WP-conveners 3rd phone meeting

- Date 20 June 2006
- Time
  - 07:00 west coast
  - 10:00 east coast
  - 16:00 central Europe
  - 23:00 Japan
- Phone +494089981390 code 52872#

Agenda for 3rd phonemeeting

AGENDA

- 1. News
- 2. Report on the electronics (Leif and Luciano)
- 3. More ideas on the endplates (Dan)
- 4. Future meetings
- 5. AOB

AGENDA

-1. News

The PRC recommendations are were released last week:

"7.2.2. TPC

The PRC congratulates the LC-TPC collaboration for the successful operation of many small prototypes, both with GEM and Micromegas detectors, and for the interesting developments with silicon pixel readout. The PRC recommends that the organization be strengthened to coordinate the worldwide R&D effort towards a TPC detector for the ILC. The PRC encourages efforts on simulation studies, in particular as they may provide a crucial input for the eventual choice between detector options. The PRC supports the large prototype detector as the next major focus of R&D that is expected to be ready for operation by the end of 2007. The project will therefore be reviewed at the PRC 65 meeting."

Agenda

-2.Report on electronics ideas

Reminder: milestone for the Eudet facility

1000 altro channels available ----------12/2007

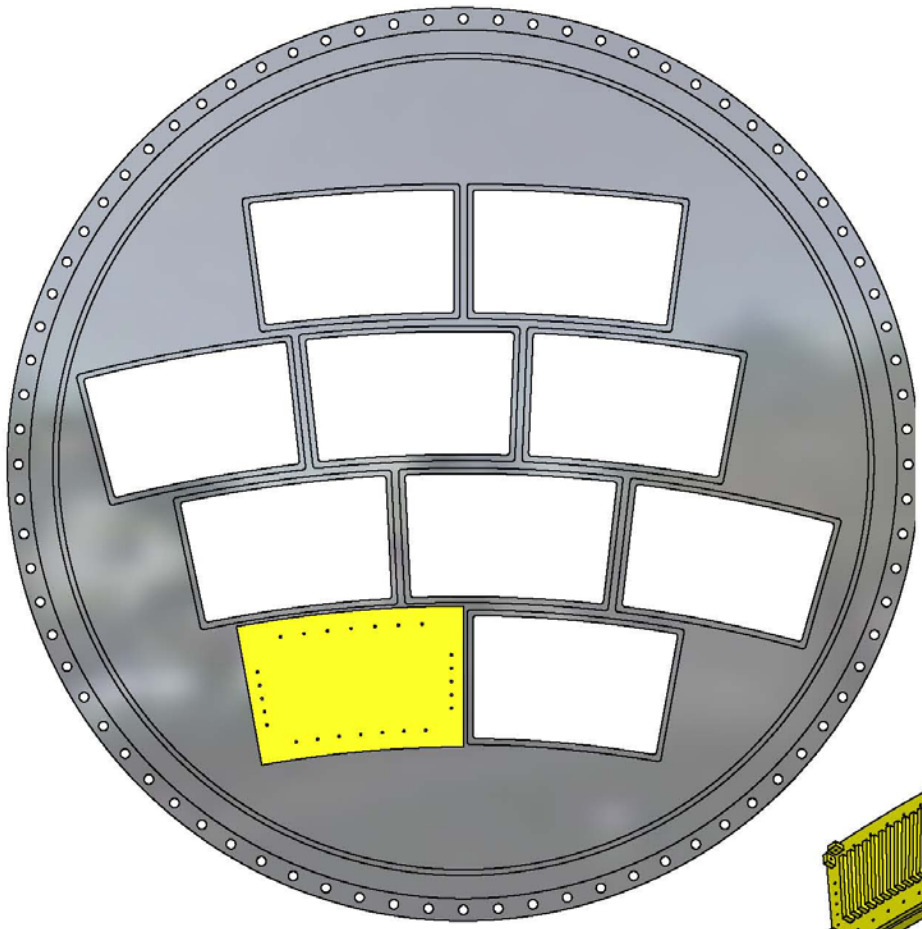
Agenda

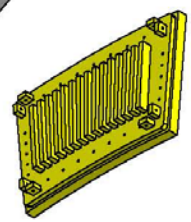
-3. Ideas for the endplate (Dan)

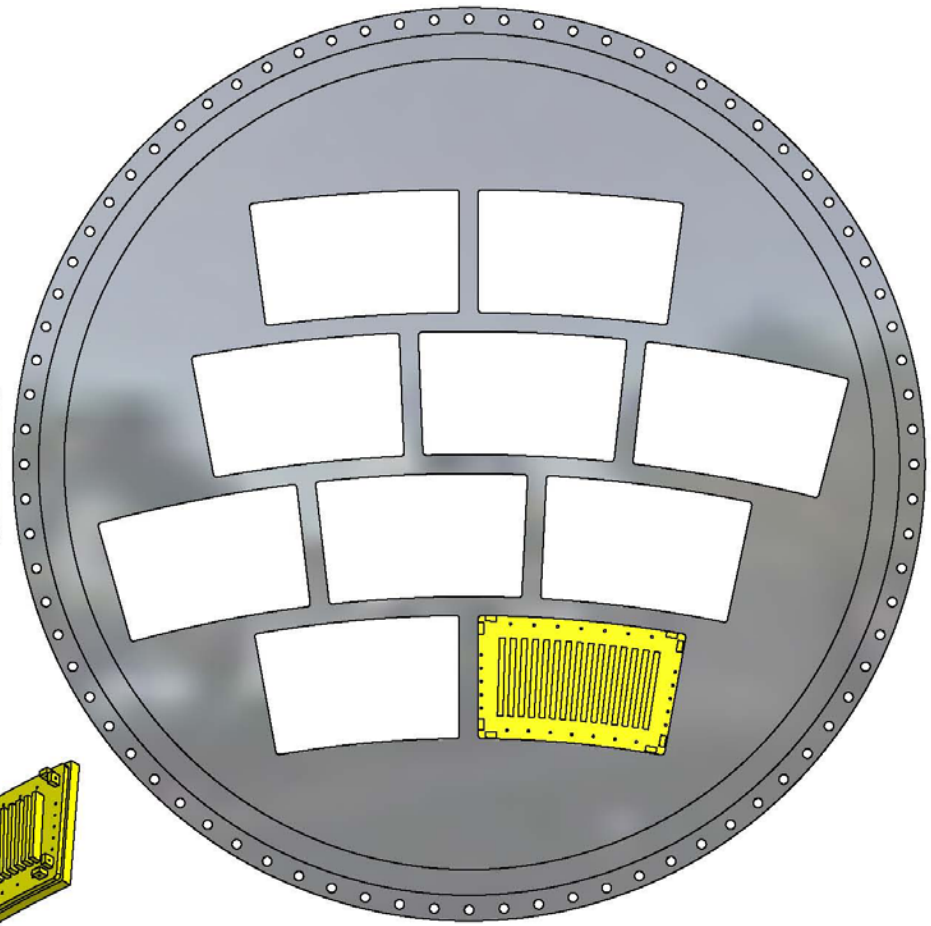
Reminder: most urgent point for LP is to

