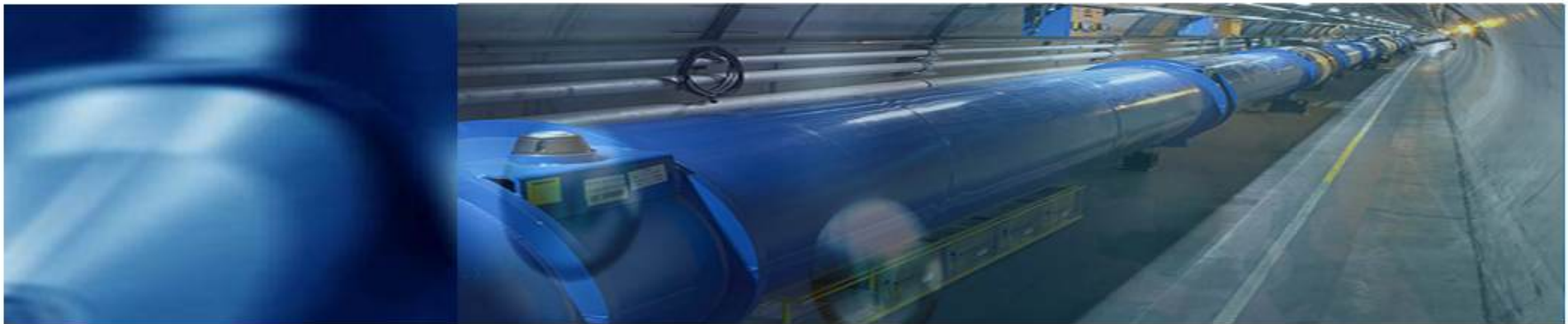


Work on SiW ECAL Front End Electronics at SKKU



Ho Seung Song, Seung Hyun Lee,
Jong Seo CHAI

Sungkyunkwan University(SKKU)



Contents

Contents

- CALICE/ILC
- Previous Experiences at SKKU
- STAR (CALISU) Project
- Work on the FEV Board



CALICE/ILC



CALICE/ILC

CALICE Project

In particle physics, French scientists from Laboratoire de l'Accélérateur Linéaire (CNRS-IN2P3/Université Paris Sud) and Laboratoire Leprince-Ringuet (CNRS-IN2P3/Ecole Polytechnique) collaborate actively with Korean institutes to develop new detectors for the future **International Linear Collider**.



