Monitoring

- 12 NTC for temperature monitoring
- 2 Honeywell humidity sensors HIH 4000
- 1 Four wire measurement e.g. PT100
- 4 digital outputs
- 32 ADC channel (6 bi-/unipolar ranges 25mV - 5V)

AIDA DCS Summary

- DCS1 was delivered in spring 2012
  - in operation since then
  - Firmware upgrades spring 2014
  - Details in AIDA-2014-004
- DCS2 delivered in spring 2014
  - first operation @ SLAC
  - in operation since then
  - Details in AIDA-2014-005

AIDA CO2 Cooler

- Goal:
  - Easy to operate (ideally on/off, set temperature)
  - Mobile
  - For detector test and development (e.g. in a test beam or lab)
- Evaporative CO2 cooling
- Temperature range:
  - -30 to +20 degC
- Cooling power:
  - Few hundred Watts
  - (More power at the upper end of temperature range)
- Several copies being made for various labs

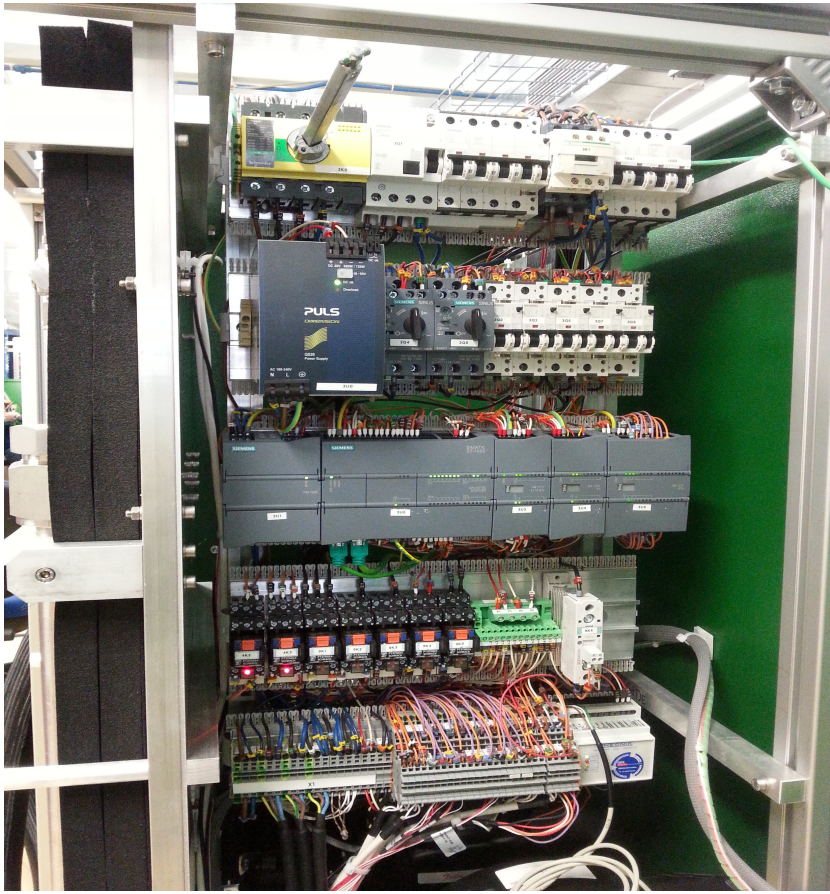
Status as of today

- Fully assembled and operational
- Few mechanical design changes being implemented
- Commissioning:
  - Needs to operate long term, safely, with minimal training of users
  - Takes time

