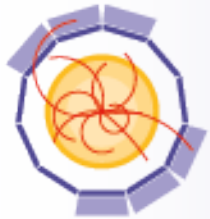

AIDA

Advanced European Infrastructures
for Detectors at Accelerators

European TB activity for Si-based vertex detector and tracker R&D

Marcel Vos (IFIC, U.Valencia/CSIC)

IFIC

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

Overall situation in Europe;

- 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)

- EU funding for infrastructure → AIDA WP9.3 and WP9.4

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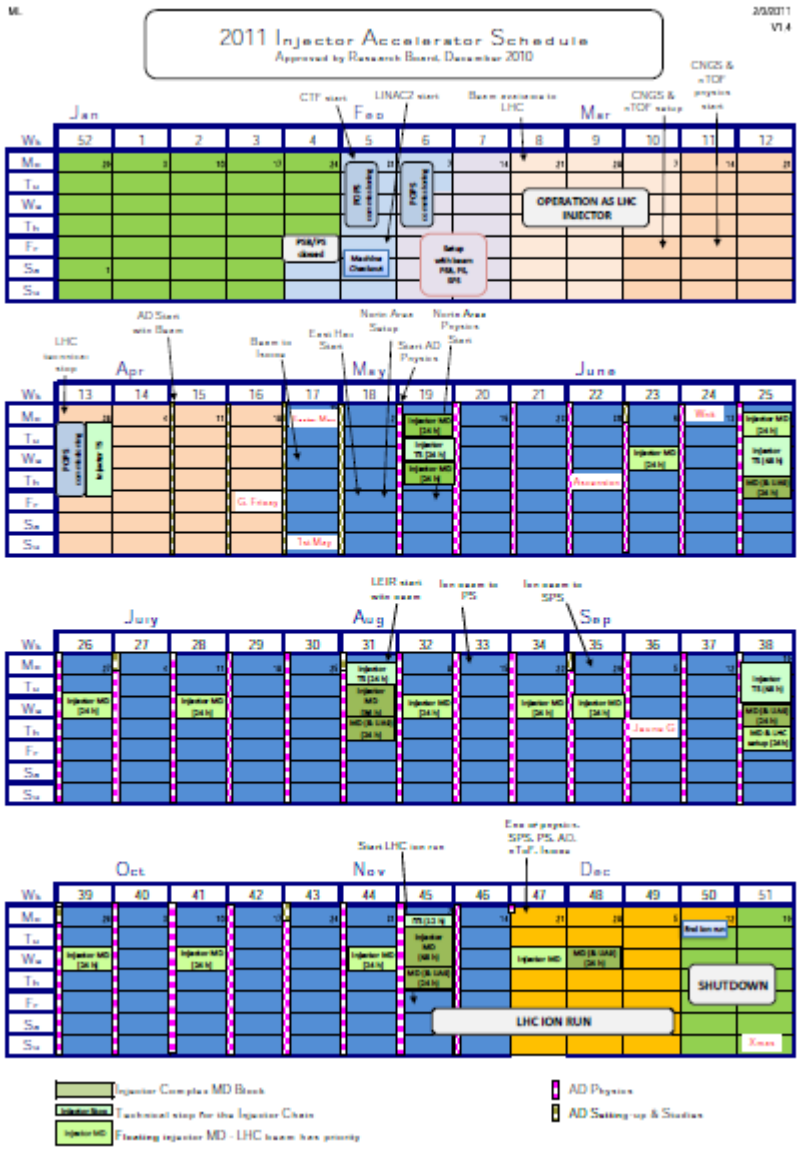
CERN injector complex schedule 2011



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19-Mar-2011 — 2011 SPS Fixed Target Programme — Version 1.0

Colour code: green = SPS-exp ; purple = LHC-exp ; dark blue = Outside exp ; yellow = not allocatable or Machine Development