Omega

A & ME

LRL



ilc



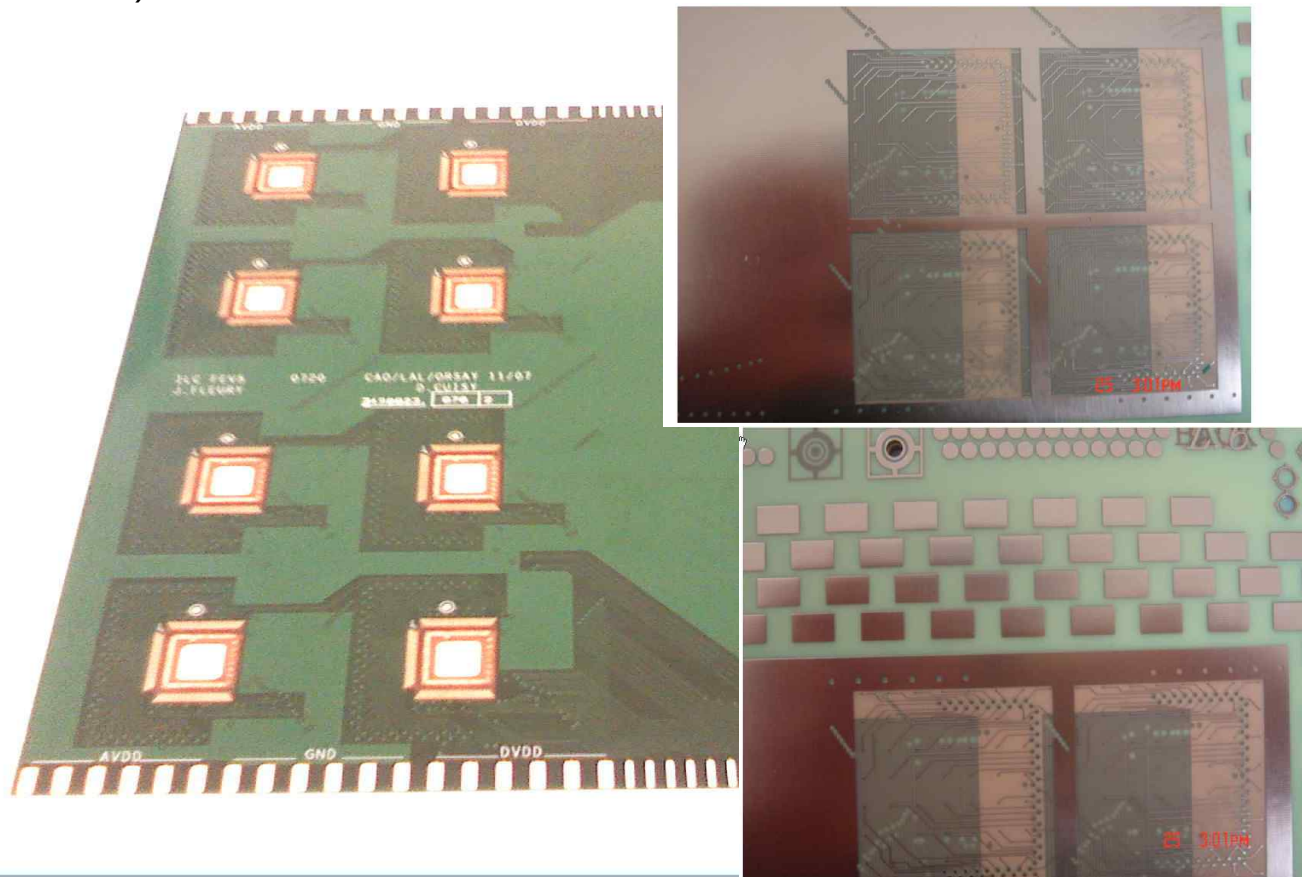
Previous Experience



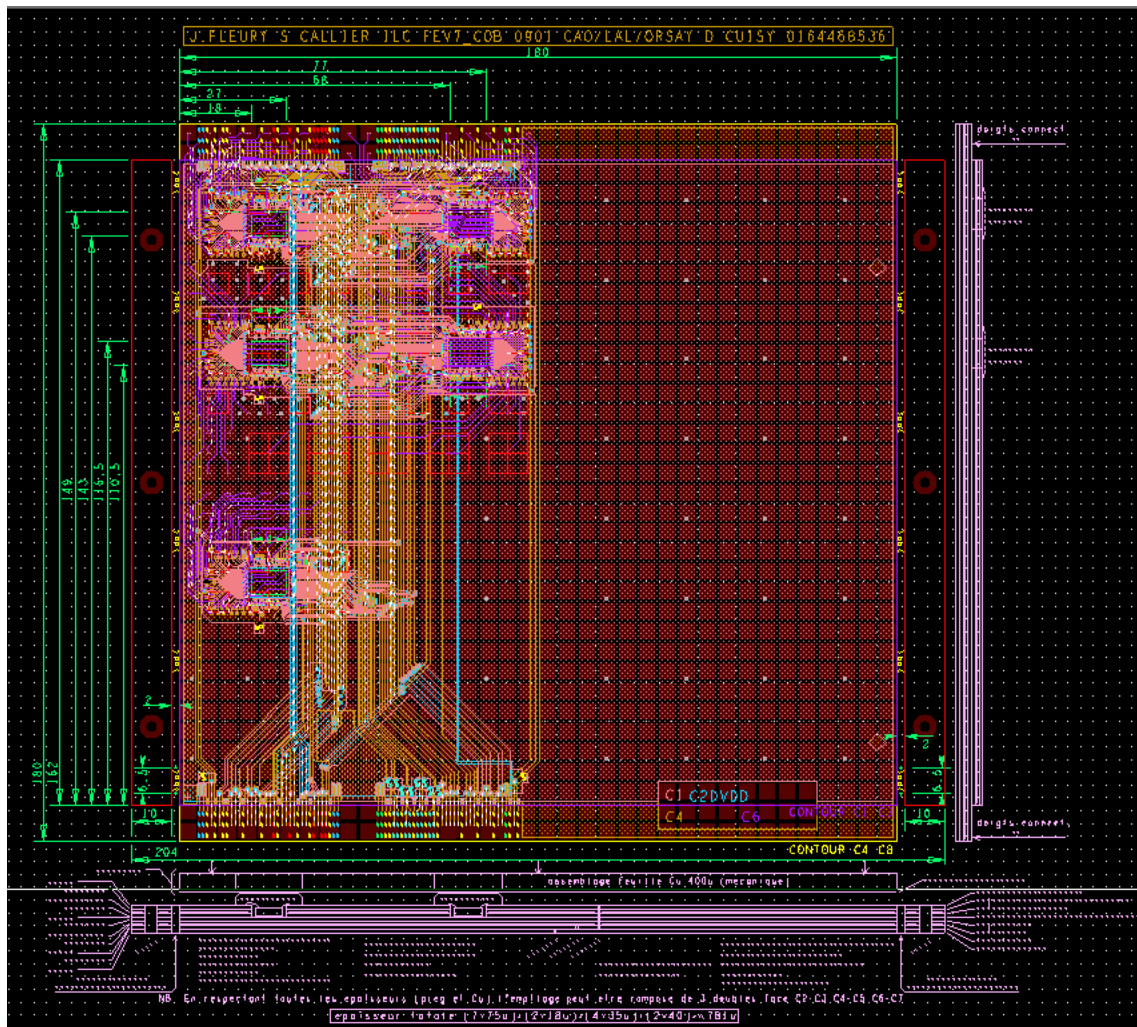
FEV5 Design

FEV5 Manufacturing Order

- Ordered by SKKU & KIRAMS (Korea Institute of Radiological and Medical Science)



