AIDA

Advanced European Infrastructures for Detectors at Accelerators

Advanced European Infrastructure for Detectors at Accelerators - WP9

Marcel Vos (IFIC, U.Valencia/CSIC)

With thanks to all AIDA members, in particular Mari-Cruz Fouz, Ingrid Gregor, Thomas Bergauer, Paul Colas, Felix Sefkow

AIDA is co-funded by the European Commission within the Framework Programme 7 Capacities Specific Programme, Grant Agreement 262025

AIDA WP9 infrastructure

Broader in scope than EUDET was

AIDA must cater to the whole detector R&D community

Second phrase of WP9 description: “The tasks are specifically designed to cater to a large community, including the major future projects in high energy physics: the upgrade of the Large Hadron Collider (LHC), a future linear e^+e^- collider at the energy frontier (ILC/CLIC) and the super B-factories (Belle-II/SuperB)”

More institutes

(over 80 from 23 countries).

And less resources!!!

8 M€ in EU-funding.

Kick-off Feb. 2011.

Duration 4 years.

Networks:

- 3D technology and shared blocks (WP3)
- Contact to industry (second event in March 2011)

Access to test beams and irradiation facilities;

-- traditionally strong CERN SPS (and PS) program. Under some threat from LHC shutdown. Current most likely scenario envisages a “normal” SPS year in 2012 and a long period without TB access starting in 2013 (S. Bertolucci)

---alternative with more flexibility at DESY: 6 GeV electrons allow to do many things including moderate spatial resolution (if the right telescope is used)

Infrastructure to boost R&D:

LCTPC infrastructure, beam telescope, u-strip and CALICE calorimeter tests

Next slides: a few examples of relevant developments in WP9

(not an overview or cross-section, with apologies to people involved in WP1-8 and those in WP9 whose progress I didn't mention)

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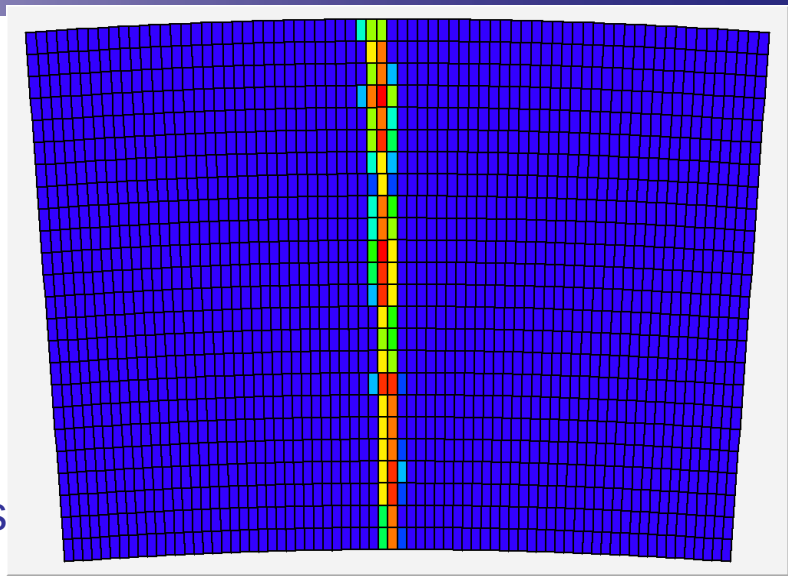
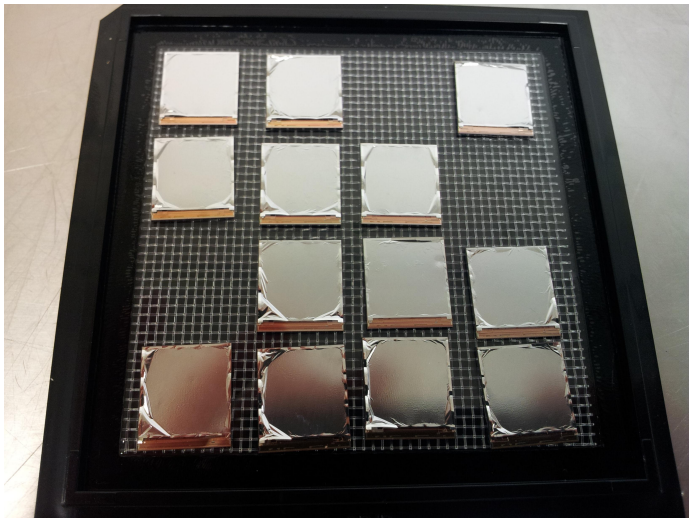
WP9.1, gaseous tracking, Paul Colas, Klaus Desch

LCTPC supported in several ways by AIDA.

- The PCmag magnet has been sent from DESY to KEK for adding 2 He compressors
- A first module test with compact electronics has been carried out. The production of 9 modules (7 to fill the prototype plus 2 spares) is starting.
- Working InGrids have been implemented by IZM Berlin on a TimePix wafer and tested.