	P1	P2	P3	P4	P5	P6
	35 26 Apr 31 May	35 31 May 5 Jul	35 5 Jul 9 Aug	35 9 Aug 13 Sep	35 13 Sep 18 Oct	34 18 Oct 21 Nov
T2 -H2	NA 4 · 22	NA61 TR 10 · CALICE SDHCAL 0 25	CMS PLT 10 · CMS CALO 14 · NA61 Protons 11	NA61-Protons 35	NA61 6 · CMS SiBT 14 · CREAM 9 · CMS CALO 6	CMS CALO 10 · NUCLEON 10 · NA61 Ions+Sec 14
T2 -H4	NA 4 · H4IRRAD 22	CMS ECAL 10 · H4IRRAD 0 12 · RD51 5 8	PHOTAG 9 · H4IRRAD 11 · CMS 9 · 6	RD51 11 · NA63 Electrons 13 · CALET 10	PANDA 7 · SciFi 9 · PEBS 12 · FAIR 7 · RD51 7 · CMS ECAL 7 · LHCf 7	14
T4 -H6	NA 4 · S&C 7 · 3 · NA62 STRAW 12	MONOPOL 9 · ALICE SPD 0 11 · CERF RD42 9 · 6	DEPFET RD42 8 · APPS MEGAS 12 · ATLAS 7 · ABCM RD42 7	AIDA TK 14 · S&C 7 · 7 · ATLAS 7	BELLE ARICH 7 · Super B 7 · ATLAS 7 · BELLE II SVD 7 · 9	3 · NA62 CEDAR GTK 10 · 7 · 14
T4 -H8	NA 4 · ATLAS IBL 22	LHCb 6 · AFP 7 · 0 · LHCb (CALICE) 16 · 6	UA9 6 · 7 · DREAM AFP AsDIS 14 · AMDT AsTGC 8	AMDT 6 · AFP 7 · APPS · AFP 7 · UA9 7 · UA9 8	CALICE 13 · LHCb 16 · 6	CALICE 13 · DREAM 7 · UA9 IONS 14
T4 -P0	NA 4 · 22	0 35	35	35	35	6 · NA62 14 · 14
T6 -M2	NA 4 · COMPASS 22	COMPASS 0 35	COMPASS 35	COMPASS 35	COMPASS 35	COMPASS 20 · 14
CNGS 27	CNGS 35	CNGS 0 35	CNGS 35	CNGS 35	CNGS 35	CNGS 34

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mobile: 164212 (ext. +41 76 487 4212)

Comments:
- no comments

AIDA is co-fund

MIMOSA (M. Winter, Strasbourg)

Our ILC related beam test activity this year is supposed to allow testing two (final) sensor prototypes, adapted to the inner and outer double-layers of the ILD-VXD. We are currently working on the design of the chips ...

Of course, the EUDET telescope implies MIMOSA sensors see a lot of beam each year

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DEPFET (collaboration, TB coordinator: M. V., IFIC Valencia)

One week in the SPS to test thin (50 um) DEPFET sensors from PXD6 production

ILC and Belle-II design sensors (first time to do this)

Final Belle-II/ILC read-out chip (already tested in Nov 2010)

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SiLC/AIDA WP9.4 (Th. Bergauer, Hephy Vienna, I. Vila, IFCA)

planning two beam tests this year in CERNs SPS North area,.

One beamtest will be devoted to the developments of new sensors with CNM Barcelona, like 2D sensors and sensors with double metal layers (i.e integrated pitch adapters).

The other beamtest will be devoted to double sided sensors.

preferably together with the EUDET Telescope. The second TB is also a system test for the APVDAQ system and the connection to TLU box and the first integration of the EUDAQ software.

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Clearly a continuation of EUDET, broader in scope

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)”

WP9 is a good example:

(s)LHC →

- ✓ *ATLAS*
- ✓ *LHCb*

Future e+e- machines →

- ✓ *ILC*
- ✓ *CLIC (strong overlap with ILC)*

Super B-factories →

- *Belle-II*

And with less resources!!!

