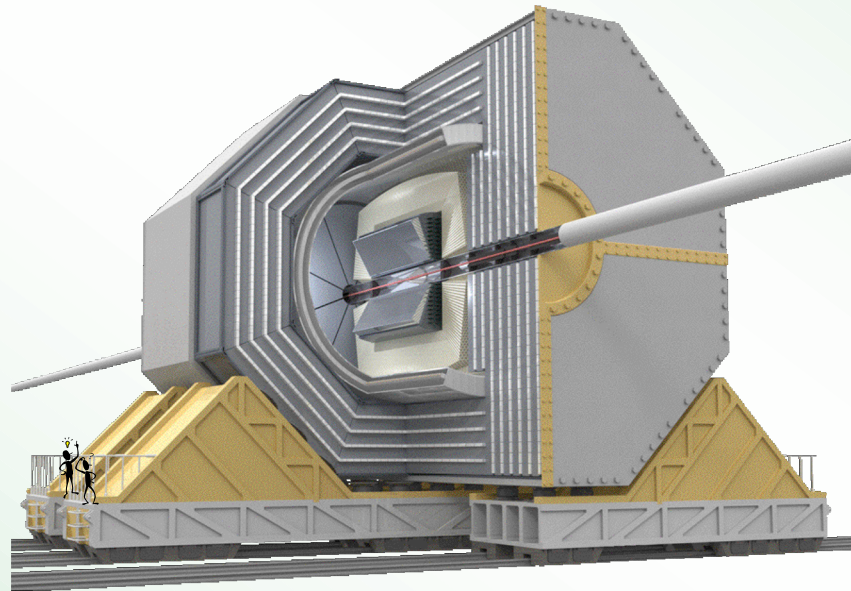


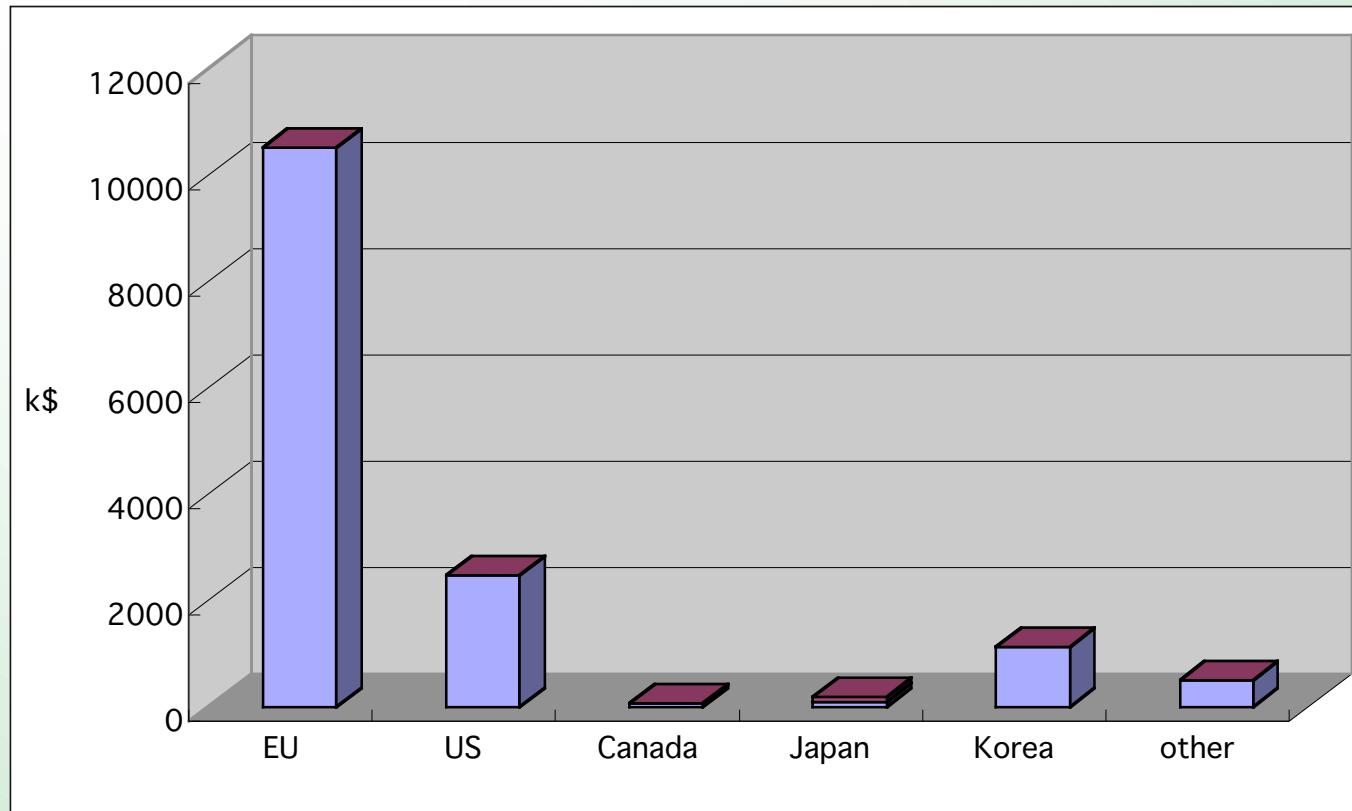
JSPS Report



Hitoshi Yamamoto
Tohoku University

ILC detector R&D funds secured for the next ~4 years (Salary not included)