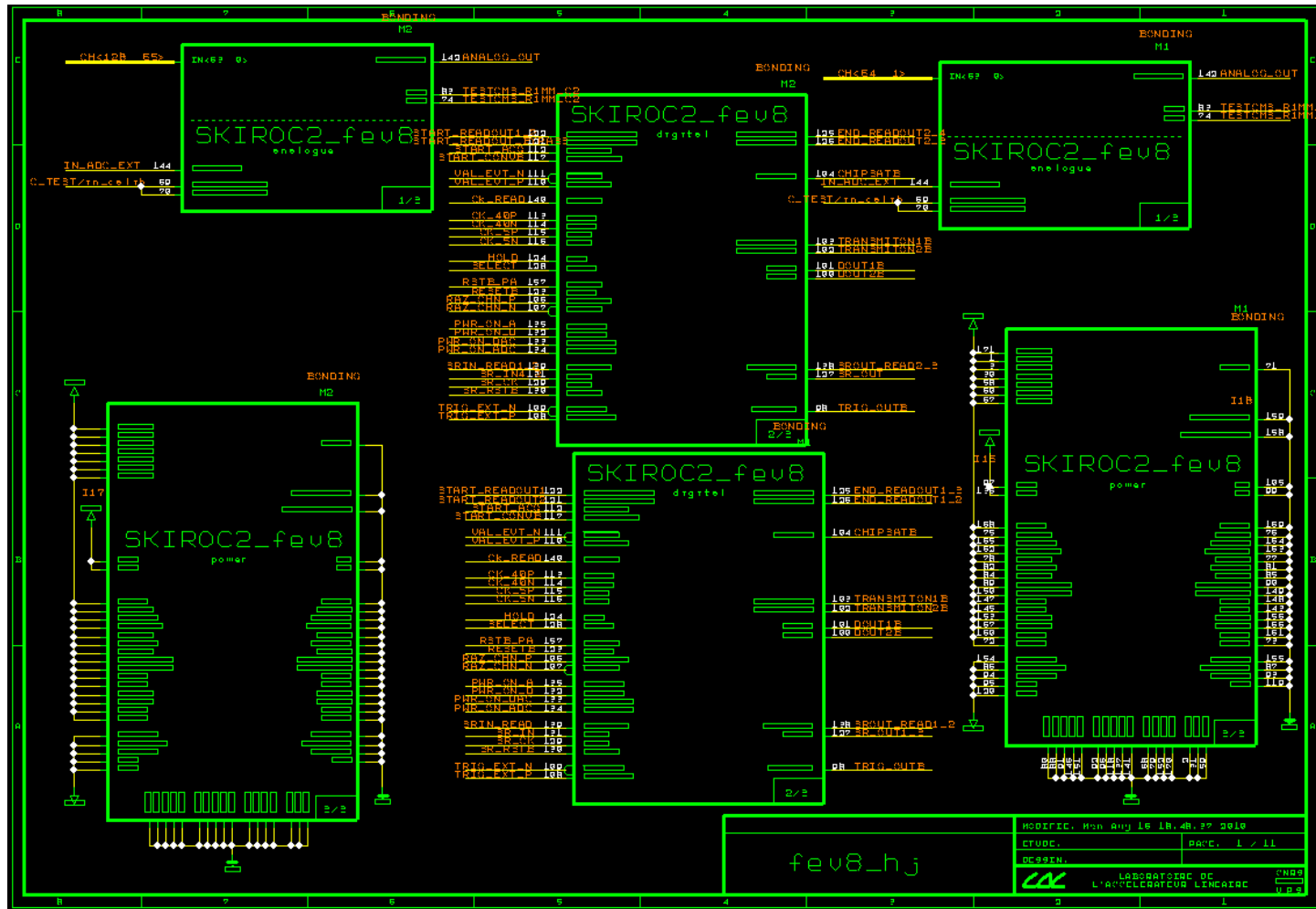
FEV7 COB1 Layout



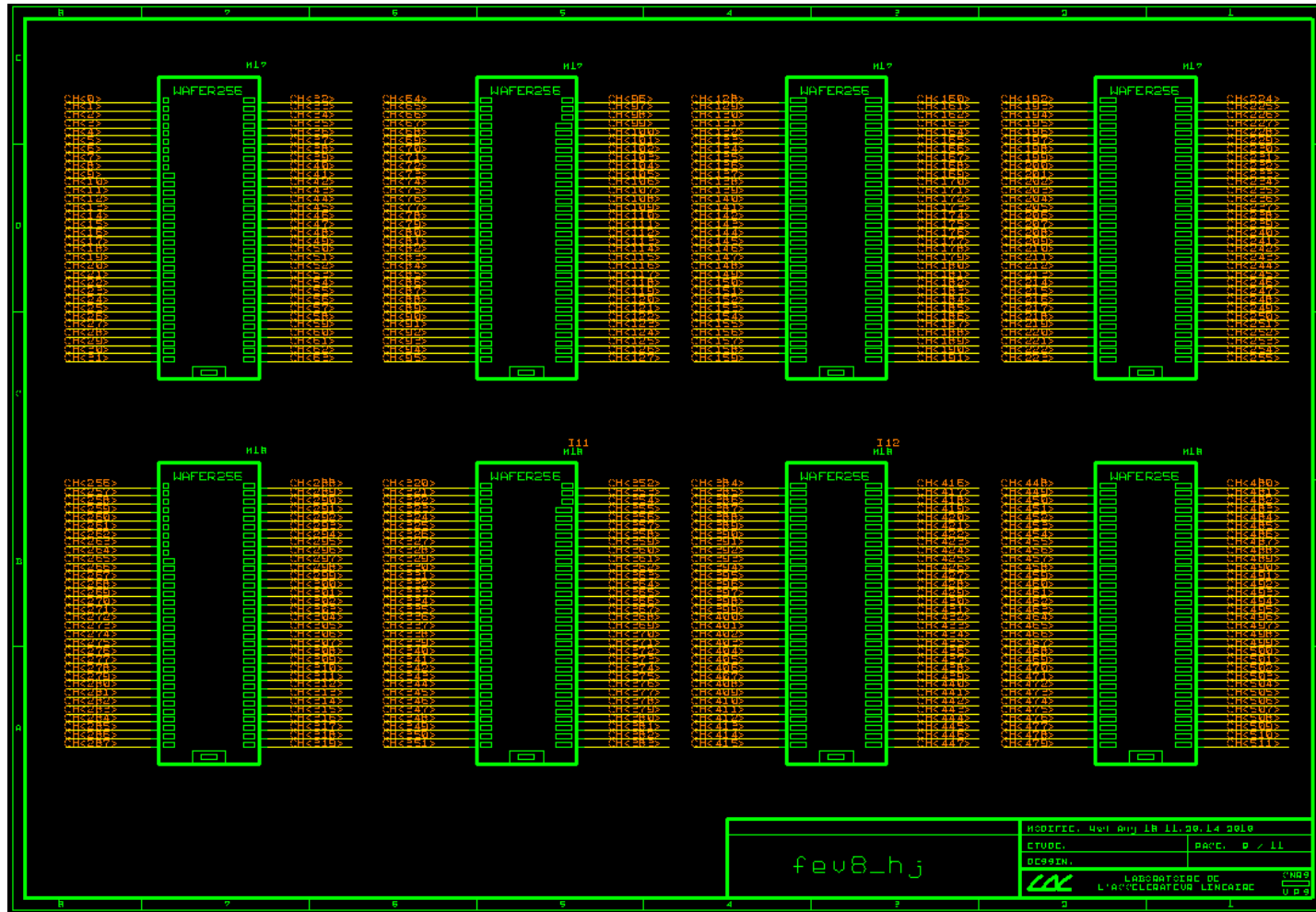
FEV7 CIP
 FEV7 COB1
 FEV7 COB2