- Design layout of endplate --- finalize ~12/2006
- See Dan's page

http://www.lns.cornell.edu/~dpp/linear_collider/LargePrototype.html







SCALE 1 / 2

FOR MACHINING LUBRICANT USE ONLY
ALKALINE DETERGENT LUBRICANT CIMSTAR 40
OR EQUIVALENT APPROVED BY CORNELL LEPP

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APP.

ITEM	DWG. NO.	DESCRIPTION	QUANTITY	REMARKS	REV.

PRINT DISTR. CR-1

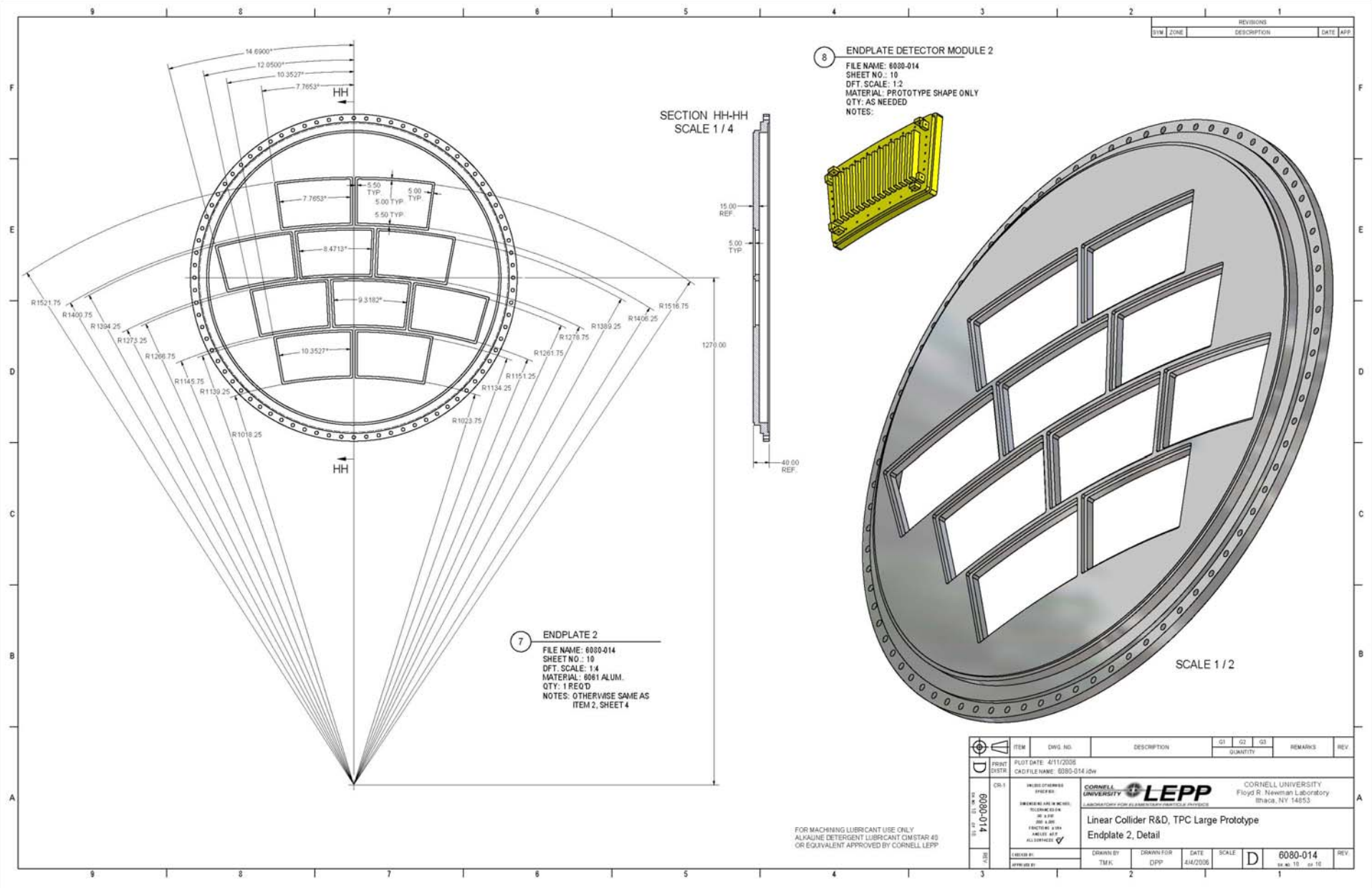
PLOT DATE: 4/11/2006
CAD FILE NAME: 6080-014.idw