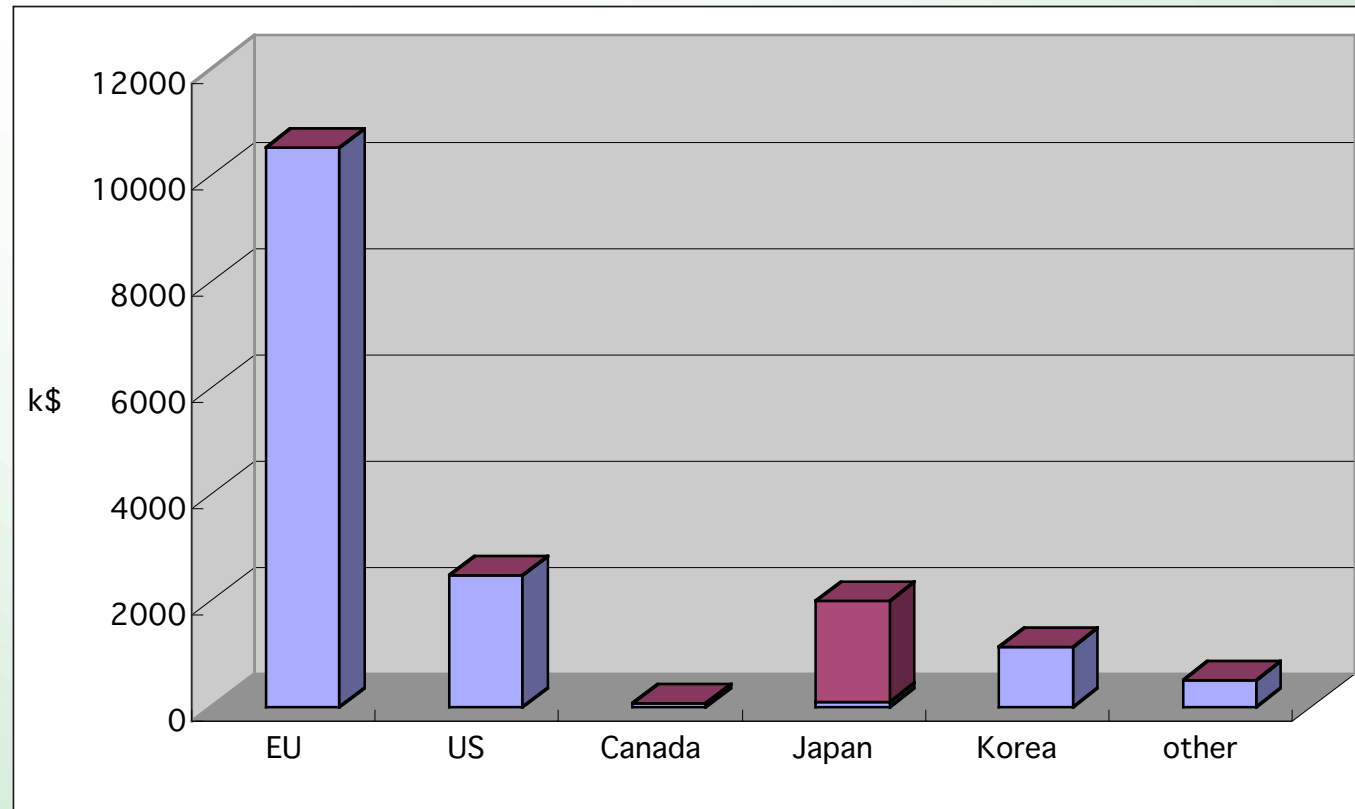
As of Jan 2006



Worldwide Study R&D panel report, 2006/1

ILC detector R&D funds secured for the next ~4 years (Salary not included)

As of May 2006



Worldwide Study R&D panel report, 2006/1

ILC Detector R&D Funding in Japan

Main sources :

- MEXT (Ministry of Education, Culture, Sports, Science, and Technology)
- JSPS (Japan Society for Promotion of Science)
 - ◆ An independent governmental organization to which some grants-in-aid programs of MEXT were transferred to in 1999.

Together, they fund mostly-university-based scientific researches in Japan. Total budget ~ \$2B (doubled in 10 years)

Other sources :

■ KEK

◆ Detector R&D office

- Generic detector R&Ds,
- Not specialized in ILC detectors
- Not included in the funding level by the R&D panel report

◆ Beam tests, etc.

- Super-conducting magnet for TPC test, etc.

■ US-Japan

◆ Funds the Hawaii pixel project

- Not included in the funding level by the R&D panel report

◆ EMI study

■ Operation funds of universities

- Traditionally, LC detector R&Ds in Japan have been supported by funds obtained by individuals without explicit coordination.
