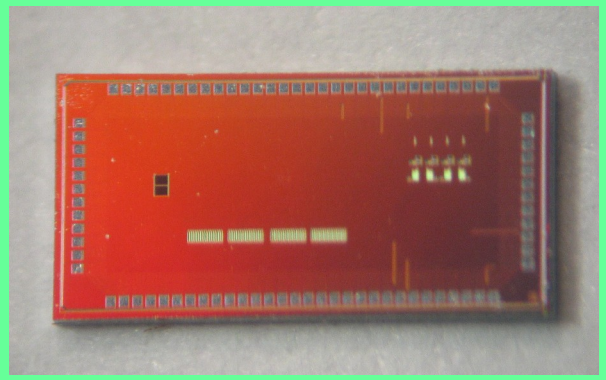
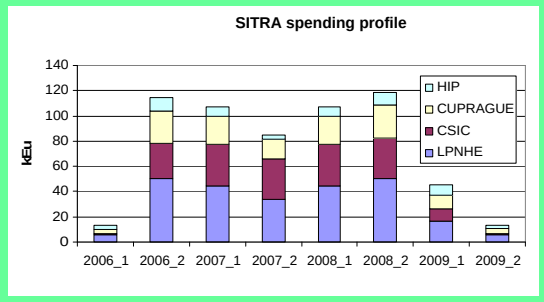
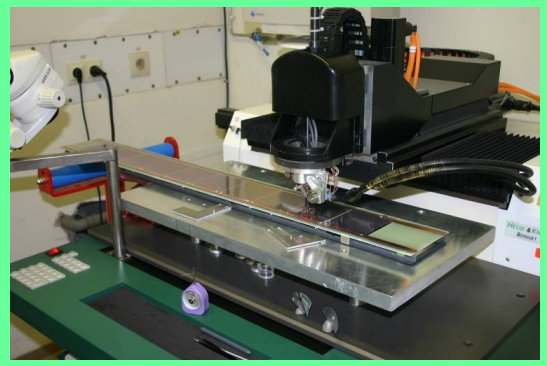






Status Report Si-tracking (SiTRA)

A. Savoy-Navarro

LPNHE-IN2P3/CNRS and Universités Paris 6&7

On behalf of SiTRA and SiLC Collaborations

EUDET Extended Steering Committee, September 11 2006:

Participants

Members

- HIP, Helsinki (Fi)
- LPNHE, Paris (Fr)
- CU, Prague (CZ)
- IFCA, Santander (Sp)

Associates

- IMB-CNM, Barcelona (Sp)
- IEKP, Karlsruhe (Ge)
- LU, Liverpool (UK)
- MSU, Moscow (Ru)
- OSU, Obninsk (Ru)
- IFIC, Valencia (Sp)

SiTRA is part of the overall SiLC R&D project
therefore includes the SiLC Collaboration
+ CERN, FNAL, SLAC (close contacts) & collab with DESY (t.b.)
and collaboration contacts with Industry

reminder

Roadmap & Scientific Objectives

23/10/06 -5/11/06 (Eventually more) DESY 5 GeV e-beam, S/N with: 180nm vs VA1, 30cm strips (2modules) &1 long strip module

Fall'07: FNAL (CERN) Full size Si detector pro. 2008: First combined tests(small calo, F.C. +TPC) within B field with various Si prototypes and 128 ch chips

Spring'09: FNAL(CERN) Combined test with final protos of Si tracker, calo and TPC, within B field new foundry FE chips, cooling and alignment protos

130nm

2006 2007 2009

Preparation test beam 07: 128ch chips & detector protos

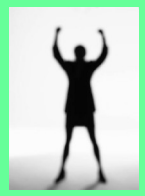
Preparation test beam 09:new chips & new detector prototypes, cooling & alignment

SiTRA deliverables: VDM FE readout chips to equip test beam prototypes
Large area SIlicon tracking structure prototypes
Cooling & Alignment systems
Series of testbeams Si alone or combined (see Roadmap)