See contributions by Madhu Dixit, Harry van der Graaf and Ralf Diener in this workshop.





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WP9.3 Precise Pixel Detectors

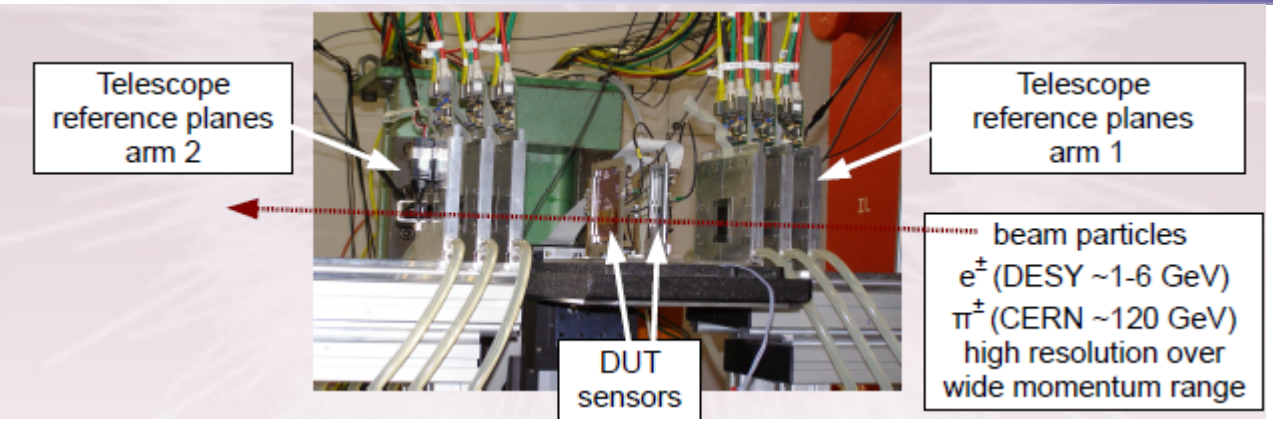
Task leader: I. Gregor (also DESY contact)

The main deliverable is an extremely precise beam telescope for characterization of prototypes (based primarily at CERN NA)

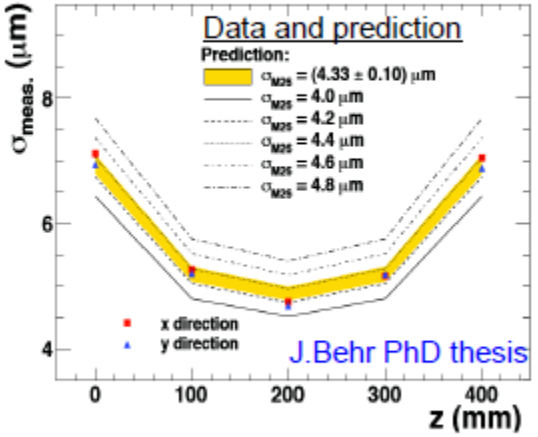
- Precise in the time domain as well as in space by combining technologies with complementary performance
- Continuation of the EUDET telescope and surrounding infrastructure,
- Catering to sLHC needs: CO2 cooling plant, fast read-out

Clients: all pixel & strip detector R&D collaborations, including slice of ATLAS IBL, first full-scale Belle-II layers, 3D sensors for sLHC, prototypes from WP3, etc., etc.)