- Started to apply for bundled projects for LC detector R&Ds a few years back.
 - ◆ Have been unsuccessful until this year
- This year, we submitted two bundled projects; nearly identical in scope and size:
 - ◆ MEXT (incl. theory)
 - ◆ JSPS (without theory)
- The JSPS proposal above has been accepted.

JSPS Creative Research Project
'Research and development of a novel detector
system for the international linear collider'

- 5 main tasks
 - ◆ VTX, TPC, CAL,
 - ◆ OPT (PFA, optimization), GRID
- DAQ, muon, MDI etc. also can be supported
- 4 oku¥ over 5 years (oku¥ = 0.9 M\$)
 - ◆ Includes indirect cost (~1/4), salaries (~1/3)
- Travel ~ 0.1oku¥ per year
- ~ 6 researchers hired any given time

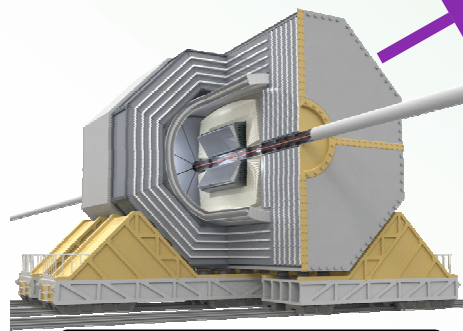
JSPS Creative Research Project
'Research and development of a novel detector
system for the international linear collider'

Leaderships :

- PI: HY
- OPT: S. Yamashita
- VTX: Y. Sugimoto
- TPC: K. Fujii, A. Sugiyama
- CAL: T. Takeshita, K. Kawagoe
- GRID: A. Miyamoto
- Structures/magnet: H. Yamaoka