Topics to be discussed here:

- Where do we are in 2006 (Scientific objectives)
- Where do we go in 2007 (Scientific objectives)
- SiTRA finances & appointments:
  - -> present status and
  - -> prospects
- Concluding remarks


Critical points


Positive points

Where do we are in 2006

- Test beam in DESY
- Developing the FE and readout chip 128 channels
- Elementary module, new sensors, design of the full size first prototype
- Cooling (see 2007)
- Alignment (see 2007)

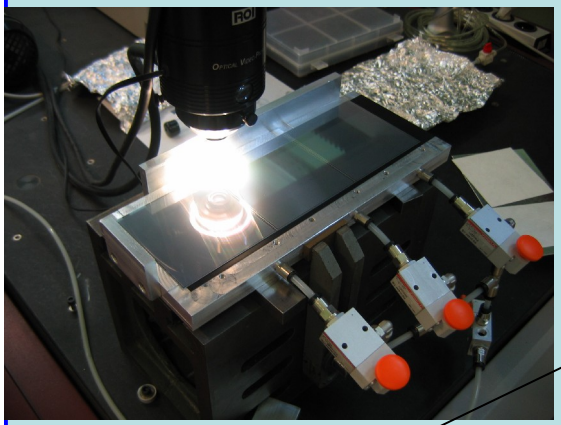
Preparation for the DESY test beam

October 23 to Nov 5, 2006

Sharing of tasks

- Construction of the detector prototypes: **CERN, IEKP-Karlsruhe, LPNHE-Paris**, IEHP Vienna, Hamamatsu)
- Mechanics: DESY,LPNHE Paris, **IFIC Valencia**, Liverpool U.(?)
- FE and readout electronics: **LPNHE-Paris**
- DAQ hardware: **DESY for beam telescopes, LPNHE-Paris**
- DAQ software: **DESY, LPNHE-Paris, CU Prague**
- Test in test bench prior to go to test beam: **LPNHE-Paris,** CU Prague, IEKP Karlsruhe
- Beam Telescopes and Beam infrastructures DESY, CU Prague, OSU Obninsk
- Analysis tools: **CU Prague**, OSU Obninsk, LPNHE Paris
- Participation to the run: all….

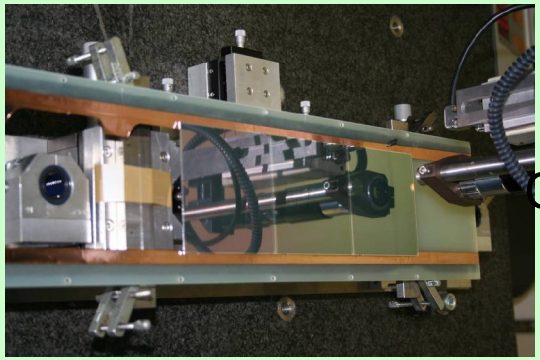
Detector prototypes: CERN (A. Honma et al.), IEKP-Karlsruhe, LPNHE-Paris, IEHP-Vienna, Hamamatsu



Assembly

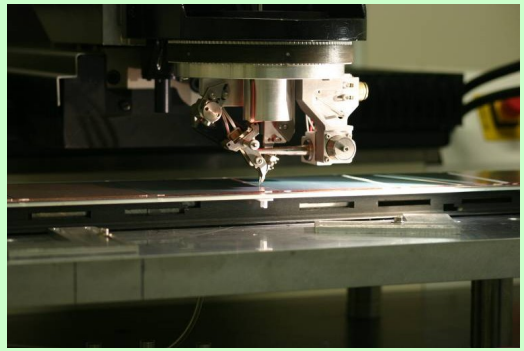
3 CMS sensors 28 cm strip long
Read out:
VA1+180UMC r.o
and all VA1 r.o.