**FEV7 COB1
 with 5chips**

FEV8 Schematic

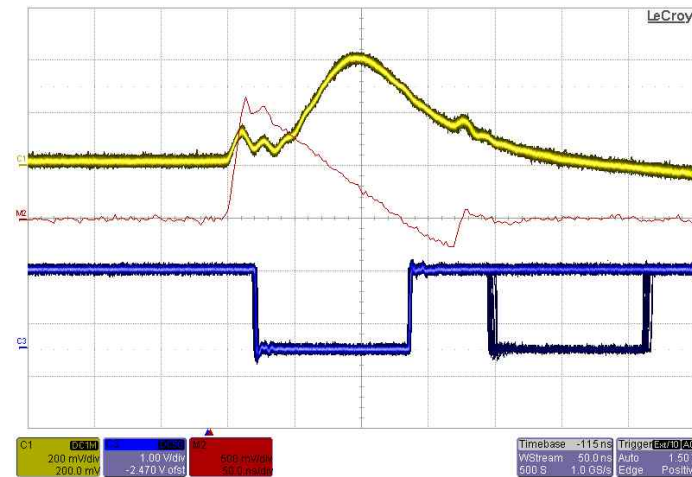
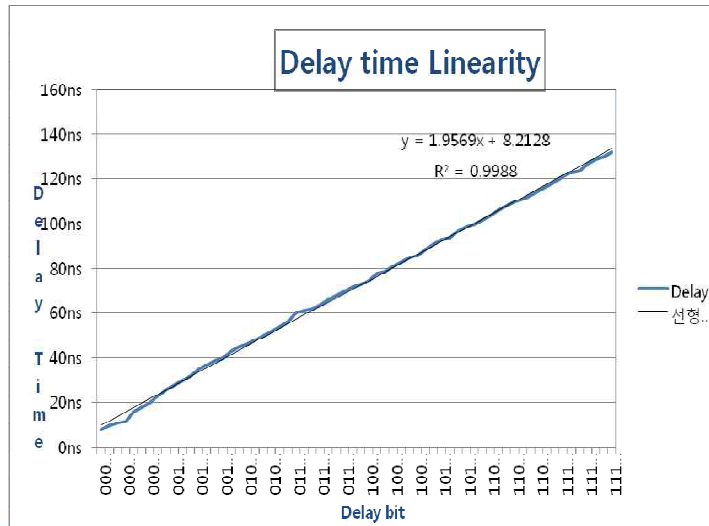