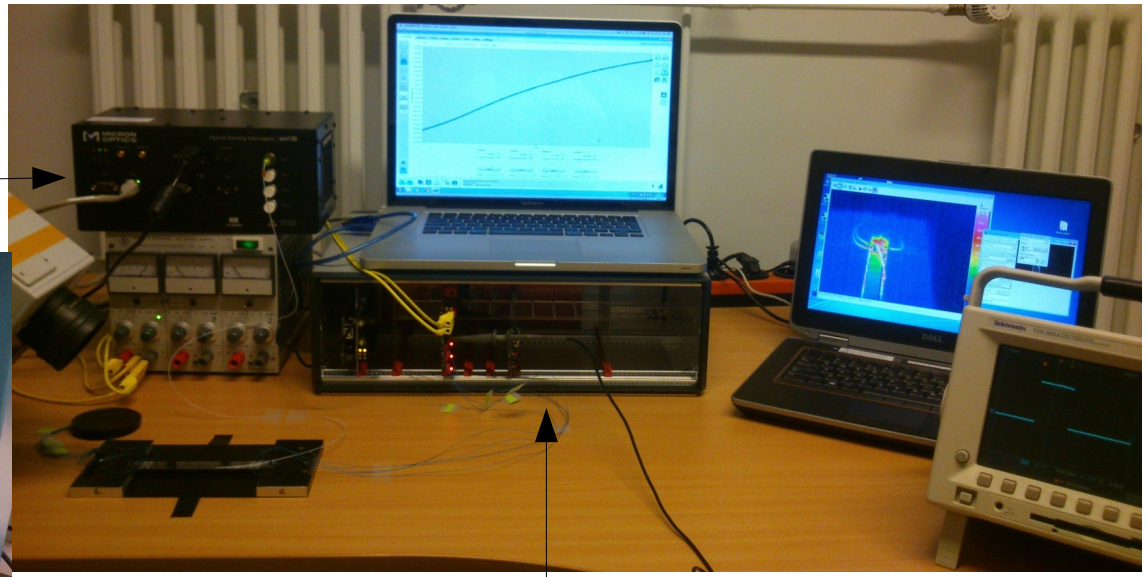
R404 Chiller inside

Time to completion

- Behind the Start and Temperature- settings panel, sit many sensors and controls
- Need a reliable system including under unusual circumstances (power failure, rapid heat load change, …)
- Team commissioning it has other tasks
  - Especially ATLAS IBL cooling system and beam-pipe bake-out, now complete
- Current work:
  - Set up web interface
    - Useful for remote monitoring and control (e.g. control room running with cooler in a locked beam area)
    - Useful for commissioning:
- In the end, patience gets you a better product



Bragg fibre read- out @ 1-10 kHz (monitors temperature, humidity, strain by reading out wave length)



Programmable power supply provides arbitrary “pulsing” pattern up to several A @ 40V

D9.1 off-beam infrastructure

Fiber optic monitoring system and pulsing power supply installed at DESY and available