EUDET telescope

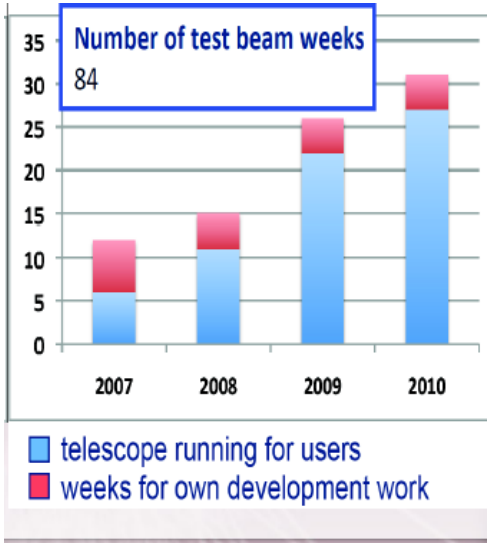


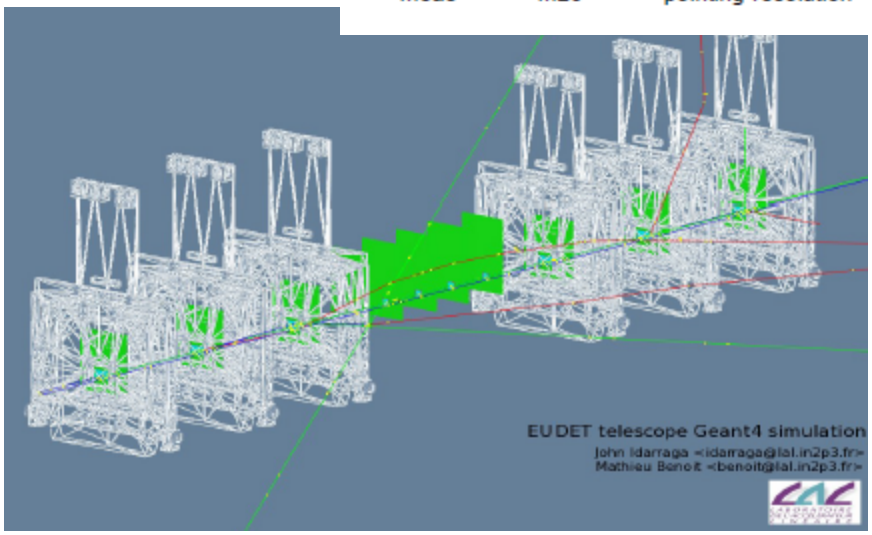
Pointing resolution in between the planes