Need to be more specific in real work (K. Desch, WP9.2 summary)

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)

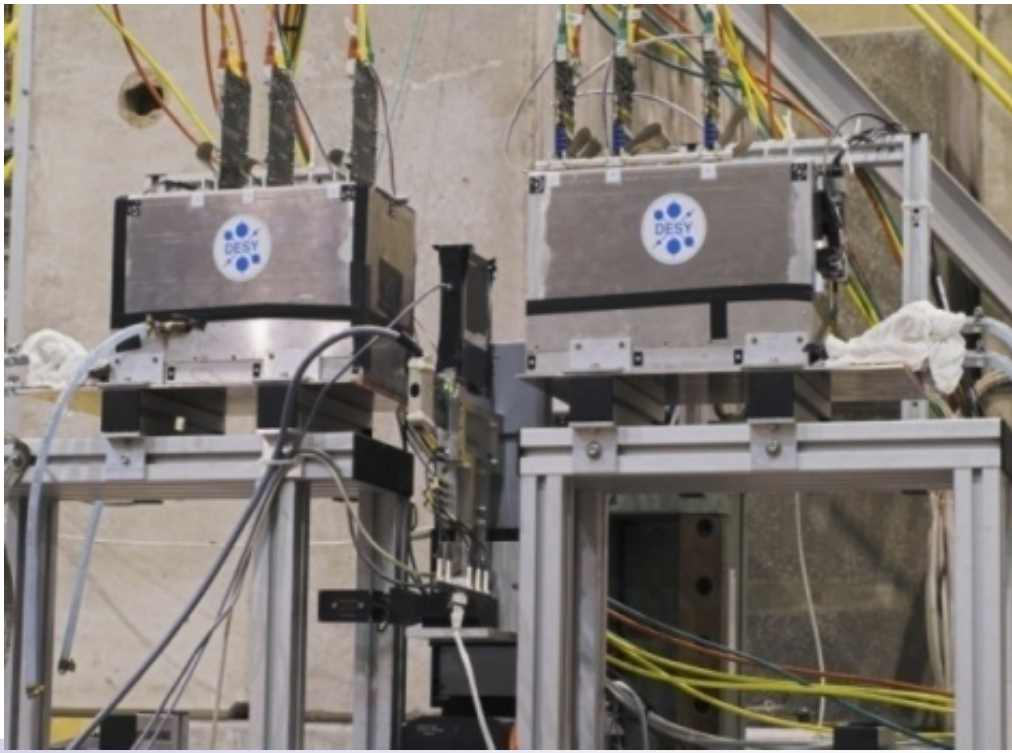
- Precise in the time domain as well as in space by combining technologies with complementary performance
- Continuation of the EUDET telescope and surrounding infrastructure,
- Catering to sLHC needs: CO2 cooling plant, fast read-out

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.)

AIDA = EUDET++

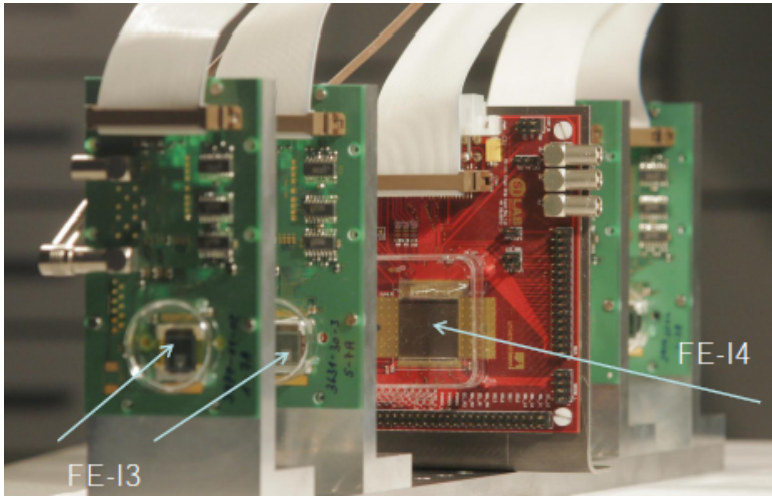
Continue and extend existing EUDET infrastructure. Mechanics (Doris Ekstein, DESY), Software (Igor Rubinsky)