CORNELL UNIVERSITY LEPP LABORATORY FOR ELEMENTARY-PARTICLE PHYSICS

CORNELL UNIVERSITY
Floyd R. Newman Laboratory
Ithaca, NY 14853

Linear Collider R&D, TPC Large Prototype
Endplate 2 and Module 2, Sub-Asm

DRAWN BY	DRAWN FOR	DATE	SCALE	SIZE	DWG. NO.	REV.
TMK	DPP	4/4/2006		D	6080-014	


ENDPLATE DETECTOR MODULE 2
FILE NAME: 6080-014
SHEET NO.: 10
DFT. SCALE: 1:2
MATERIAL: PROTOTYPE SHAPE ONLY
QTY: AS NEEDED
NOTES:
SECTION HH-HH
SCALE 1 / 4
SCALE 1 / 2
ENDPLATE 2
FILE NAME: 6080-014
SHEET NO.: 10
DFT. SCALE: 1:4
MATERIAL: 6061 ALUM.
QTY: 1 REQ'D
NOTES: OTHERWISE SAME AS ITEM 2, SHEET 4
FOR MACHINING LUBRICANT USE ONLY
ALKAJNE DETERGENT LUBRICANT CIMSTAR 40
OR EQUIVALENT APPROVED BY CORNELL LEPP
CORNELL UNIVERSITY
LEPP
CORNELL UNIVERSITY
Floyd R. Newman Laboratory
Ithaca, NY 14853
Linear Collider R&D, TPC Large Prototype
Endplate 2, Detail
6080-014

AGENDA

-4.Future meetings

Since the ideas are very diverse at the moment we need rather frequent 1-hour phonemeetings to work through the options.

For now:

Bi-weekly meetings: next 05July,18July(Vancouver)

-05July will include

----continued discussion about the endplates,

----a more detailed LP electronics proposal by Luciano and Leif,

----a discussion about R&D plans for the LP by Takeshi
(he sent around the preliminary version).

-At Vancouver, in addition to the above we can also decide frequency of next phonemeetings.

After Vancouver there are (in addition to phonemeetings):

-Paris, WP1 workshop? (between 4 and 15 September)

-Eudet annual meeting MPI-Munich (18-20 October)

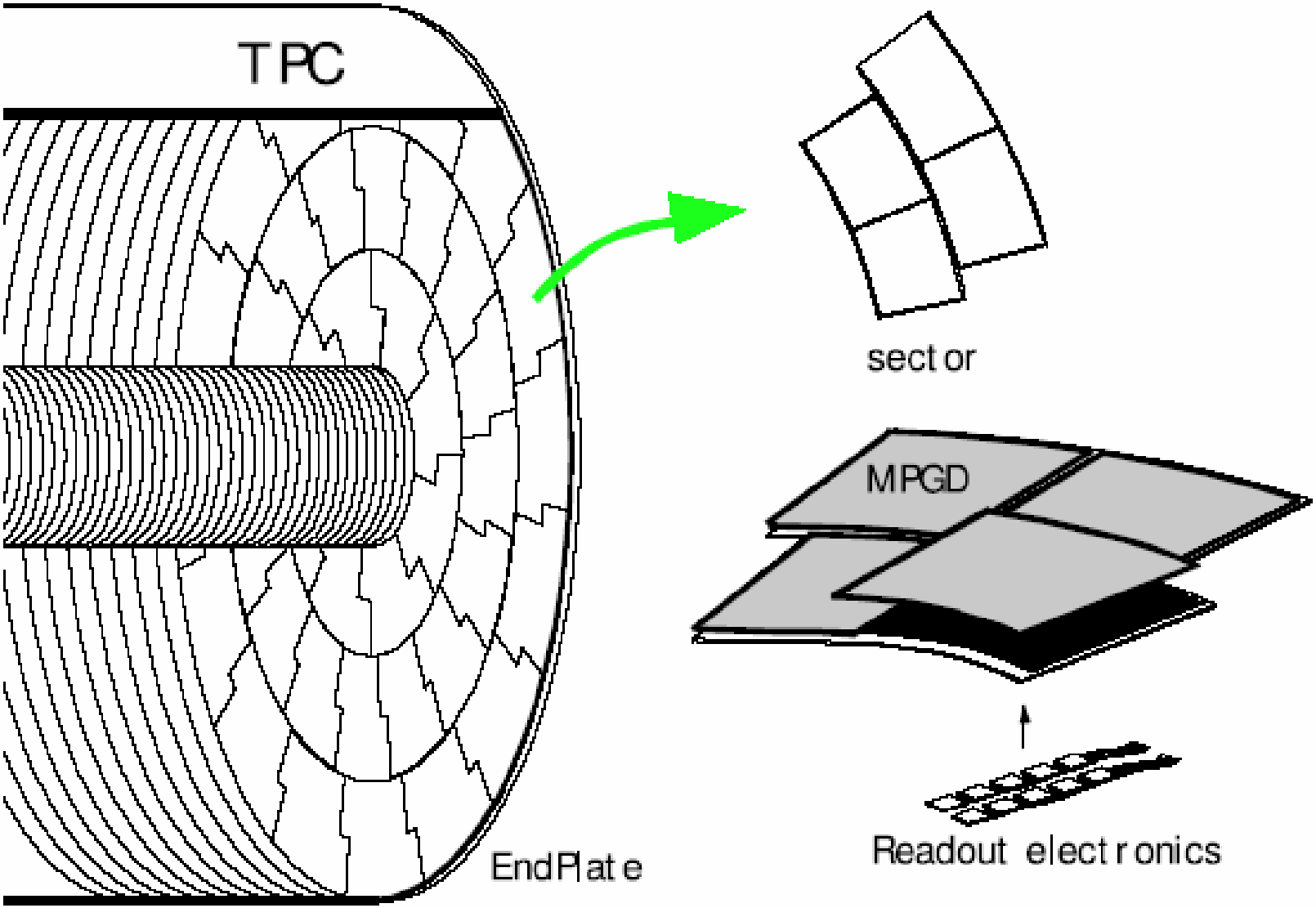
-Valencia LC workshop (6-10 November)