$$\sigma^2_{meas} = \sigma^2_{m26} + \sigma^2_{pointing\text{-}resolution}$$

See: Igor Rubinsky (DESY), TIPP2011

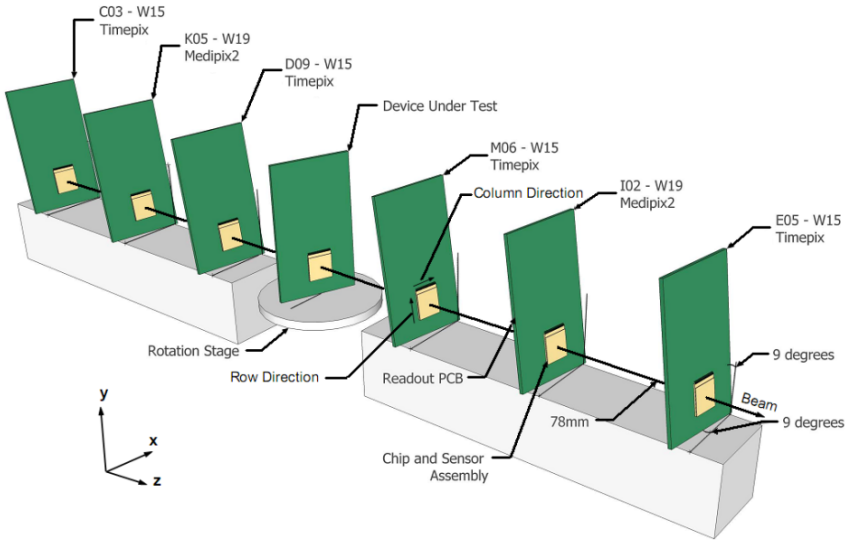


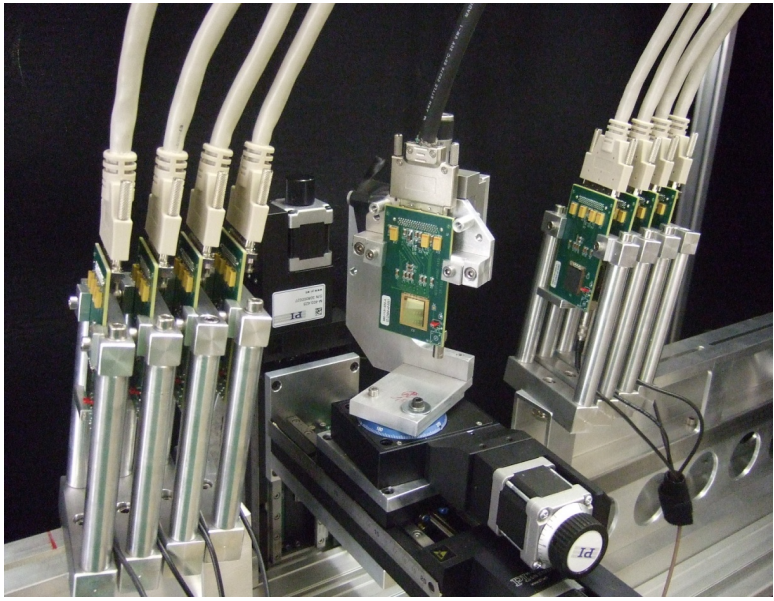


Integrate other systems I: TimePix

Charged Particle Tracking with the Timepix ASIC.arXiv:1103.2739

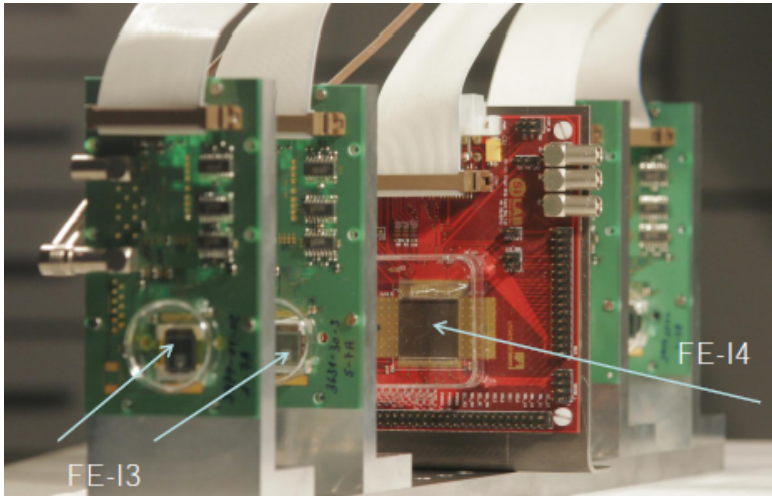
Precision scans of the Pixel cell response of double sided 3D Pixel detectors to pion and X-ray beams. 2011 JINST 6 P05002



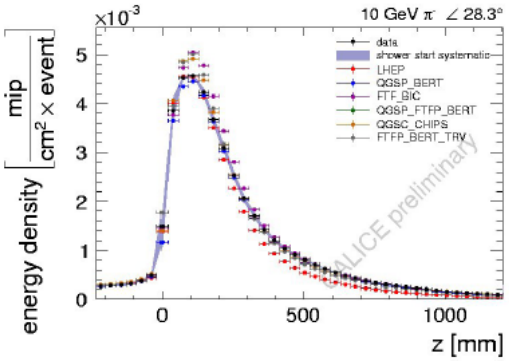


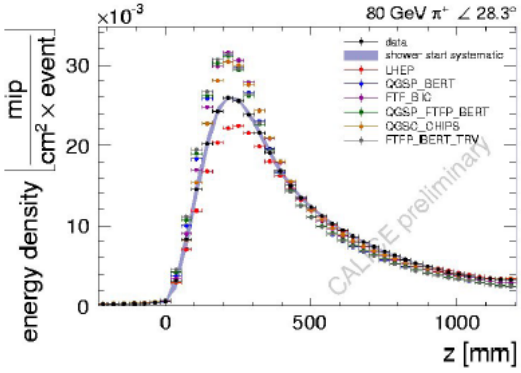
WP9.3

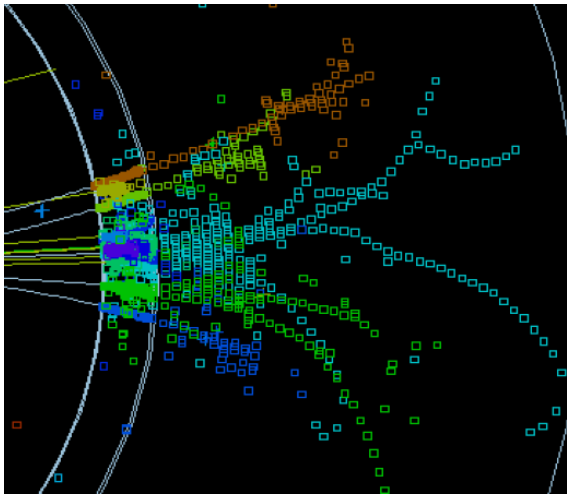
- Integrate other systems II: ATLAS FE-I4
- Very good History of integration with EUDET telescope: see for instance EUDET-MEMO-2010-016 (since then: integration of new USB system for FE-I4)
- 2010 and 2011 program comparing 3D and planar sensors