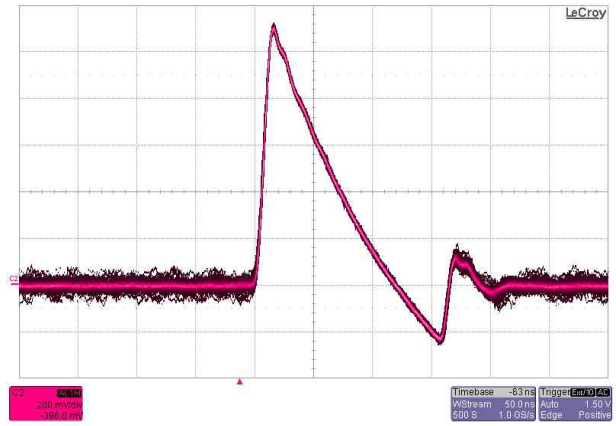
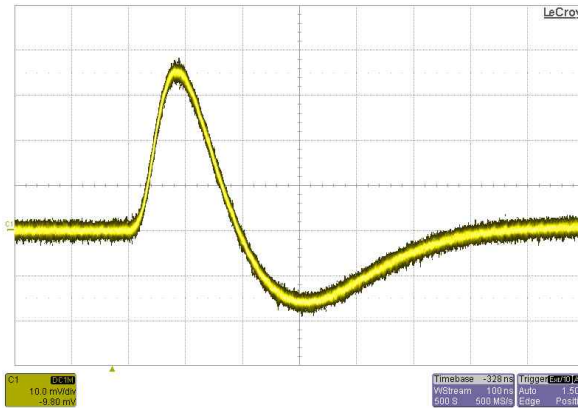
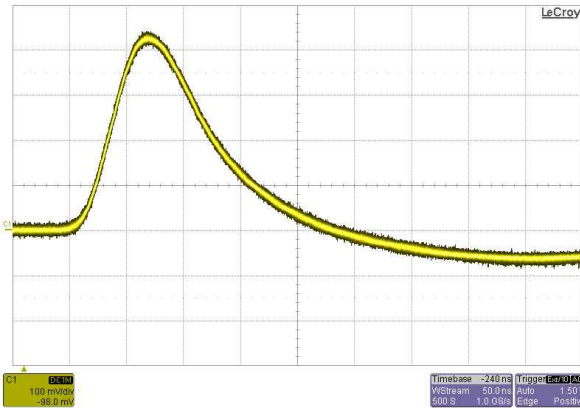