AGENDA

-5.AOB

Back up slides, for reference

Akira Sugiyama – GLD DOD


TPC
sector
MPGD
Readout electronics
EndPlate

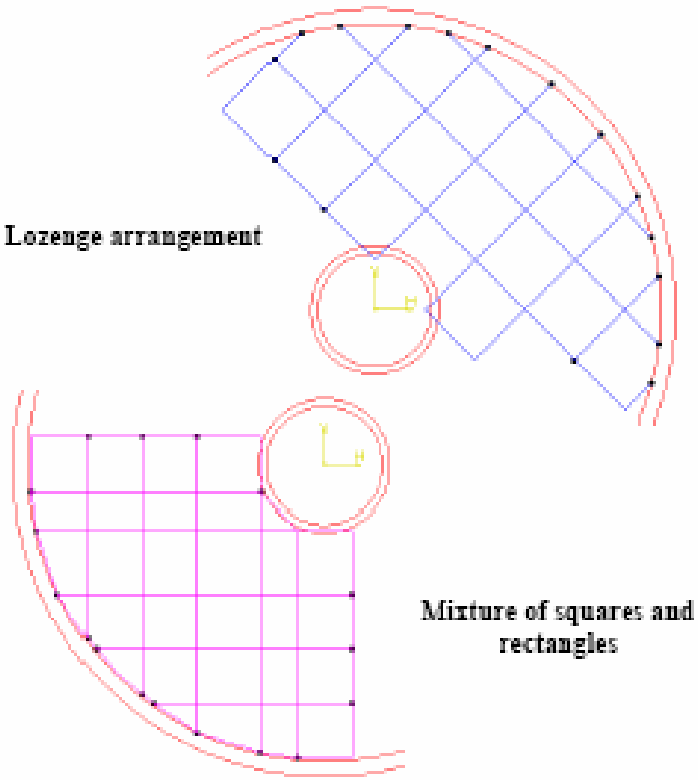
RS study - LDC DOD - together with

Joel Pouthas
Philippe Rosier
(IPN Orsay)

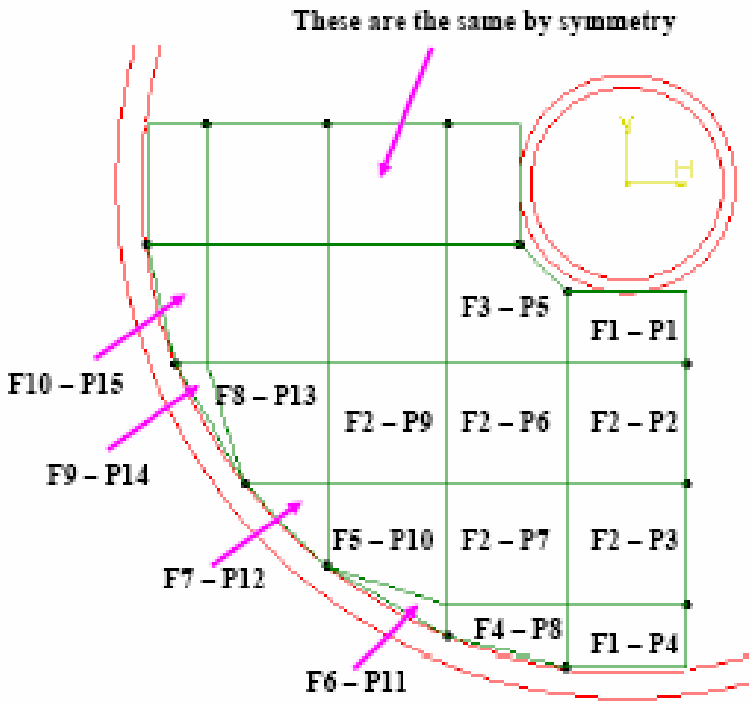
Arrangements of detectors on the active area of the end cap (1/2)
Squares, rectangles, lozenge of 300/350 mm or 400 mm size

Annotations: F is the type number of frames / P is for the PADS board

Lozenge arrangement



Mixture of squares and rectangles



These arrangements need too much different sorts of frames and PADS boards, even if the right drawing is the simplest

Page 1

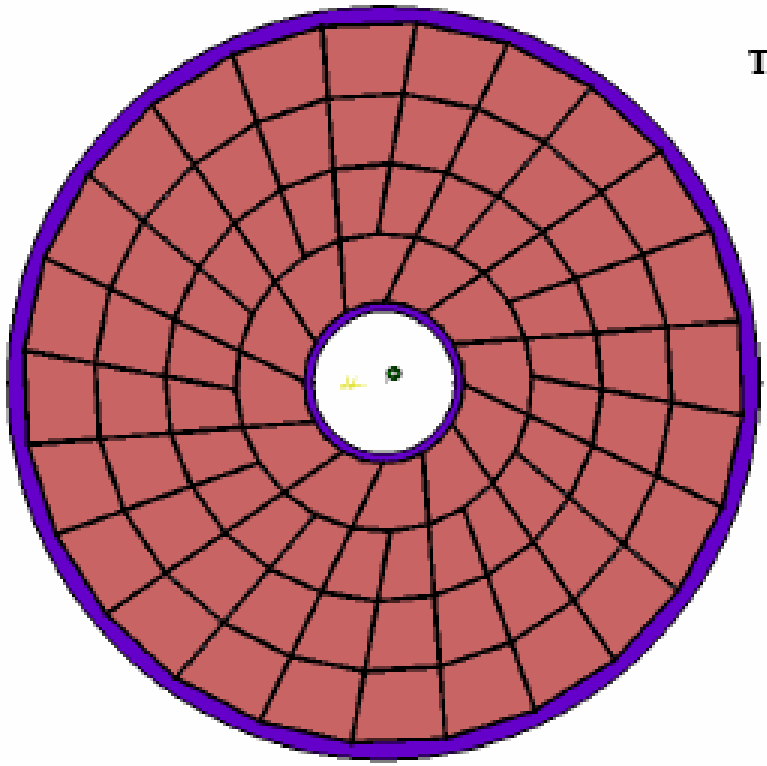
ROSIER.Ph. 26-11-03

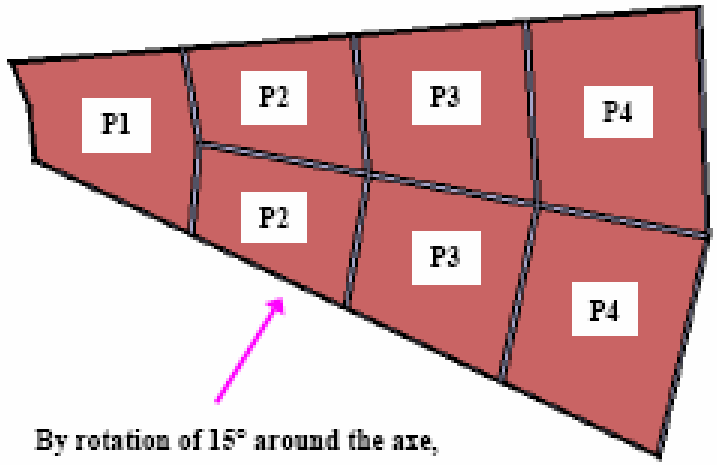
Arrangements of detectors on the active area of the end cap (2/2)
Trapezoidal shapes assembled in iris shape