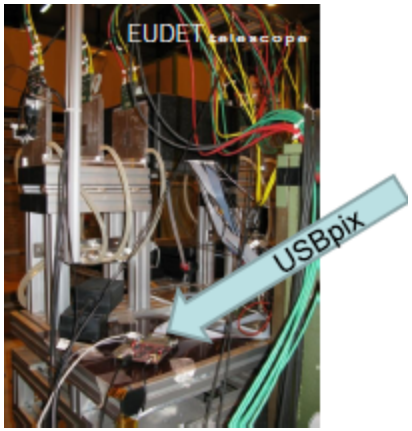
Sensor upgrade: ULTIMATE reticule-size: device before month 12 and stitched 5x5 cm^2 for final deliverable (M. Winter)

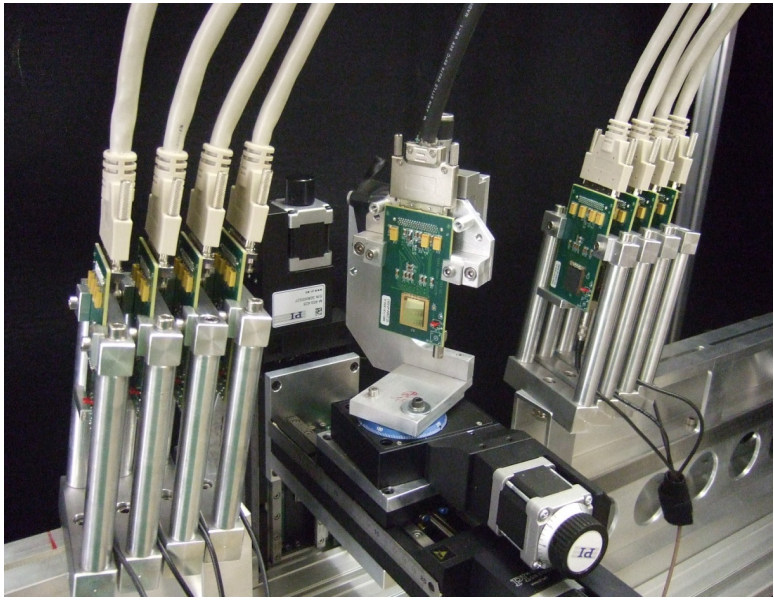


WP9.3

- Sensor production of two other technologies well under way:
  - ATLAS FE-I4: devices ready, integration well advanced, joint EUDET-ATLAS beam tests planned for this year (N. Wermes)
  - TimePix: devices ready, integration under discussion (P. Collins, R. Plackett)