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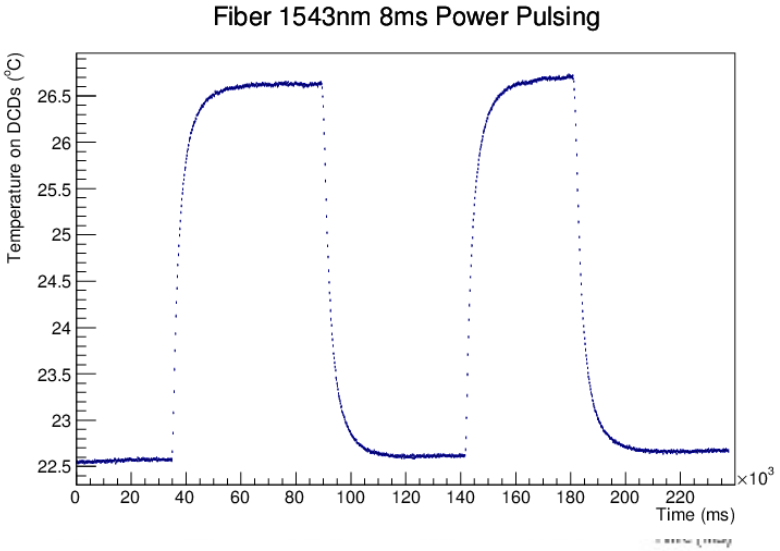
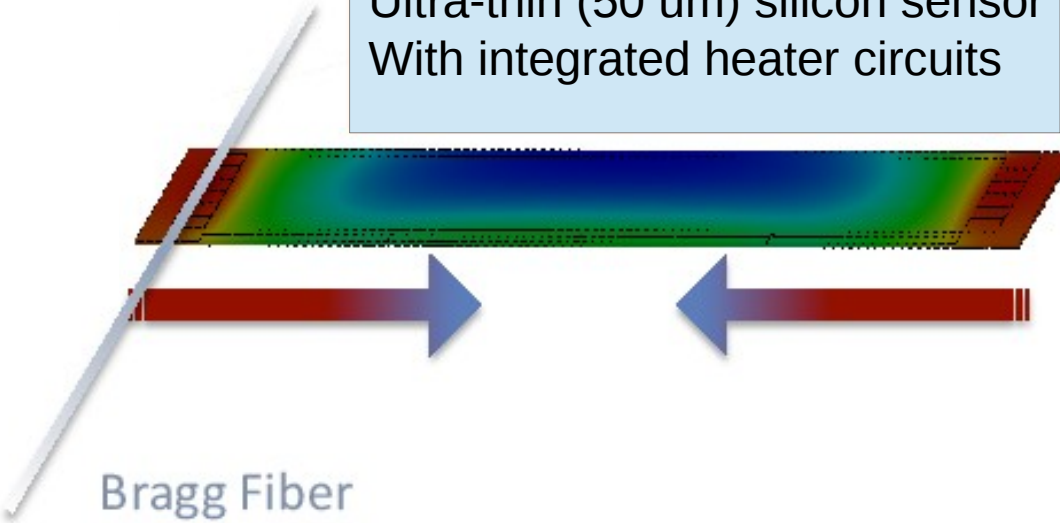
AIDA

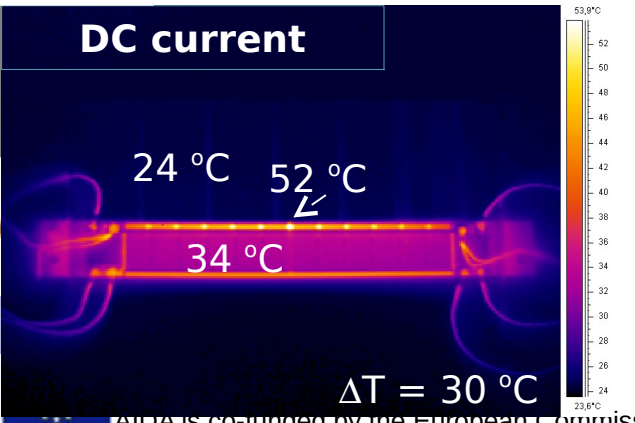
Advanced European Infrastructures for Detectors at Accelerators

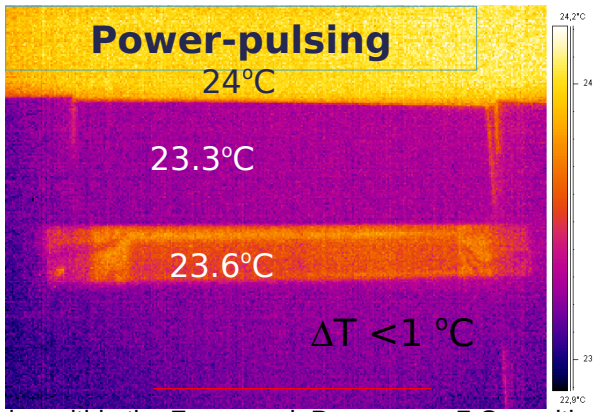


Ultra-thin (50 um) silicon sensor
With integrated heater circuits



Thermo-mechanical measurements





- Belle II TB + DEPFET LC prototypes
- Deliverable report (due M33) handed in March 2014
- To be continued in AIDA-2...