FEV8 Schematic



Measuring of SPIROC1

Results





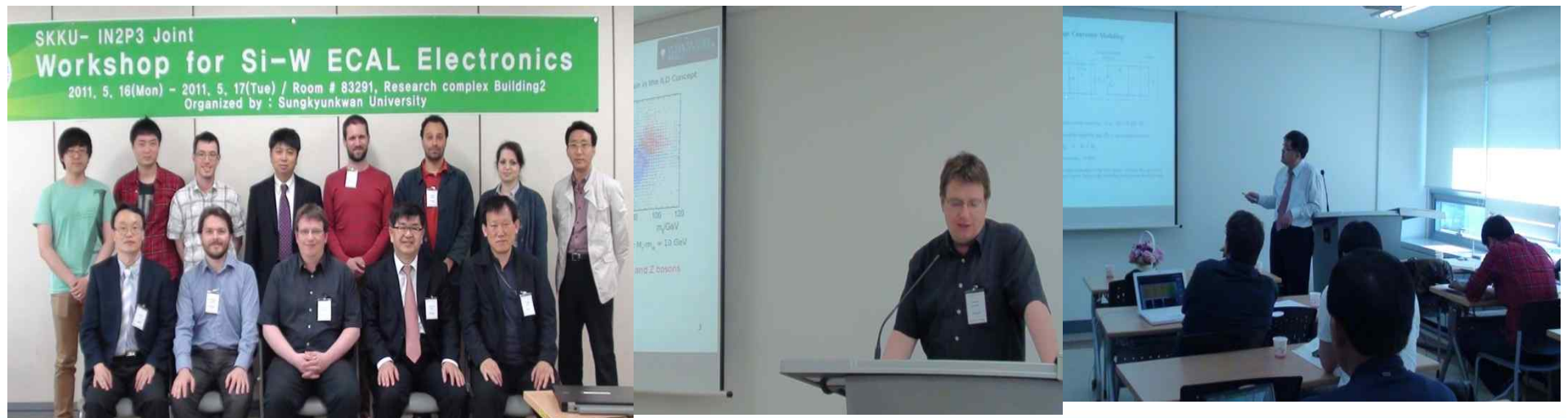
STAR Project



STAR Project

CALASU Project

The next generation of detectors in particle physics requires highly compact low noise electronics. The proposed project comprises the development of microelectronic circuits, ASICs, and interface boards, PCBs. The power consumption and signal integrity of the ASICs will be validated and optimized. The PCBs will have to be ultrathin. The devices will be examined in high-energy particle beam tests as well as in beam tests dedicated to determine the radiation hardness of the electronics.





Schedule Lists

Schedule lists (2012)

Jan – Mar:

- Equipments setup at SKKU,
- PCB prototype manufacturing

Apr – Jun:

- Data Analysis,
- Test setup with PCB

Jul – Aug:

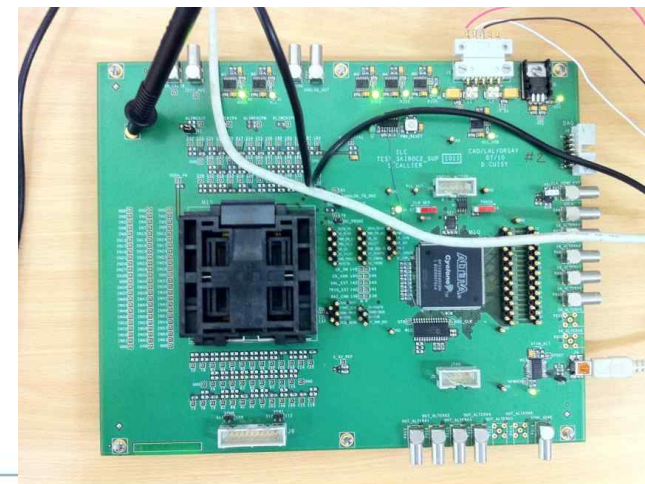
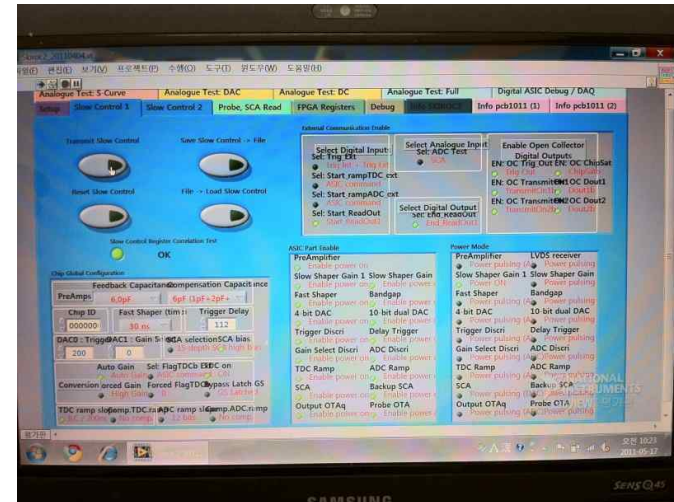
- Beam test at DESY of a calorimeter

Sep – Dec:

- Data analysis,
- Annual seminar on experiment result and PCB manufacturing,
- Test preparation with cyclotron at SKKU.