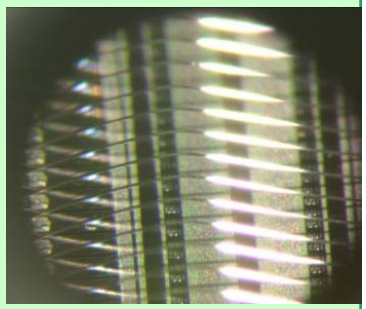
2 modules fabricated in Paris,
bonding CERN on automated CMS system
(Collab CERN-LPNHE)
Ready by September 25th



Assembly:
Module = 10 GLAST sensors
90 cm strip long

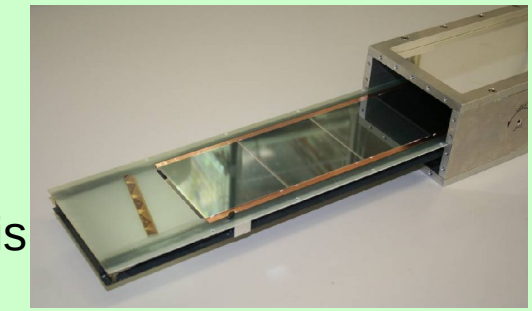
Bonding





The full construction done at IEKP

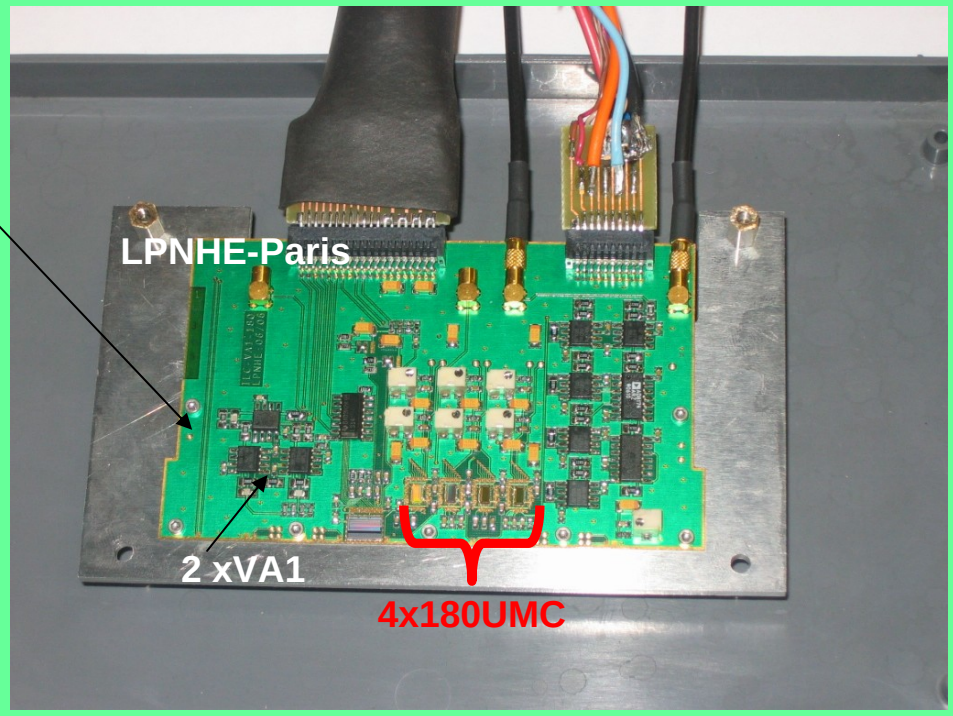
R.O.
Pitch adapter +
VA1 + 180UMC
provided by Paris