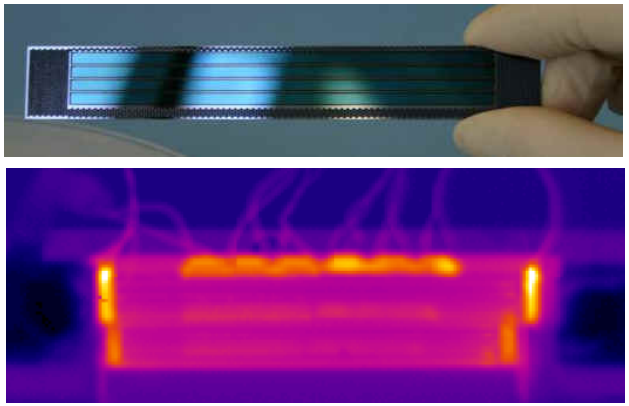


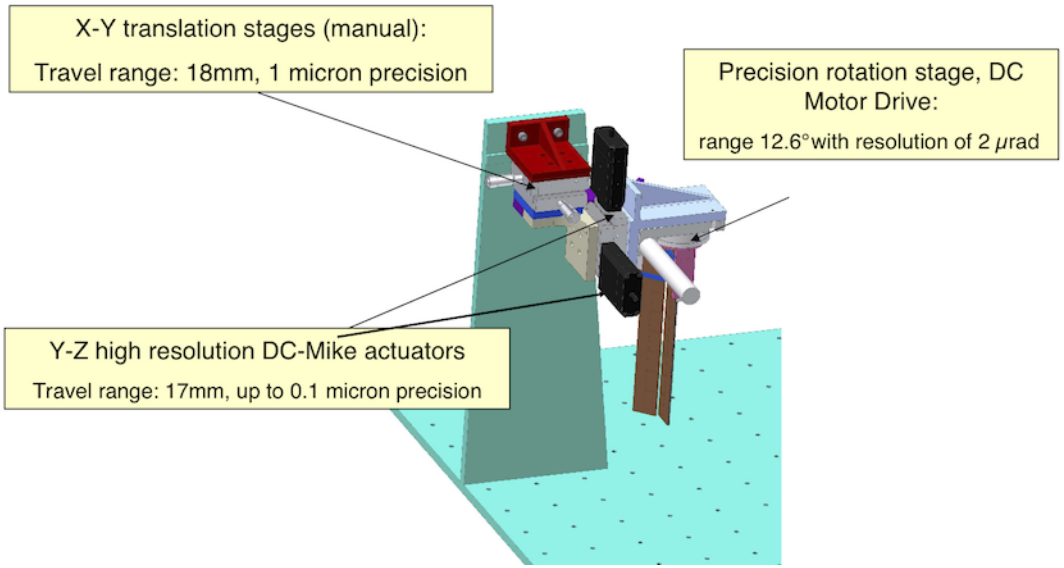




Thermo-mechanical & AID

Complementary infrastructure for high precision thermo-mechanical characterization at DESY (I. Vila, IFCA)
Alignment investigation device (A. Nomerotski, Oxford)





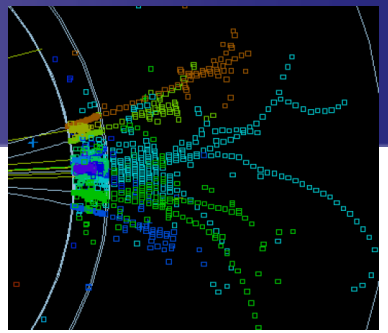
WP9.4 Silicon Tracking

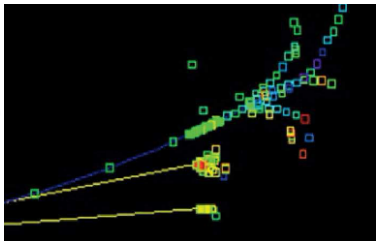
Task leader: Thomas Bergauer (HEPHY Vienna)

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

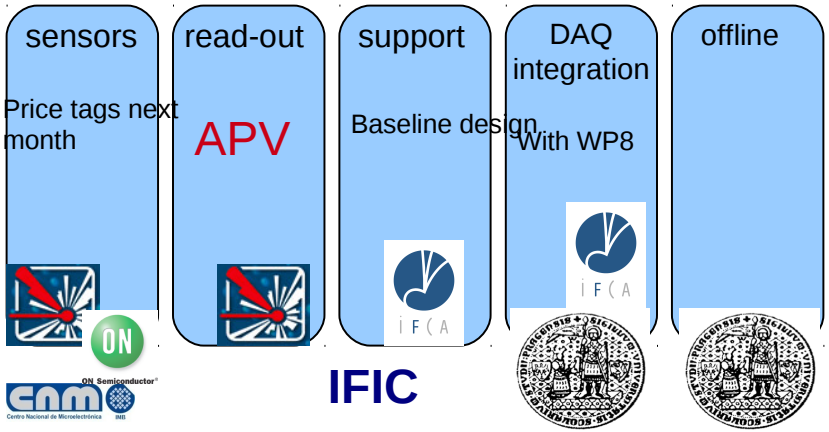
Precise entry point as a reference for study of overlapping showers
Default 50 µm pitch → down to few µm resolution (way too good, might leave fraction of strip unbonded)
3 ns time resolution (matches typical trigger scintillator resolution quite nicely)