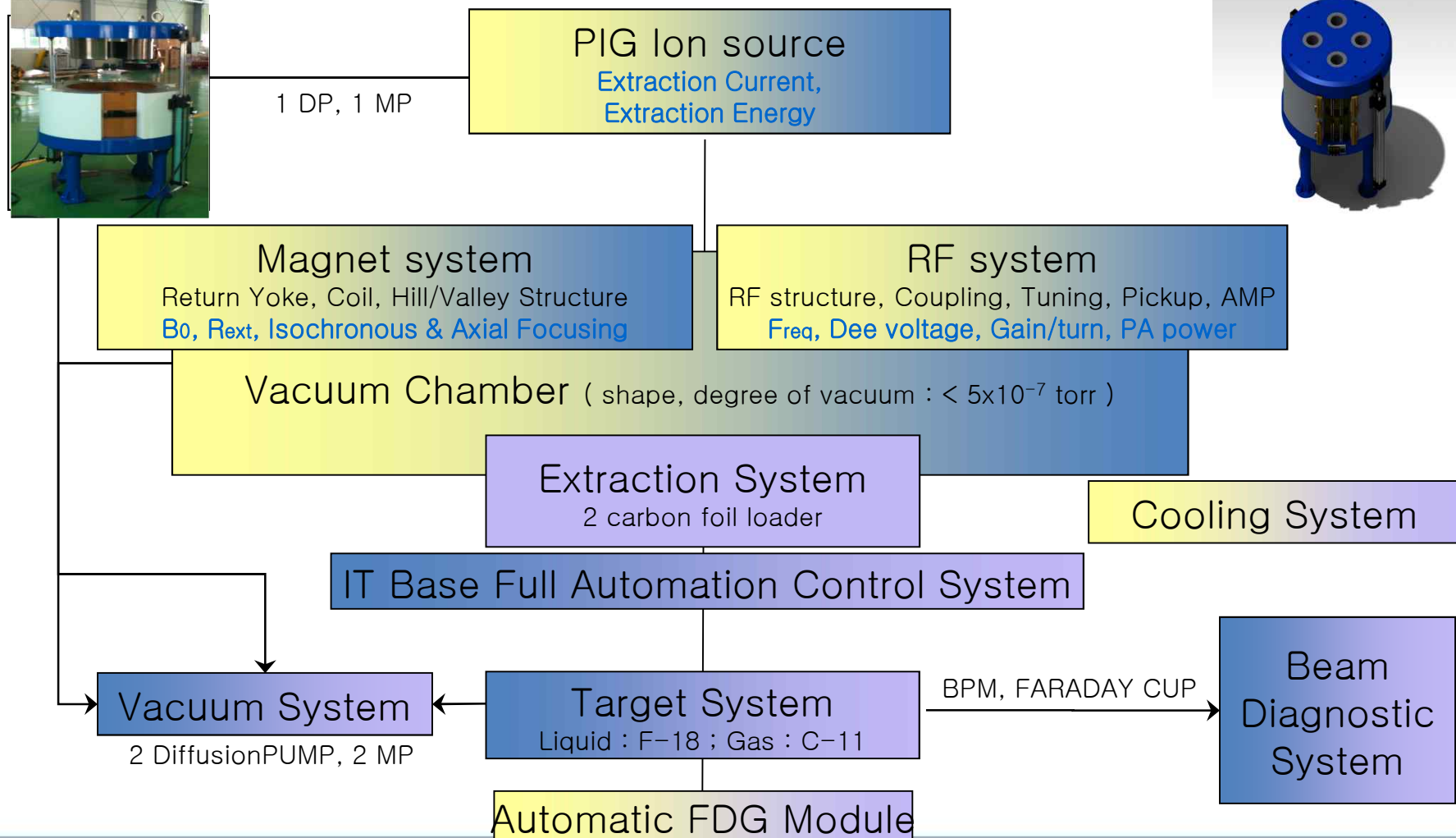
Experiment Setup at SKKU

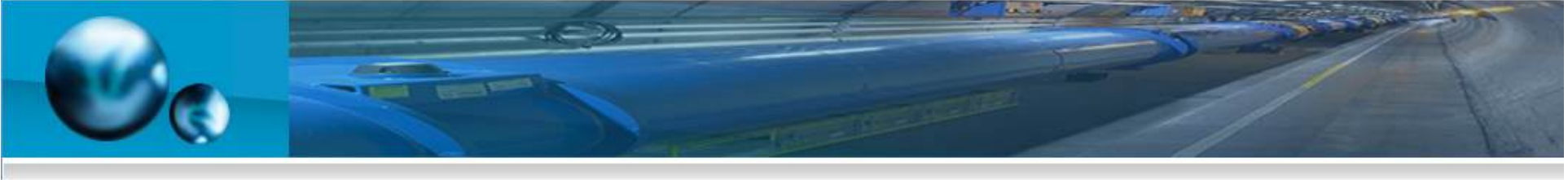
Experimental Setup





Test Preparation with Cyclotron





FEV Board



FEV7 COB2



DEPTH, PLANARITY ARE VERY IMPORTANT!

FEV7 COB2 Manufacturing

Manufacturing Cost (10 PCBs)

Terms of payment :
 Production Lead time:
 Price listed below are effective before date of 08-Feb-12

Description	Unit	Unit price	Total Amount	Remark
Model : ILC_FEV7_COB2 Description : FR-4, 0.8T, 1oz, 8Layer, ENIG Dimension : 180 x 180 (1Up)	10 PCS	₩ 800,000	₩ 8,000,000	
Model : Description : VOID Dimension :				
Model : Description : VOID size :				
Model : Description : size :				
VOID				

6000 Euros

Notes: 1. If any description listed above deviate to the requirement of current design, the price is to be negotiated.
 2. Loading PO to RUGATECH is seen as accepting above conditions unless early information advised.

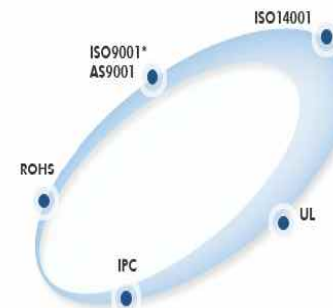
EOS is the **expert manufacture company** of Printed Circuit Board.

EOS has built the system to correspond with the international standard related ISO, Product Safety, Production and inspection rule for the best quality.

We continue to train employees and focus to improve internal power to be the most competitive company in the world.

EOS QUALITY KEY

- ISO9001 and AS9100 of Aerospace Quality Managemnet System [VIEW](#)
- ISO 14001 of Environment System [VIEW](#)
- Obtain UL Certificate #E146670 and #E327303 [VIEW](#)
- IAQG (International Aerospace Quality Group) Member [VIEW](#)
- IPC Member [VIEW](#)
- Pro-environmently Products [VIEW](#)
- System improvement through regular internal inspection
- Internal certificate program about quality task