Ready by September 25th

Readout Electronics: LPNHE Paris

2 VA1 + 4x 180UMC channels: hybrid R.O. card under test



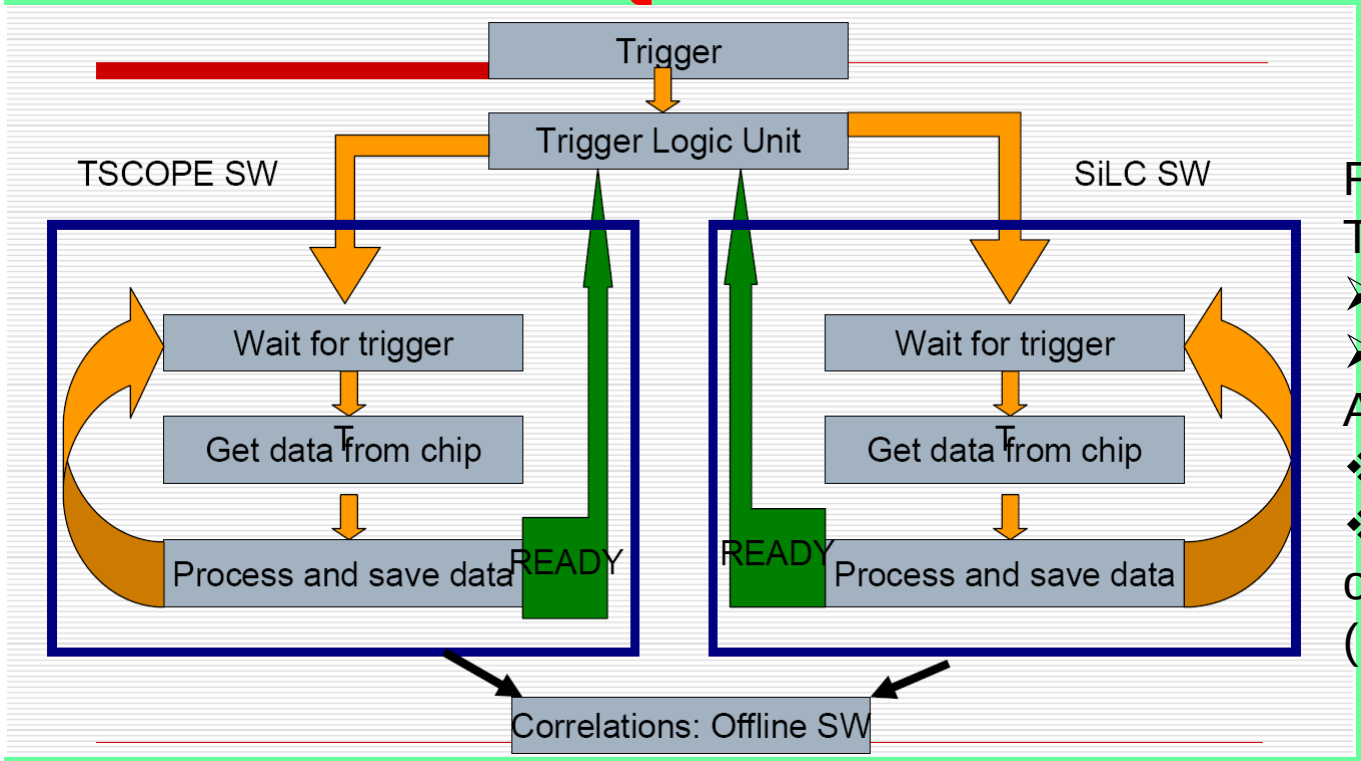
4 VA1 r.o card

- VA1 r.o. card ready
- 2 hybrid r.o. cards: VA1+180UMC ready

Both being tested at Paris Lab test bench

Pitch adapter

DAQ: hardware & software

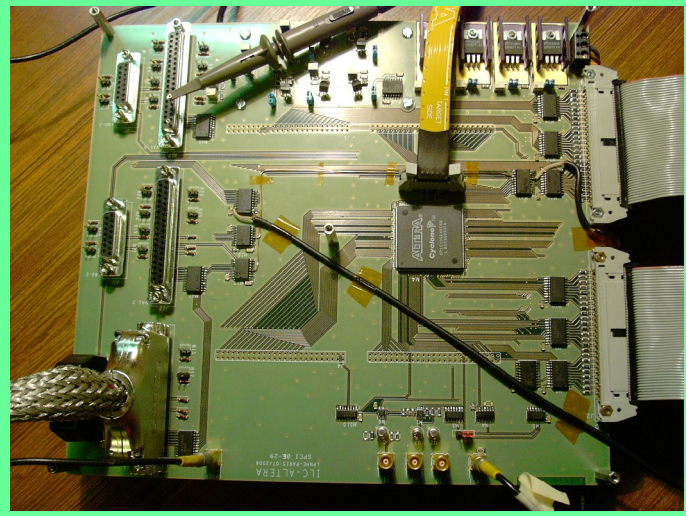


LPNHE-Paris:
Rebuilt its DAQ test bench
To be used both for
- Tests @ Lab t.b. before
- Tests @DESY t.b.

Adapted to
- new R.O. electronics
- and to link with DAQ

of the beam telescopes (mostly done, now under test).

DESY ad CU-Prague:
Use of the existing hardware and software developed by DESY for the beam telescopes implementing a very basic trigger logic for connecting the two DAQ systems.



Tests at the Lab Test bench before DESY

Everything will be tested on the Lab test bench in Paris before being sent to DESY. It includes:

- **Complete upgrade of the Paris Lab test bench (~achieved)**
- **Characterization of the new readout chips (VA1 and 180UMC)**
  - with and without connection to the Si modules
- **Characterization of the new Si modules:**
  → 2 x 3CMSmodule
  → One long strip module
- **Test of functioning of the new DAQ hardware**
  → New command card
  → New Altera card
  → Effect of 15 m long cable between Altera & detector R.O.
- **Test 2 DAQ's running in parallel (beam telescope and Si detector R.O.)**
- **Test analysis packages with Lab test bench runs**

Preliminary tests on the R.O. cards and DAQ hardware/software has just started in Paris. Test at Lab test bench: end of September till October 20.

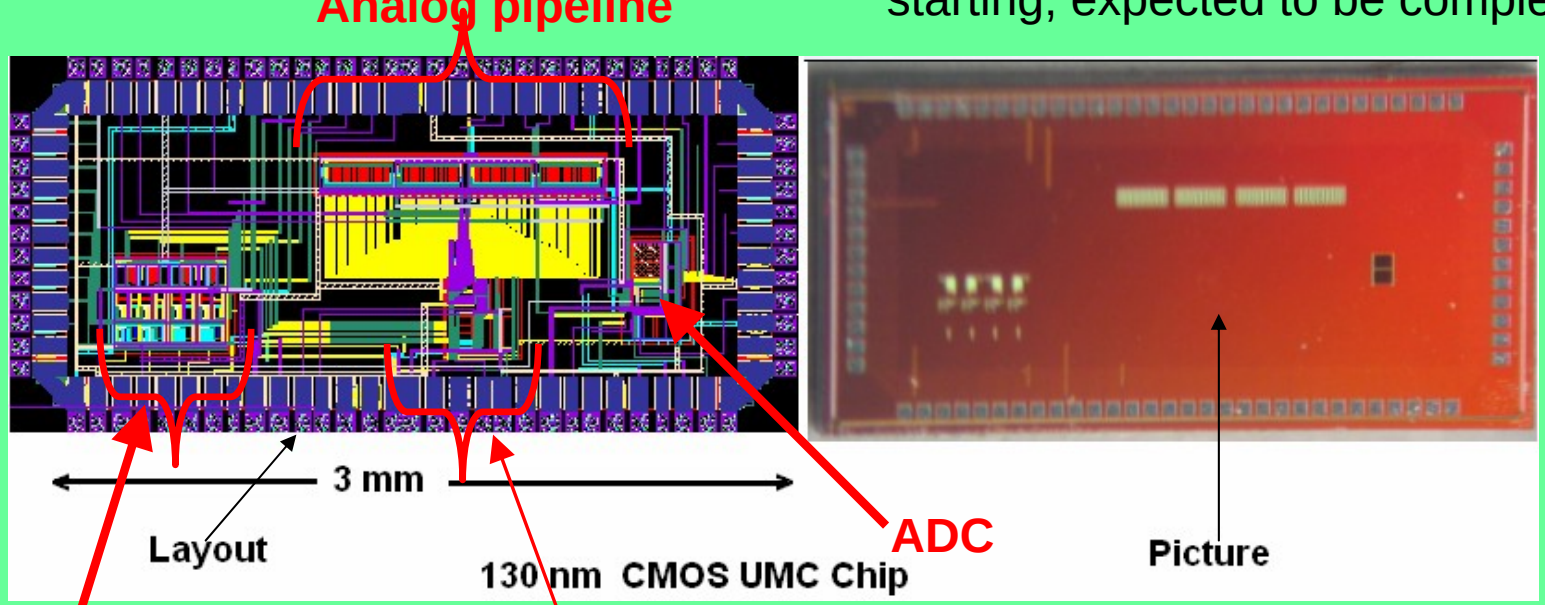
Development of the VDMS FE and r.o. chip to equip EUDET beam tests