New physics results

- * Nature of vacuum
- * Dark matter
- * SUSY
- * Extra-dimensions



High resolution detector

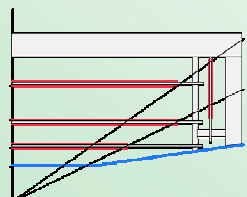
Subdetectors

Optimization

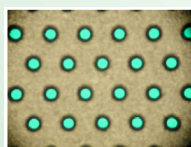
Vertexing

TPC

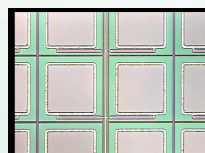
Calorimeters



FPCCD



MPGD



MPPC

New detector elements

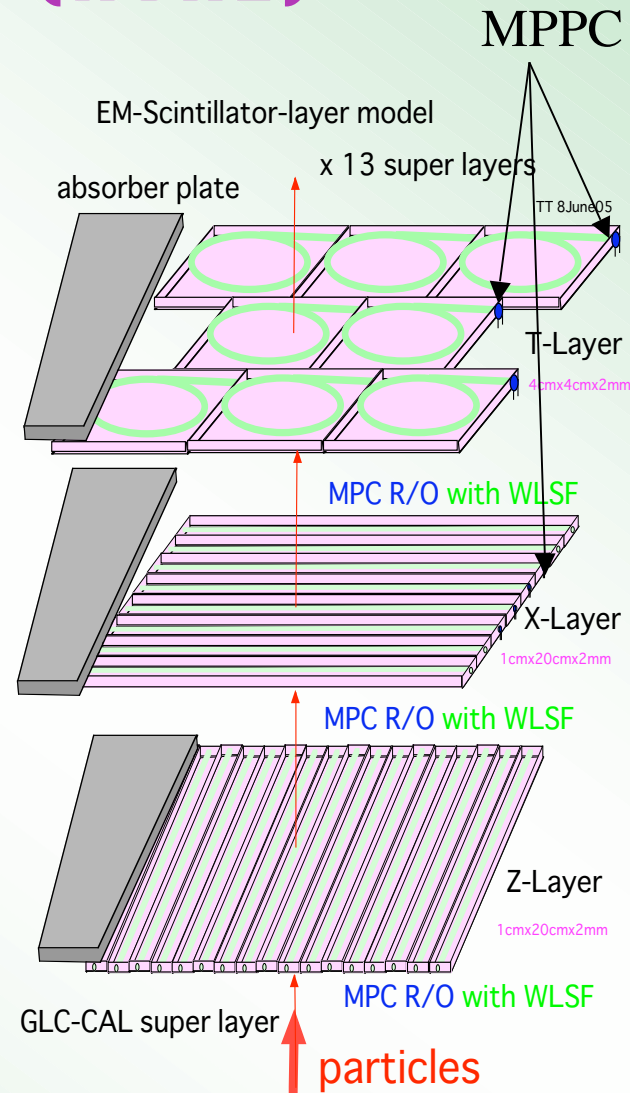
GRID

This Project

applications in other areas : medicine, astronomy, etc.

Calorimeter (HCAL)

- Goal: Beam test
 - ◆ Energy resolution
- Absorber/Structure
 - ◆ With CALICE/EUDET
- Fine segmentation
 - ◆ Scintillator tiles + strips
 - 4cm × 4cm
 - 1cm × ~16cm
- Readout using new photo sensors
 - ◆ Multi-Pixel Photon Counter (MPPC)
 - ◆ 25000 ch
(The real detector will have ~10M ch)



MPPC (Multi-Pixel Photon Counter)

Recently invented in Russia (SiPM)