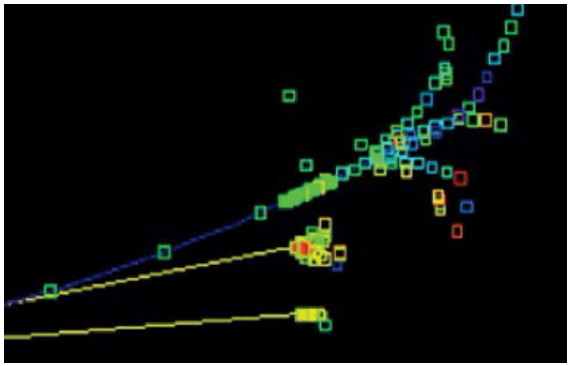
WP9.5 calorimeter







SiD simulation: 250 GeV jet and $\rho \rightarrow \pi^{+}\pi^{0}$ decay



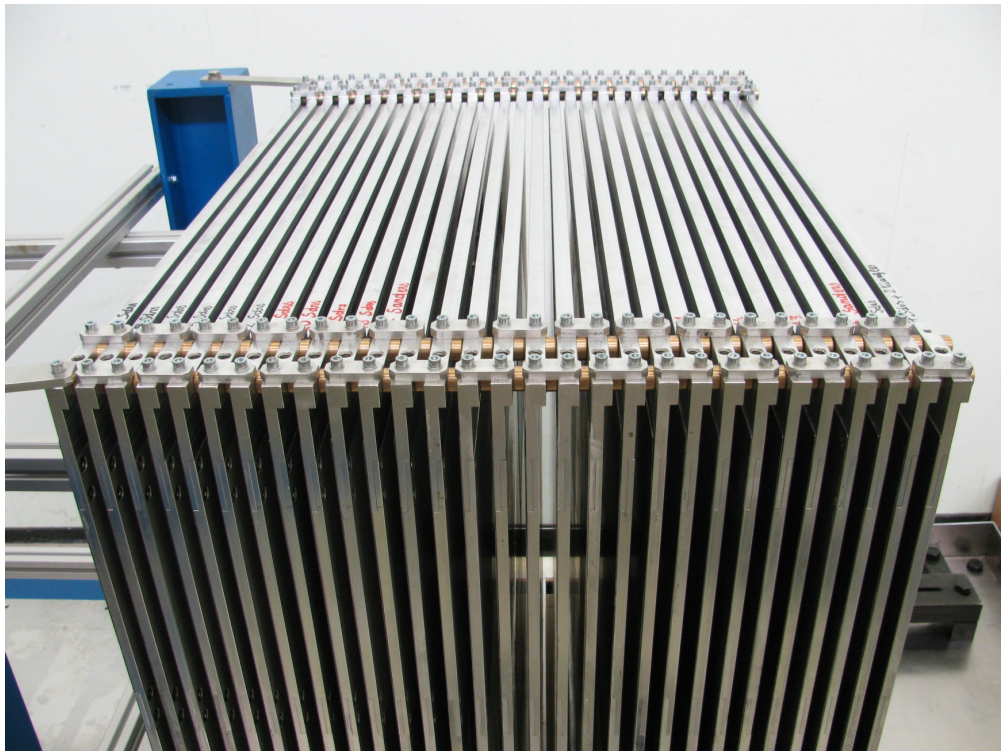
For backgrounds: CALICE reports to the DESY PRC:

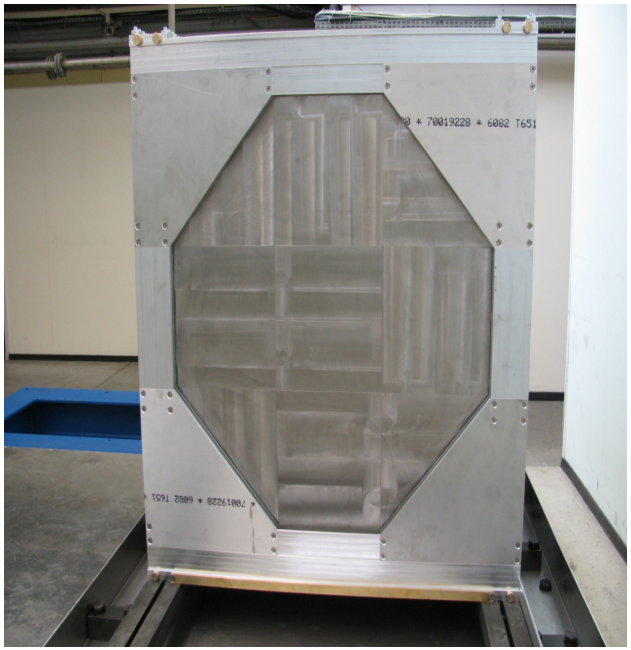
March 2010, http://arxiv.org/pdf/1003.1394