Annotations: Px is the type number of PADS boards or frames

12 sectors (30° each) as super modules are defined

On each, 7 modules are fixed
The sizes of detectors are varying from 180 to 420 mm





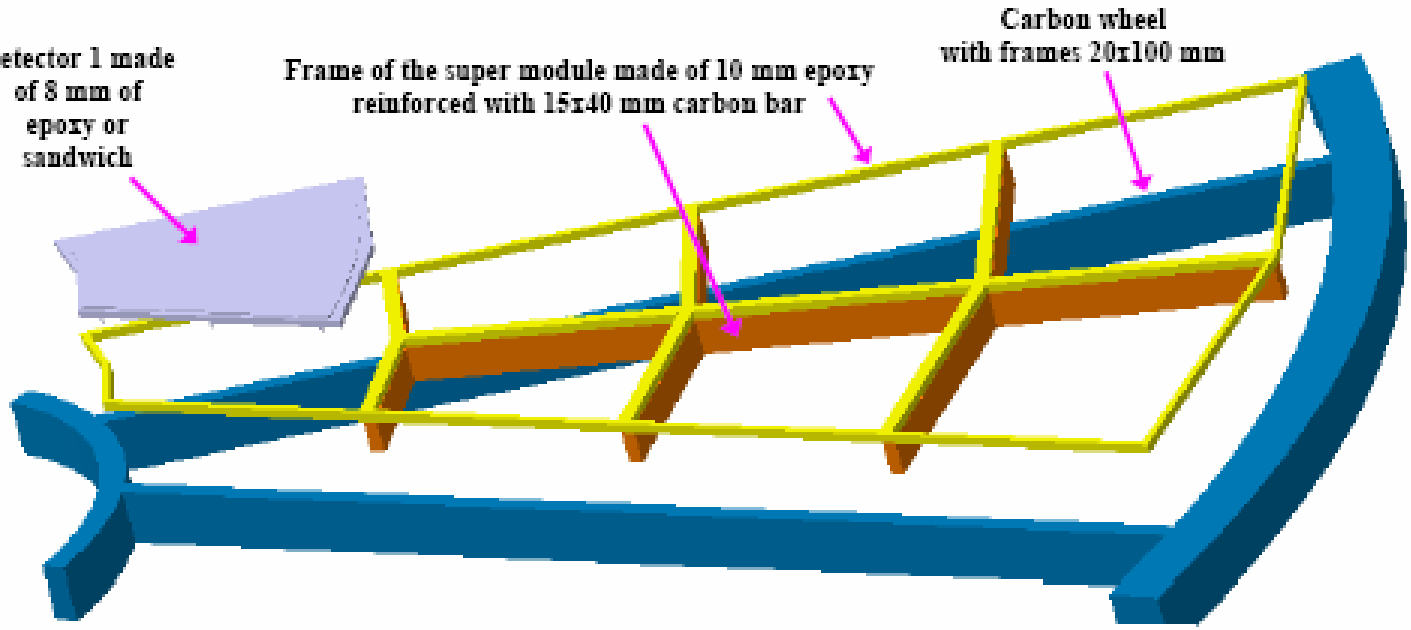
By rotation of 15° around the axe, these frames are the same

These arrangement seems to be the best as only 4 different PADS are necessary

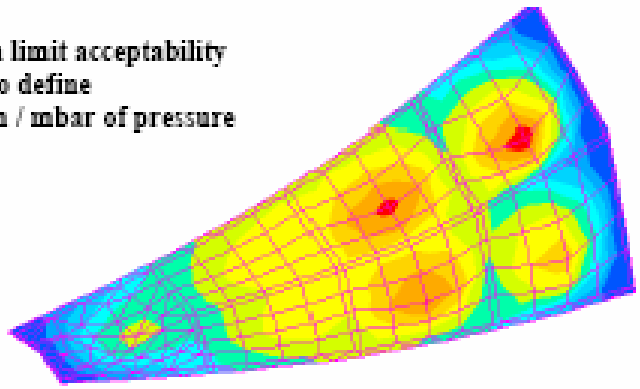
Page 2
ROSIER Ph. 26-11-03

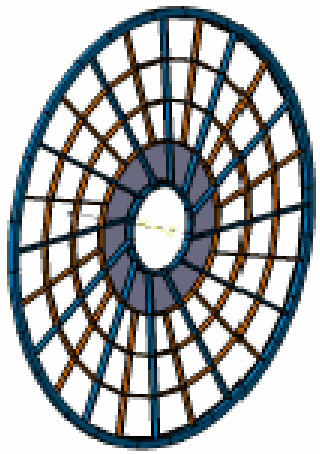
Principle for a Super Module equipped with detector 1