■ Collaboration with Hamamatsu

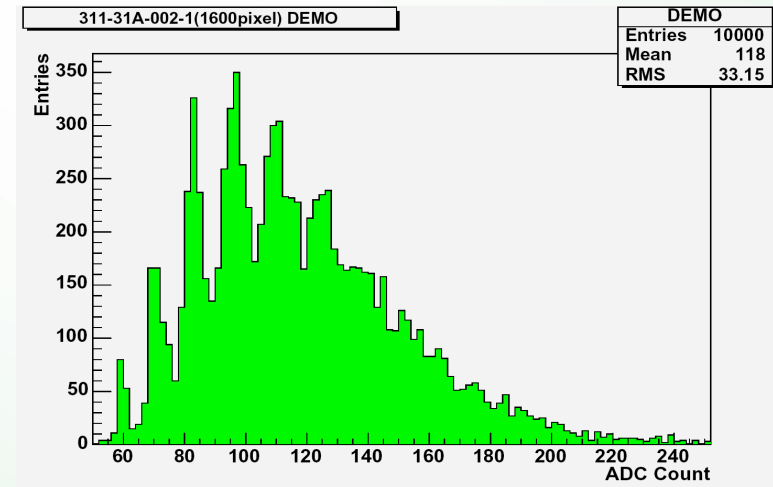
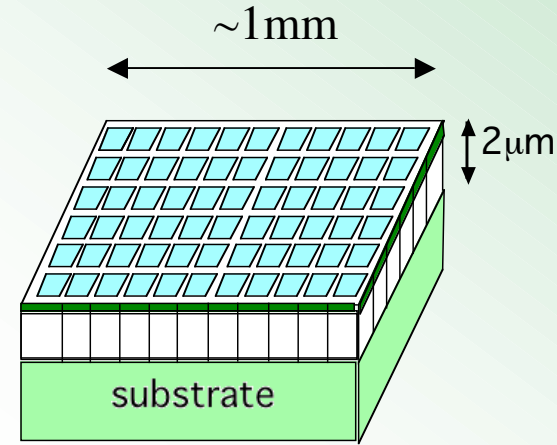
- ◆ High photon efficiency $\sim 30\%$
- ◆ High gain $\sim 10^6$
- ◆ High time resolution $\sim 50\text{ps}$
- ◆ Low voltage $\sim 50\text{V}$
- ◆ Works in high B field $\sim 5\text{Tesla}$ OK

■ Goals of this project

- ◆ Dynamic range
- ◆ Larger sensitive area
- ◆ Stable operating voltage

Likely to revolutionize PMT

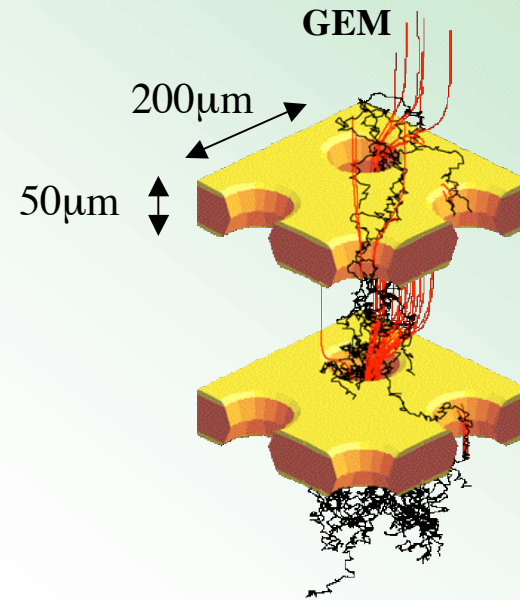
- ◆ Cheap : 1~5\$
- ◆ PMT \rightarrow MPPC
- ◆ NMR,PET applications
- ◆ New applications for satelites and optical communications