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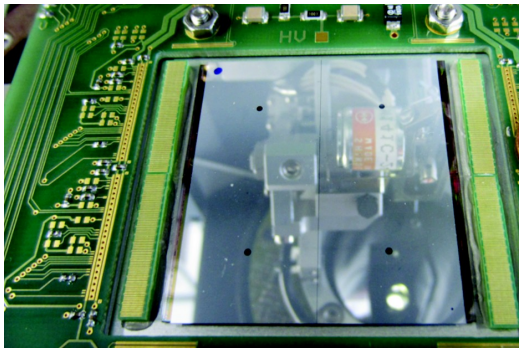
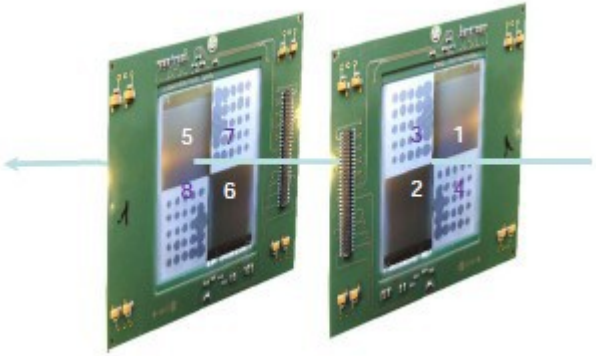
Final AIDA deliverable table…

Subtasks	Degree of completion:
WP 9.3.1: Milestone with design (M37)	**95 %**
EUDAQ 2.0 + AIDA-TLU (common with WP8.6.2)	**95 %**
- DESY + Bristol, LPNHE, Santiago d.C.	
SALAT arm consisting of 3 SALAT planes	**99 %**
- Strasbourg, IPHC	
FEI4 single and quad planes for triggering and timestamping	**95 %**
- Bonn & IFAE Barcelona	
Offline software infrastructure	**99 %**
- DESY + non-AIDA institutes (Goettingen, Glasgow)	
CO2 cooling plant as general infrastructure	**80 %**
- NIKHEF & CERN et al.	
DCS as generic HV (LV) and Climate monitoring system	**99 %**
- Wuppertal	
WP 9.3.2 Thermo-mechanical deformations mockup	**99 %**
- CSIC (IFCA Santander, IFIC Valencia)	



FEI4 operational



SALAT: delivered November

CO2 plant?

D9.4 telescope

Due: M37 (feb. 2014)

Delayed in June steering meeting to wait for SALAT (OK!) and CO2 plant

AIDA notes are being prepared for major contributions

- FEI4, SALAT arms, CO2 plant

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Task Leader Summary

Overall the project converges on time:

- most of the development work has been done on time
- all hardware components procurement & production is complete
- AIDA Telescope Lite – standard 6 Mimosa26, 1 FEI4, DCS, EUDET TLU, EUDAQ2 – commissioned

The following delays in the subtasks:

- CO2 cooling plant – hardware is present and tested in parts, test runs and installation in H6B is missing → possible convergence after 31.01.15

- miniTLU & EUDAQ2.0 – missing fanout board and beam test example
  → possible convergence before 31.01.15

- Offline Infrastructure – missing data streams merging tool
  → possible convergence before 31.01.15

- AIDA Telescope LAT – all ingredients in place
  → possible convergence before 31.01.15

WP9.3: the write-up

Note on FEI4 arm and DCS submitted to AIDA database
Note on telescope software written and in good shape
Draft note exists for Large Area MIMOSA telescope arm
Draft note exists (in Spanish) for thermo-mechanical infrastructure

MiniTLU and EUDAQ in collaboration with DAQ task.

Description of CO2 plant expected to be ready when the hardware is

Draft of report for telescope deliverable (D9.4) exists. Igor Rubinskiy is leaving → Marcel Stanitzki and M.V. to finalize the document.

M.V. to hand in D9.8 in M46 → need latest TA statistics.

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