http://arxiv.org/pdf/1105.0511

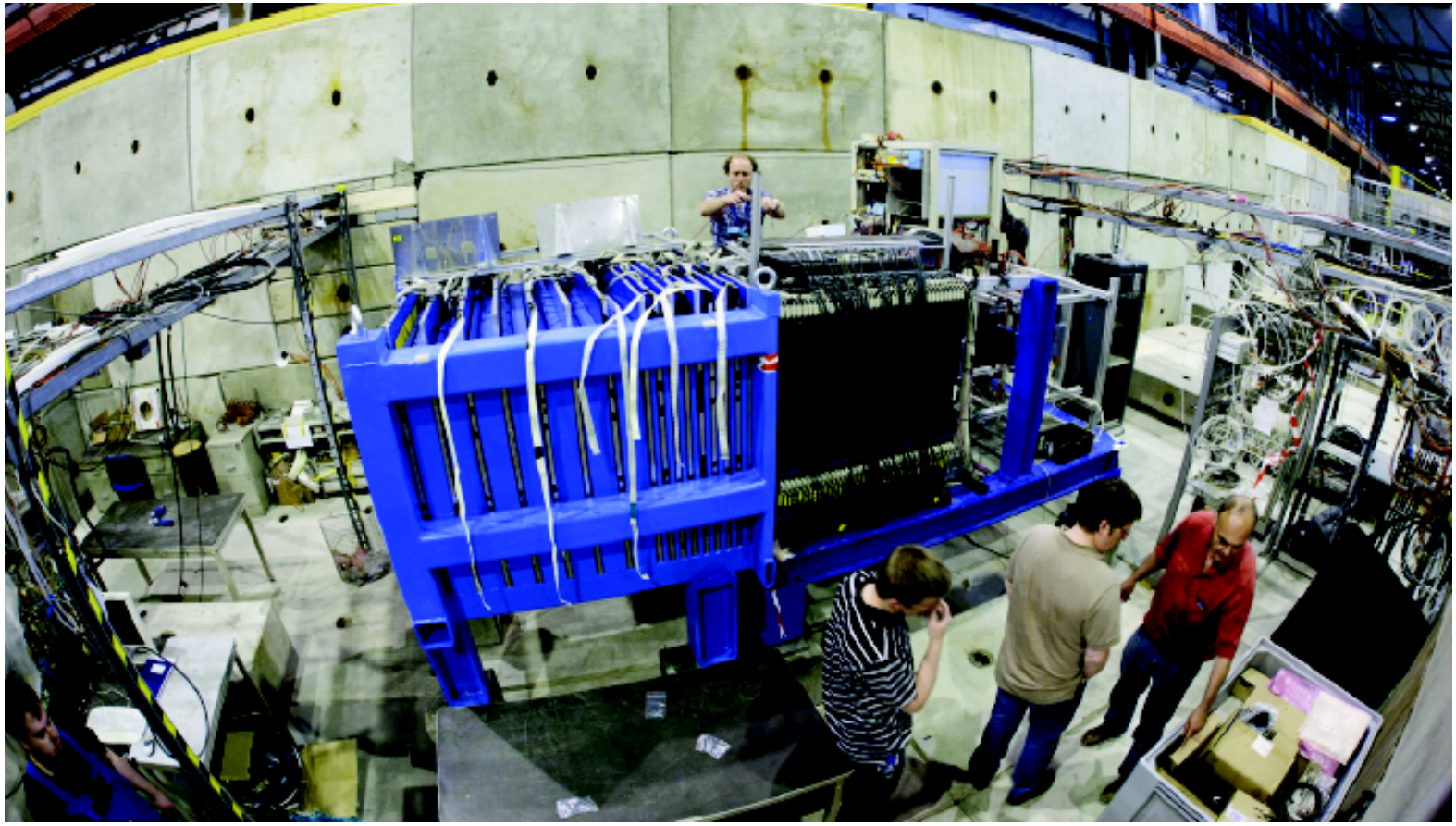
WP9.5 calorimeter

1 m^3 W stack





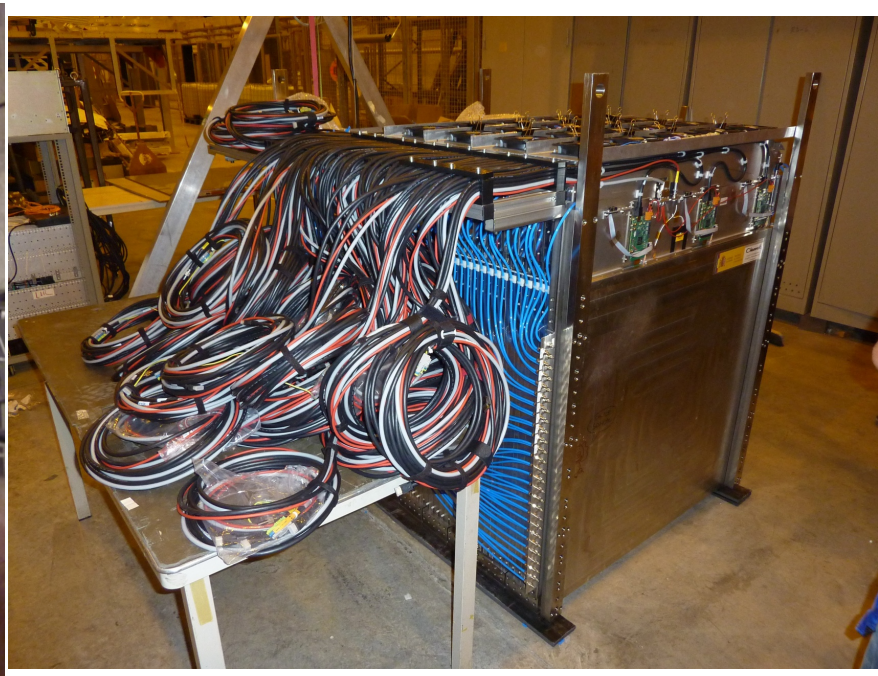
WP9.5 calorimetry

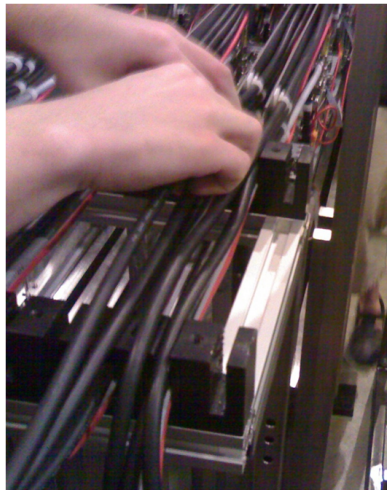