Pulse Height

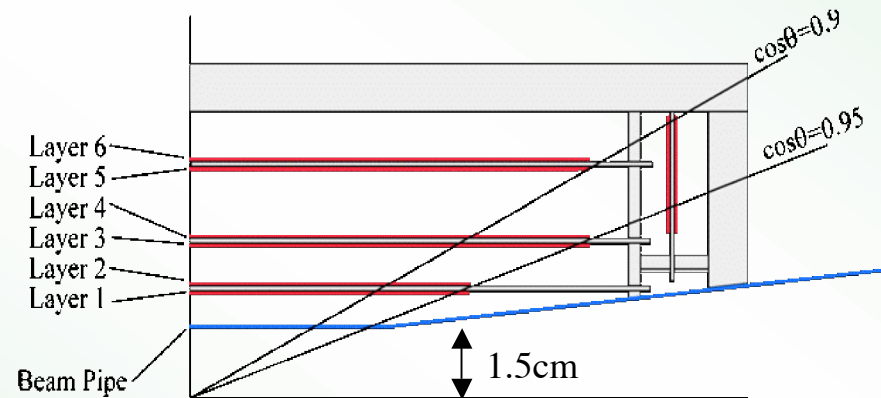
■ Micro-Pattern Gas Detector (MPGD)

- ◆ Collaboration with Cyenergy Co.
- ◆ Mainly GEM (Gas Electron Multiplier)
- ◆ Goals :
 - Larger gain
 - Larger area, 20m²
 - Test with the EUDET large prototype