End cap – TPC - LC



Deformation limit acceptability to define
Here is 20 µm / mbar of pressure



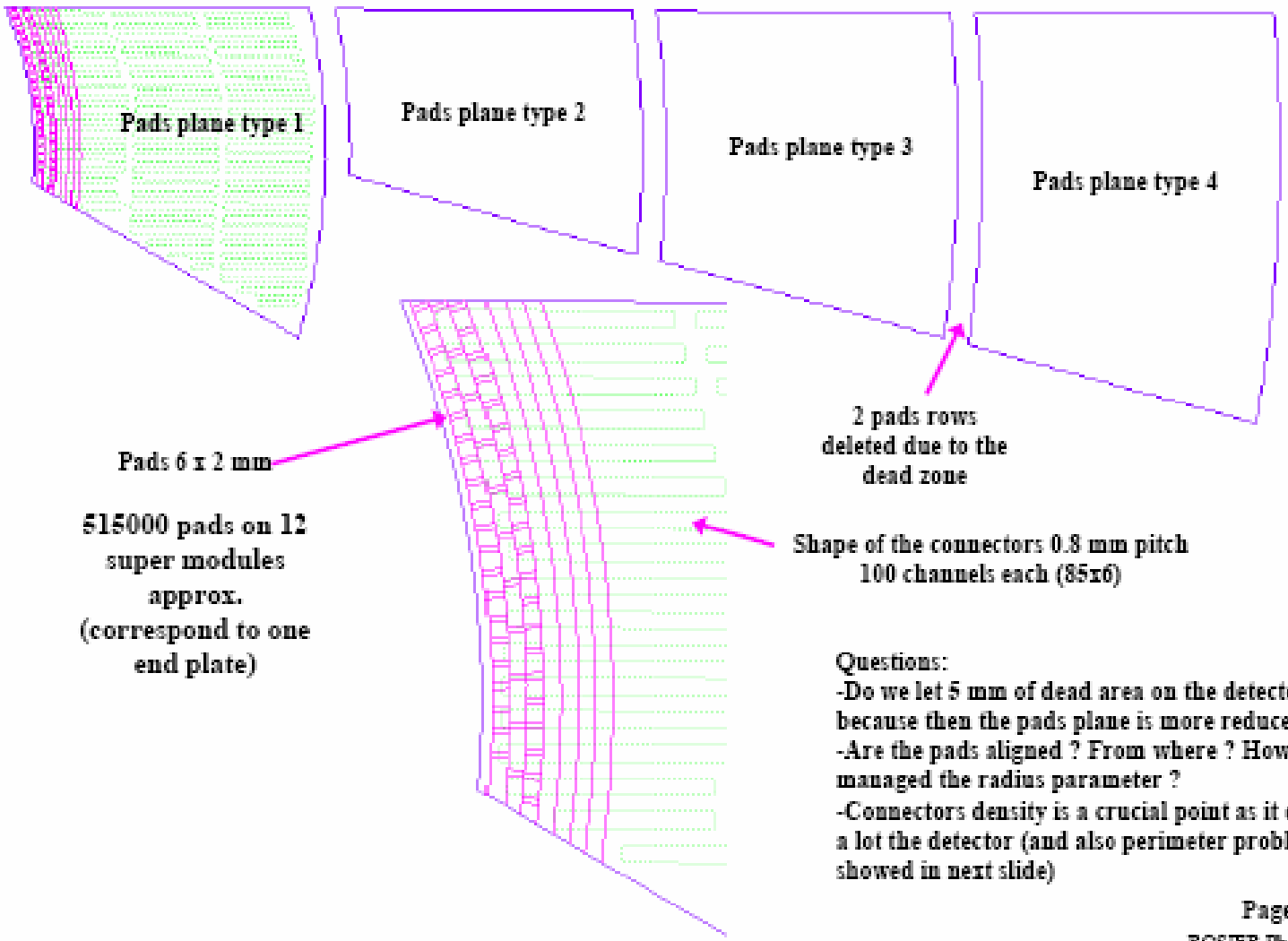


Complete wheel with 12 super modules

Page 3
ROSIER Ph. 26-11-03

Principle for the 4 types of Pads plane

End cap – TPC - LC

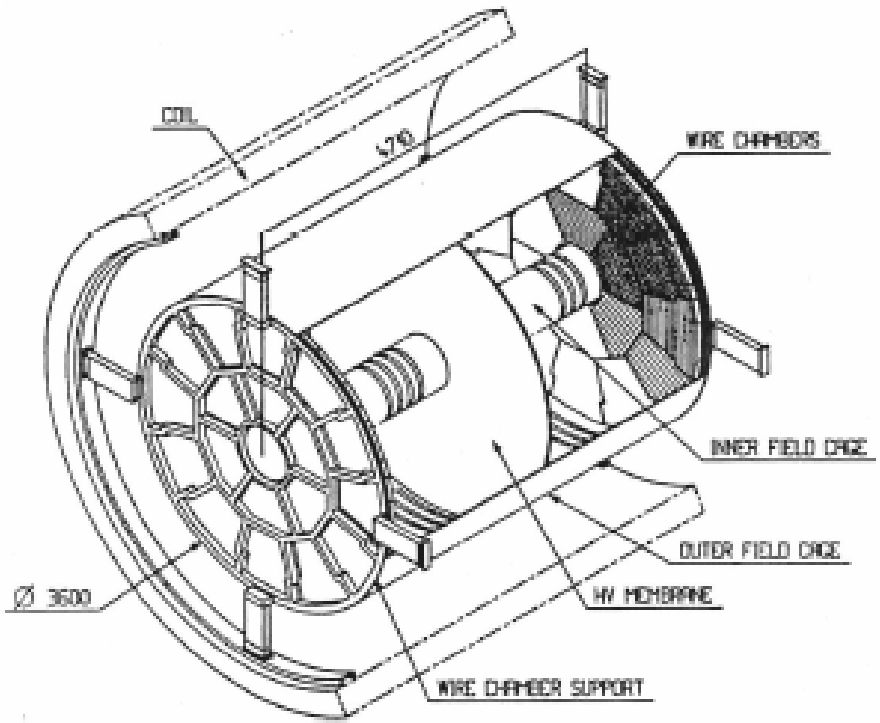


Questions:
-Do we let 5 mm of dead area on the detector, because then the pads plane is more reduced ?
-Are the pads aligned ? From where ? How is managed the radius parameter ?
-Connectors density is a crucial point as it drills a lot the detector (and also perimeter problem showed in next slide)