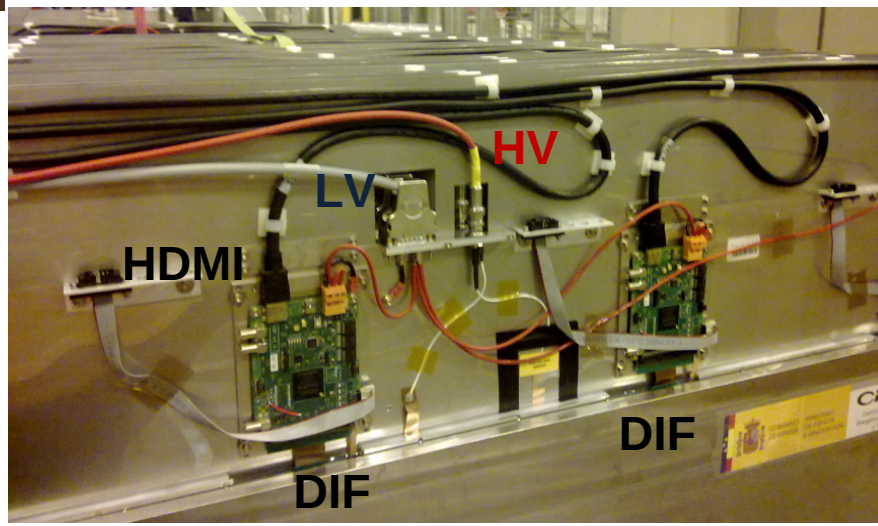
Large W-stack installed and instrumented at CERN (+ tail catcher)

WP9.5 calorimetry

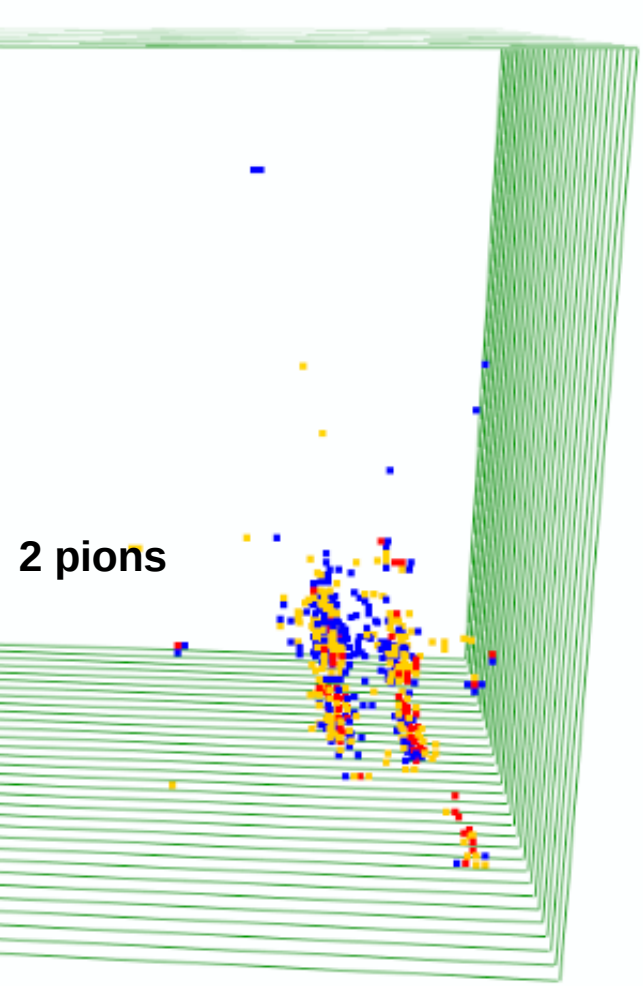
Instrument stainless steel stack with RPCs for June 2011 TB