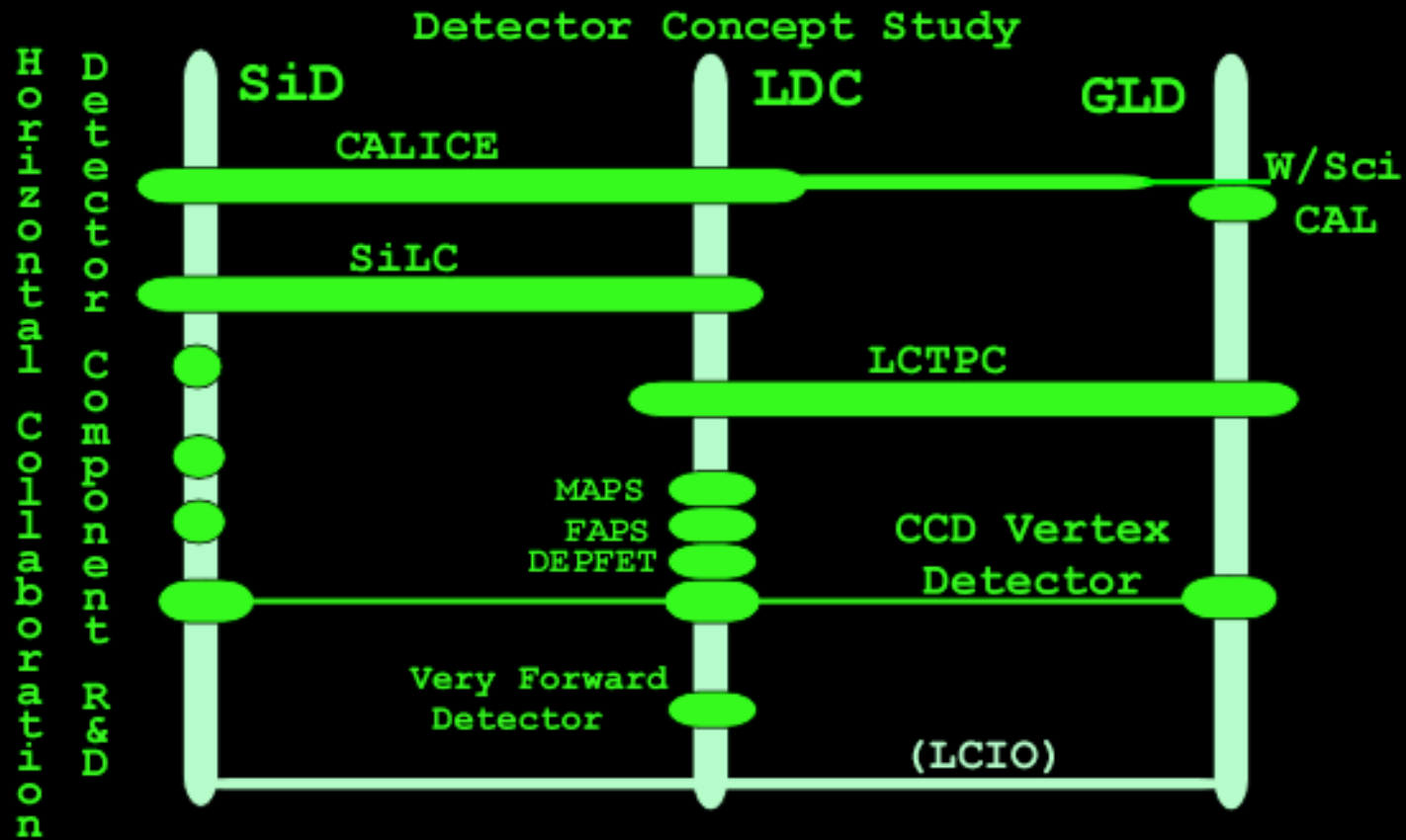


■ Fine-Pixel CCD (FPCCD)

- ◆ Pixel size : 20µm sq → 5µm sq
- ◆ Fully depleted to reduce diffusion
- ◆ Goals :
 - Thinning : 300µm → 50µm
 - Fast readout : 1port → 32port
 - Radiation tolerance

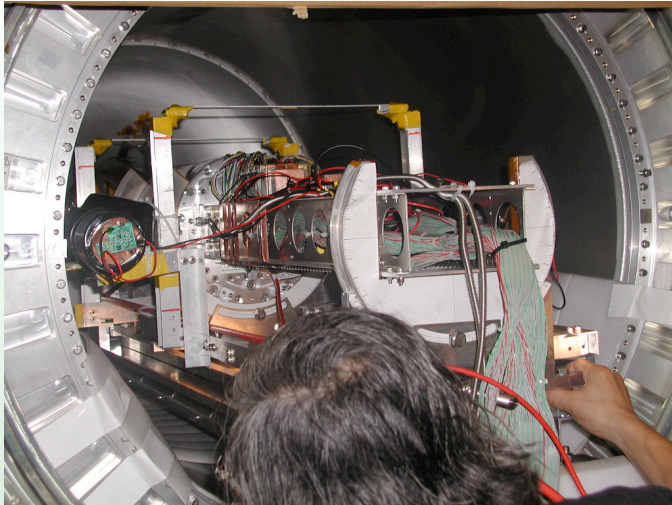


THE MATRIX



TPC Prototype Beamtest

MPI, DESY, IPN Orsay,
Asian institutions



TPC Large Prototype

- Funded by EUNET.
 - Designed to fit within the PC magnet from KEK.
 - Large Prototype collaboration starting.
-
- 'PC Magnet'
 - Superconducting solenoid (KEK)
 - 1~1.2 Tesla
 - 85cm inner diameter
 - Testing with MPI prototype

Klauss Desch @ Bangalore LCWS06

(Red emphasis is by HY)

EUDET



EU funded 4-year program ('Integrated Infrastructure Initiative')
to improve infrastructure for ILC detector R&D
total budget 21.5M€, EU-funded: 7M€

Coordinating Lab: DESY - Participants from all over Europe
Magnet from Japan (good example... more of that, please)

Workpackages on

- Testbeam Infrastructure
- Tracking Infrastructure
- Calorimetry Infrastructure
- Common tasks (Software,
Computing,
Chip-Design)