Page 4
ROSIER Ph. 26-11-03

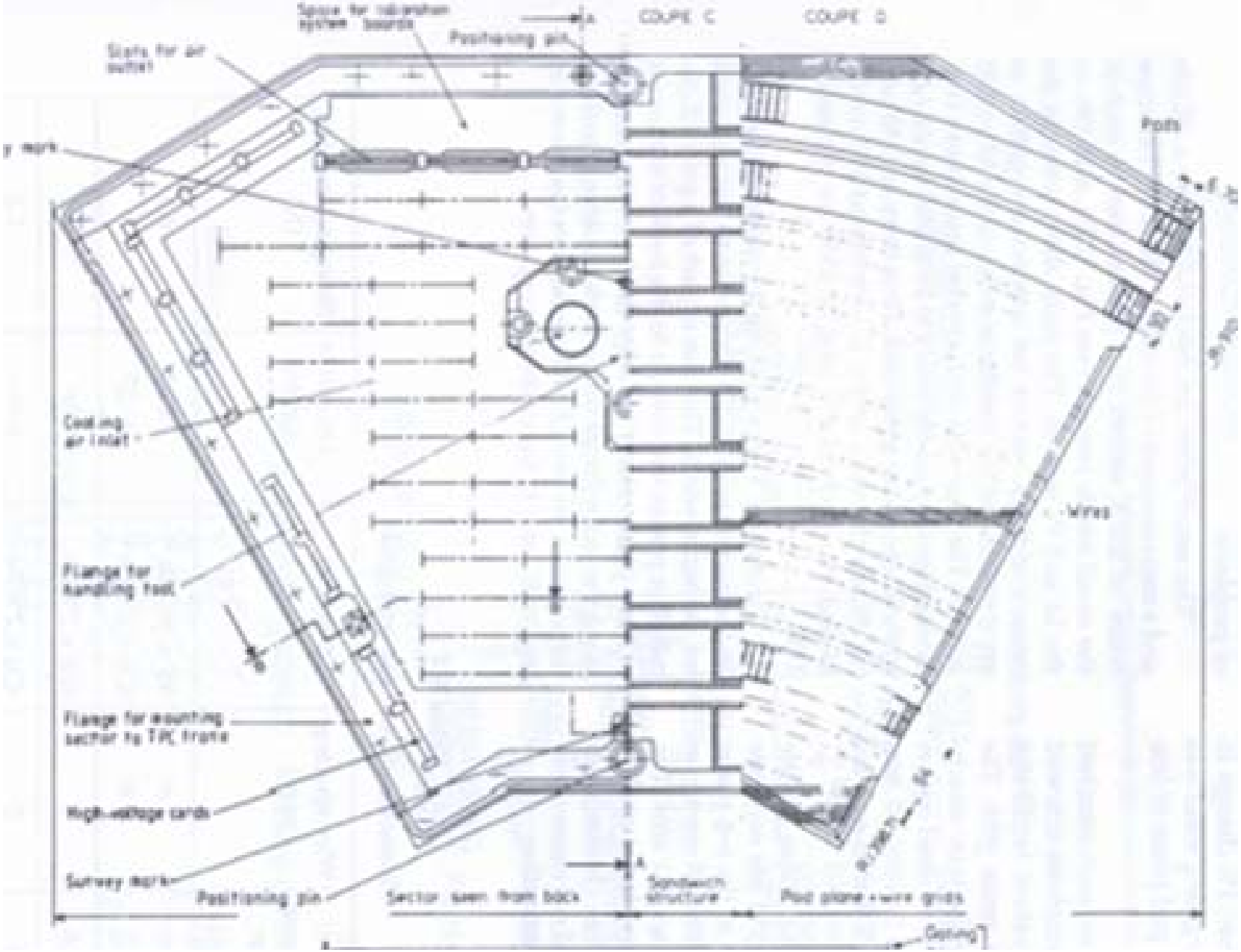
Aleph Endplate

TPC



- rφ from pad position
- z from drift time (pads + wires)
- dE/dx from wires and pads

- Length = 4.7 m
- Outer radius = 1.8 m
- Total weight = 3.6 t
- Drift length 2 × 2.2m
- Up to 21 space points / track
- 18 wire chambers / endplate
- 47340 channels in total
- B = 15 kG
- HV (Membrane) = −27.5 kV
- Gas
  - Volume $43\,m^3$
  - Argon/Methan (91:9) at atmospheric pressure
- Angular coverage
  - 2π in φ
  - 21 pad rows hit for $|\cos\Theta| \leq 0.8$
  - At least 3 pad rows for $|\cos\Theta| \leq 0.97$


COUPE C
COUPE D
Positioning pin
Posts
Cooling air inlet
Wires
Flange for handling tool
Flange for mounting sector to TPC frame
High-voltage cards
Survey mark
Positioning pin
Sector seen from back
Sandwich structure
Pad plane + wire grids
Casing