- regular correction management program about measure device
- Design Rule Checking and
- Design For Manufacturing
- NET compare layer and Image compare layer
- SPC management for Critical Process
- The selection of ade raw material to IPC-4101 standard
- Quality Program against IPC-A-600/610, IPC-6012 Class 3
- Reliability Analysis in accordance with IPC-TM-650





FEV7 COB2 Manufacturing

Manufacturing Process

CAM- FILM- Cut- Inner Layer Light Exposure- Etching- Test- OXIDE- LAYUP- TRIM- SCALE- DRILL- Reliable TEST- Plating

- Light Exposure- Etching- Test- OXIDE- LAYUP- TRIM- HALF Etching- DRILL- Reliable TEST- Plating

- Light Exposure- Etching- Test- OXIDE- Reliable TEST- LAYUP- TRIM- HALF Etching- DRILL- Reliable TEST- Plating

- Light Exposure- Etching- Test- OXIDE- LAYUP- DRILL- CONFORMAL- LASER DRILL- VIA FILL- HALF Etching- Reliable TEST

- Plating - Outer layer Light Exposure- Corrosion- Test- Print- PSR Test- Electronness Au Plating- BBT- Final Test- Shipping Test- Shipping



FEV7 COB2 Manufacturing

Some Setbacks

- Complicated manufacturing process (requires many reliable tests)
- One of the most sophisticated level of PCB manufacturing
- FEV7 COB2 Prototype is being delayed (Expected to be made until the end of this Mar)
- Korea's big companies (SAMSUNG, HYNIX) are NOT currently interested in this PCB.



Summary

Summary and Outlook

- We have a certain experience on FEV board design and analysis.
- Currently setting up the environments for experiments.
- Waiting for FEV7 COB2 manufacturing.
- Plan to find out for FEV8 COB manufacturing company if it succeeds.



Thank you for your attention

(Some of the slides were adopted by OMEGA Group.)