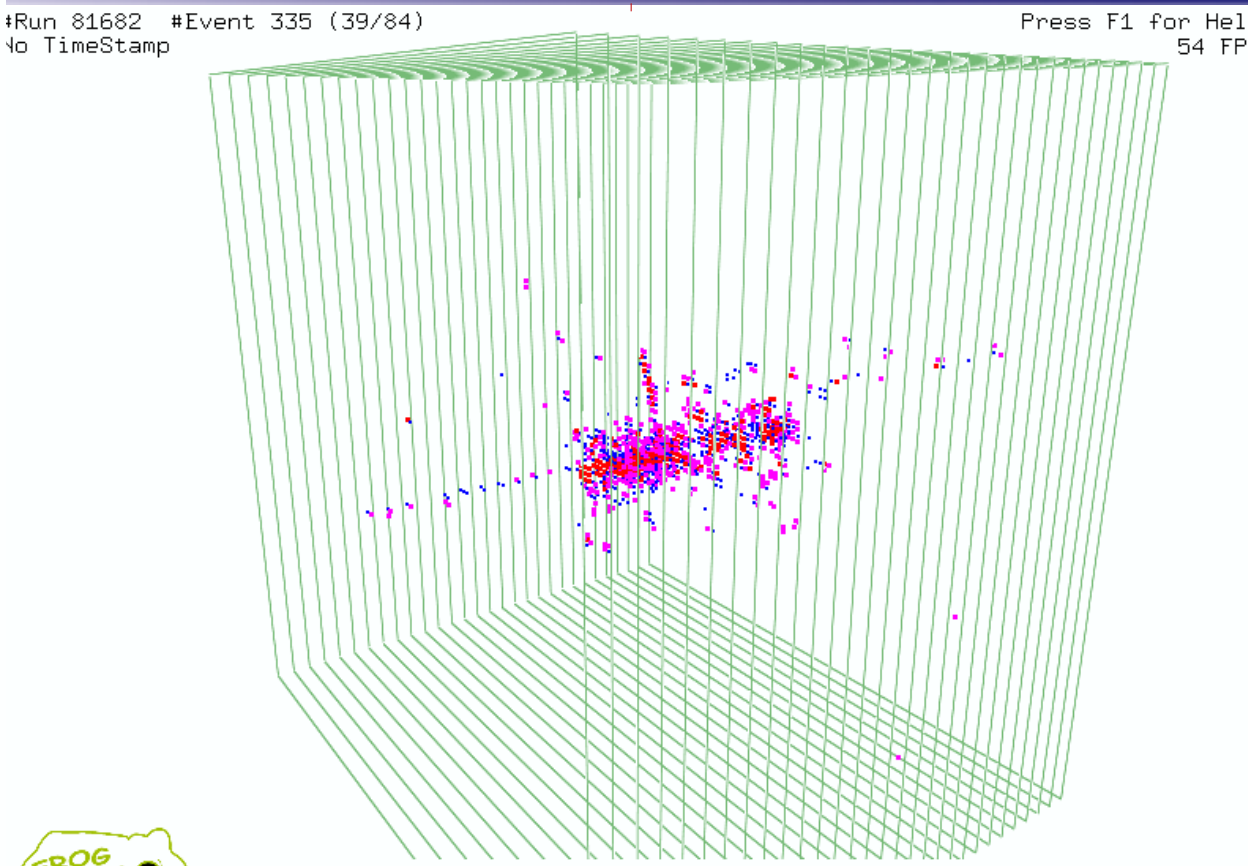






WP9.5 calorimetry



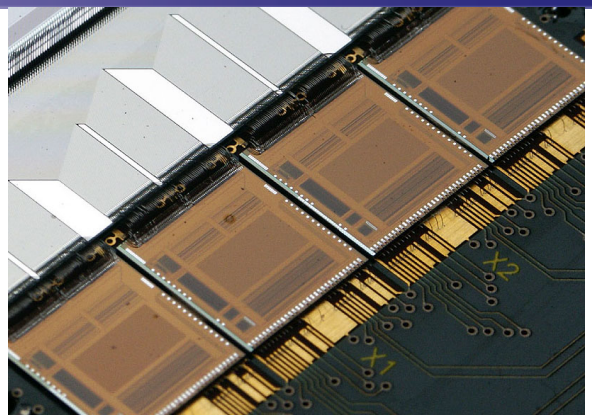


Semi-digital: different color → Different threshold fired
WP9.4 to provide u-strip detector plane to measure impact point (=distance between pions)

WP9.4 Silicon Tracking

Task leader: Thomas Bergauer (HEPHY Vienna)

Providing multi-layer Si µ-strip coverage for the calorimeter stack of WP9.5



Precise entry point as a reference for study of overlapping showers
Default 50 µm pitch → down to few µm resolution
3 ns time resolution (matches typical trigger scintillator resolution quite nicely)

Hand in baseline deliverable early, then go on to more ambitious goals.
Small group, potentially seeding a lot of Si u-strip R&D. Very active TB program.

sensors	read-out	support	DAQ integration	offline
Price tags next month	APV	Baseline design	With WP8	
IFIC				

DAQ → APVDAQ (for APV25 chip used in CMS/Belle-II).... Done!!

Summary

AIDA may help you perform R&D

easing and funding access to facilities, through networks and events, providing infrastructure to characterize your prototypes

Project started in February 2011

Even if most deliverables are expected only in 3rd and 4th year, the four “infrastructure” tasks in WP9 are already too active to summarize in 20 minutes.