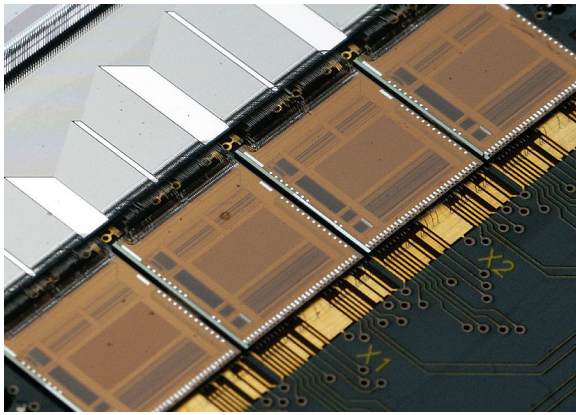
Hand in baseline deliverable early, then go on to more ambitious programme





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





Sub-tasks now solidly assigned to participants

Limited in funding and number of participants: modest goals and focused scope (much more so than the EUDET µ-strip package)

Still a place to nurture existing collaboration on Si R&D

WP9.4 read-out

Few 1000 – 10.000 channels

Two/three options considered during proposal preparation:

- APV25 (CMS/Belle-II)
  - _APVDAQ (HEPHY Vienna + IFCA)
  - _Needs software development (but needed for Belle-II anyway)
- ALIBAVA
  - _USB to PC (IFIC/CNM)
  - _Needs hardware development
- custom FE design (U.Barcelona)
  - _Pursued with Spanish CPAN funding, but not part of the deliverable

Decision: APVDAQ led by Vienna, hardware cost and manpower shared (key to be defined) by all

AIDA WP9.4 sensors

Need to procure sensors to instrument an area of O(500 cm^2)

Several options for sensors:

- Existing sensors (HPK from SiLC)
- New sensors with same masks
- Produce a few extra sensors in a run scheduled for some other project
- New sensors from CNM Barcelona (in-house)
- New sensors from On µ-electronics

  (through V. Vrba, IoP, Prague, link to WP4?)

Last two options investigate non-standard and novel features

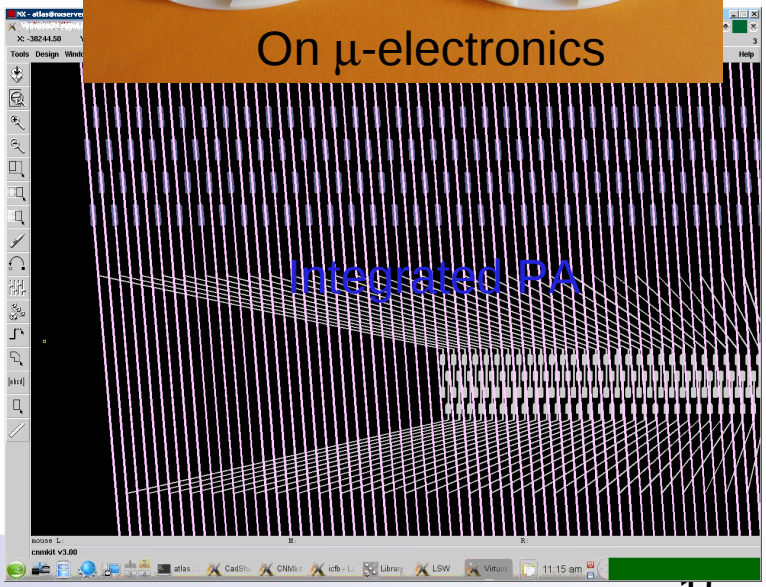
(not all at the same time, prioritize this list)

Thin devices (230 um)

Integrated fanins

IR "transparent" detectors (for laser alignment)

Resistive coupling capacitors (2D sensing)



Summary

- Limited, but solid ILC-specific TB activity in the CERN SPS and DESY
- AIDA to provide infrastructure (continuing AND extending EUDET)