❖**First prototype in 130nm UMC techno and with full FE+ RO chain:**

LPNHE+LAPP+IMEC

submitted April 19 2006

received August 15 2006, the tests are starting; expected to be completed end 06.



<u>Tests of first 130nm prototypes:</u>

An intensive test work on the analog part is undertaken at LPNHE. First results are expected beginning of October, on analog part. Followed by tests on digital part.

VDMS FE+r.o. chip to equip EUDET t.b. (cont'd)

- 2nd prototype in 130nm UMC: improved F.E. version,possibly power switching+calib (LPNHE-LAPP-IMEC)
  To be sent by end of September

- 3rd prototype in 130nm IBM, analog part only: CERN+LPNHE sent by November 2006
  Meeting/Decision on the technology for 1st production (128 ch)

- Full Prototype with 32/64 channels, last try before production of 128 channels for the end of 2007 test beam. To be sent end of December or at latest in January

- Packaging, detector wiring and r.o. cards (IMB-CNM Barcelona + LPNHE + Industrial firm(s)): starting…

Actions are conducted in parallel

New sensors, new modules, new prototypes

- **New sensors**: organization with IEKP Karlsruhe as coordinator helped by IEHP Vienna.

  Need closer contacts with Industry (in progress)

  Automated fabrication line, starting to be experienced with A. Honma et al. at CERN, on very first modules.
- **New modules**: under R&D very dependent of the technology used for wiring the electronics on detector for the first full size prototype
- **New prototype(s):** discussion just starting… will include the participation of other SiLC collaborators

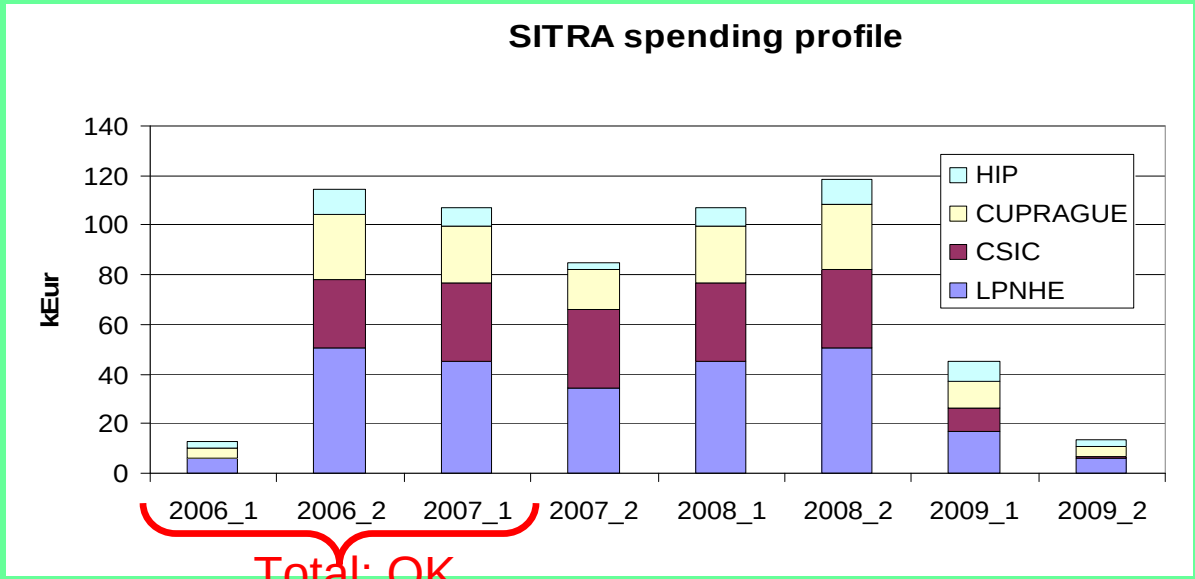
Where do we go in 2007 (Scientific Objectives)