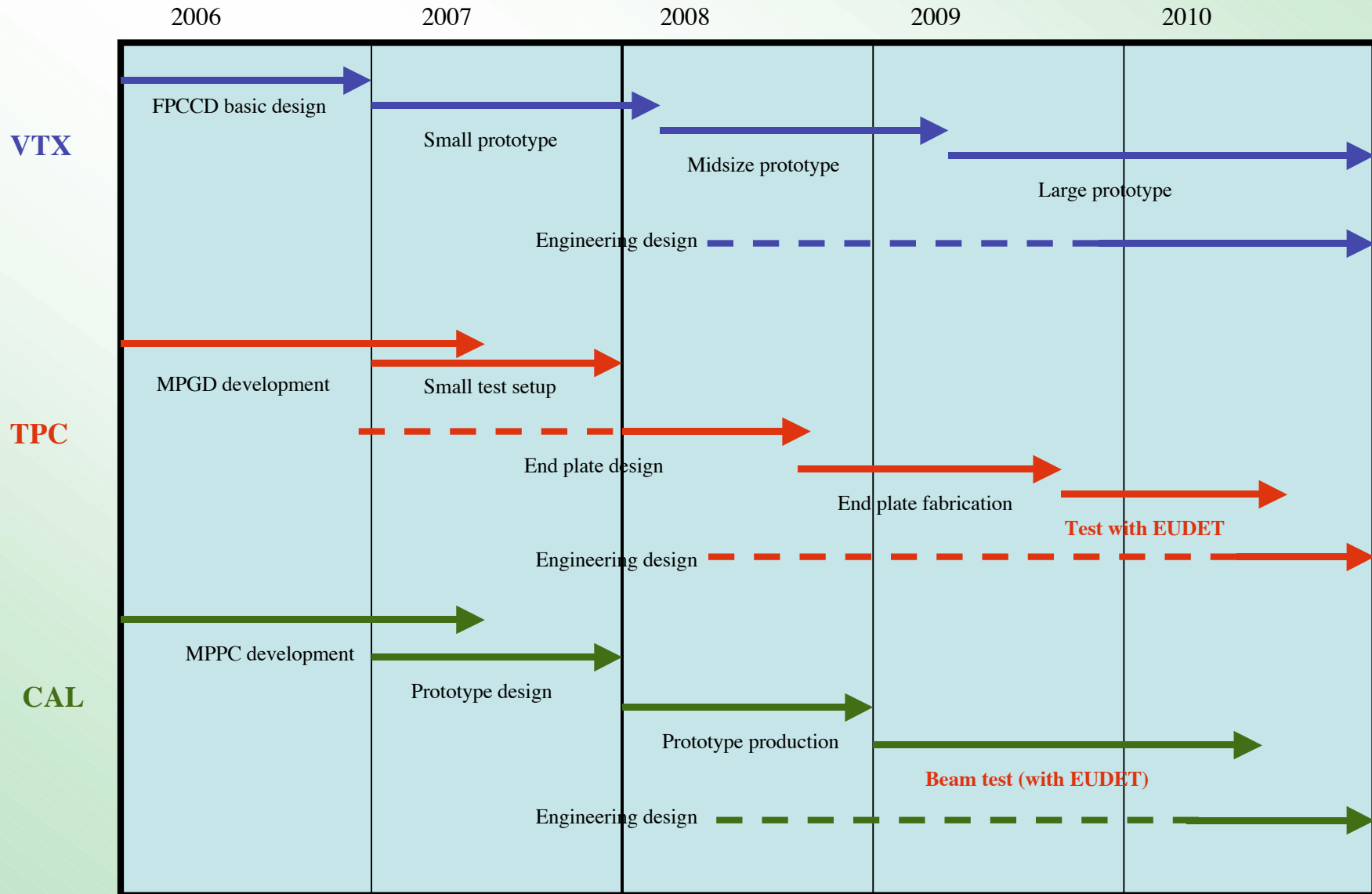


This infrastructure is open to the world!

Timeline (tentative)

Phase 1 : detector elements

Phase 2 : midsize to large prototypes



Summary

- ILC detector R&D in Asia recently had a boost by a JSPS funding.
- The funding level is reasonably adequate, IF we closely collaborate with other regions (particularly, CALICE and ILC-TPC).
- With this funding, we will be a reliable collaborator.
- More close collaborations needed, e.g. in vertexing etc.