- **Electronics**: Fabrication of about 20 K channels (1 or 2 wafers), of 128 FE and readout channel chips in 130nm. Foundry by end of March 2007.
- **Modules**: 2 types of elementary modules based on new 6'' double sided and new 8'' single sided
- **Prototype(s):**

  Design and fabrication of full size prototypes for developing the new ideas on large area structures.
- **Test beams:** FNAL or CERN

  Both Labs are interested in hosting these tests (contacts of ASN with both managements)
- Start designing and building first **proto of cooling and alignment** (IFCA starting to work on it).

SiTRA Finances status



With 3 x 32 person months

Appointment status: 2 out of 3 job positions are filled

CU Prague: filled since August 2006 (Petr Kvasnicka)

IFCA Santander: filled since September 4 (foreseen in July 2006)

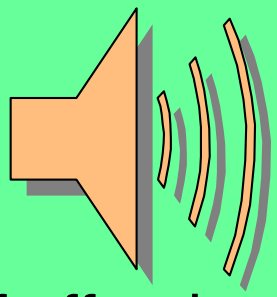
LPNHE-Paris: still pending, should be filled at latest early 2007 (foreseen Sept 06)

Most likely not all the foreseen **total amount of money** will be spent by end of 2006. Largest part will be spent for the FE chip foundry production and related stuff next year. And total amount allocated for the first 18 months should be expended as anticipated

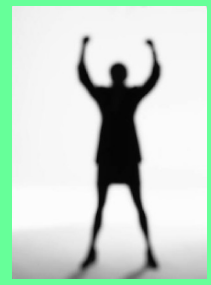
Transnational Access 1: SiTRA has requested indeed now 2 weeks test beam in DESY (Note the change) and ask for money travel support

Critical points:
(*not only for SiTRA)*

- **Appointment** of postdocs or PhDs (also non E.U. supported)
  (R&D is not so popular; competition with running or forthcoming experiments)
- **Financing**: non E.U. money to ensure all needed tasks (sensors, detector prototypes, part of cooling system, all the alignment system, DAQ and related electronics) is mandatory.
- **Collaboration with industry** on some of the high aspects is crucial (new sensors; wiring/packaging, VDMS foundries, new materials)
- Getting **people to participate to the beam tests**
- Need to **reinforce collaboration within EUDET on tasks of common interest between sub detectors (grand unification)** for DAQ systems, analyses framework etc…



Positive points



- Lots of effort by some teams from SiTRA & SiLC are making possible to be ready for the first beam tests in DESY.
- Progress on FE chip & collaboration extended to CERN.
- Building of new large area Si tracking prototypes: interest of teams from SiLC or new ones joining.
- Starting collaborative contacts with other sub detectors (TPC)
- Interest of both FNAL and CERN in hosting the next year SiTRA beam tests
- Non E.U. SiLC teams willing to join our beam tests next year
- Positive first contacts with industrial firms to be pursued; crucial for new sensors & new packaging (new Si modules).
- R&D non E.U. financing is increased for some SiLC teams.
- R&D SiLC collaboration developing very well with regular meetings of the whole collaboration or on dedicated topics.