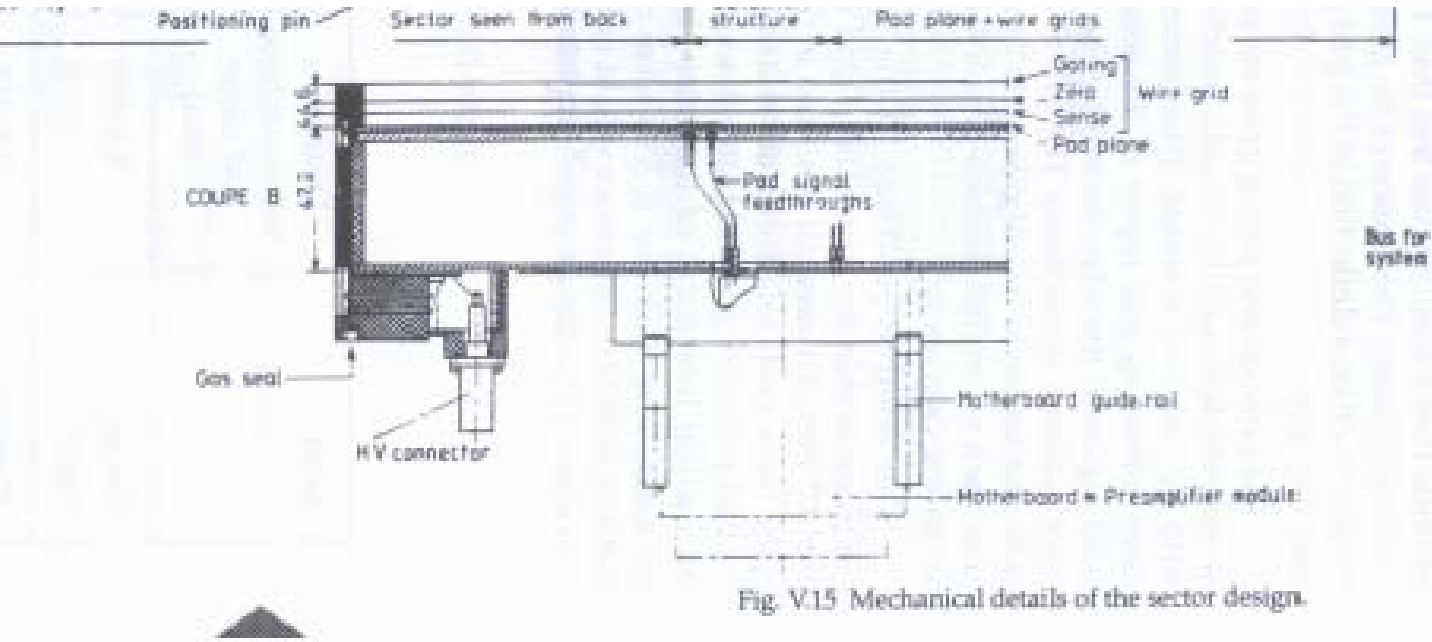
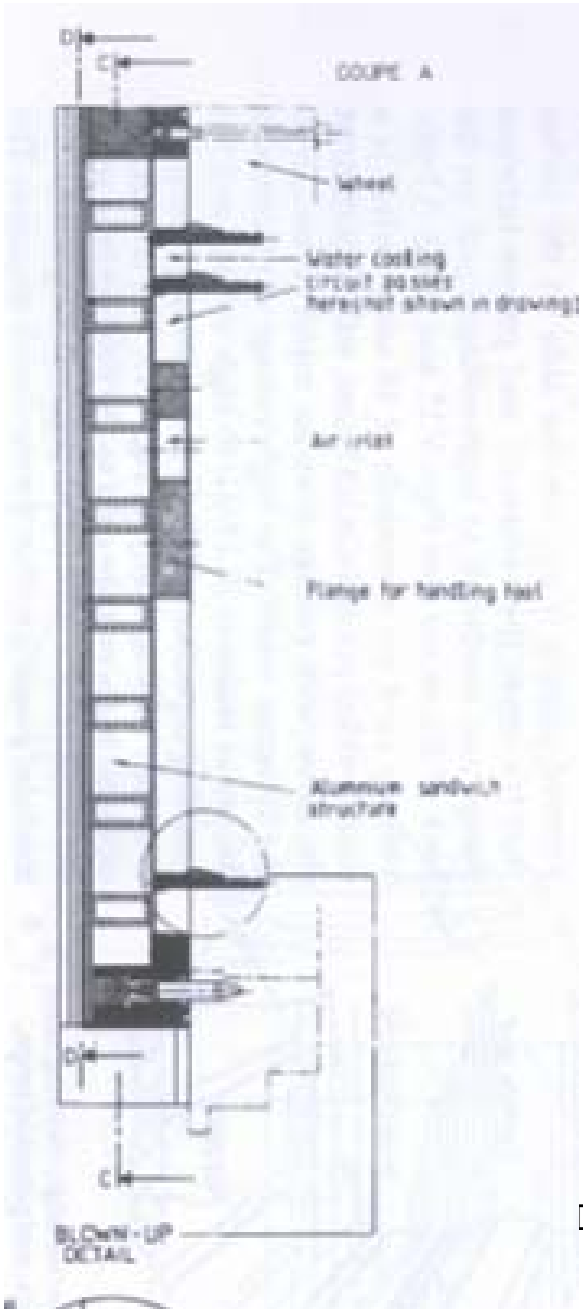


Fig. V.15 Mechanical details of the sector design.


D
C
COUPE A
wheel
Water cooling
Flange for handling tool
Aluminium sandwich
structure
D
C
BLOWN - UP
DETAIL

Some features

- Zigzag structure prevented loss of tracks > θ~22°
- Sectors mounted from inside using a "handling tool" to minimize the dead space between sectors. This straight-forward operation which was performed at least 30 times during the lifetime of Aleph.
- Alu sandwich structure stiff, lightweight to
  - contain 7mb overpressure
  - provide forced-air thermal insulation between electronics and TPC volume
- Water cooling of 1kW electronics/side in addition
  - 22K channels per side
- Combination water/air cooling blocked all heat to TPC
- Overall thickness ~ 25%Xo (average) w/o cables
- Bending of endplate
  - 20 micrometers due to 7mb overpressure
  - 5 micrometers due to wire tension

TPC R&D Groups (7 June 06)

Europe
- RWTH Aachen
- Bucharest
- CERN
- DESY
- U Hamburg
- U Freiburg
- U Karlsruhe
- UMM Krakow
- Lund
- MPI-Munich
- NIKHEF
- BINP Novosibirsk
- LAL Orsay
- IPN Orsay
- U Rostock
- CEA Saclay
- PNPI StPetersburg
- U Siegen

America
- Carleton U
- U Cornell
- Purdue U
- Indiana U
- LBNL
- MIT
- U Montreal
- U Victoria
- Yale

Asia
- Tsinghua U
- CDC:
- Hiroshima U
- Minadamo SU-IIT
- Kinki U
- U Osaka
- Saga U
- Tokyo UAT
- U Tokyo
- Kogakuin U Tokyo
- KEK Tsukuba
- U Tsukuba

Other
- MIT (LCRD)
- Temple/Wayne State (UCLC)

…Other groups interested?

R&D Planning

- 1) Demonstration phase
  - Continue work with small prototypes on mapping out parameter space, understanding resolution, etc, to prove feasibility of an MPGD TPC. For CMOS/Si-based ideas this will include a basic proof-of-principle.
- 2) Consolidation phase
  - Build and operate the LP, large prototype, (Ø ≥ 75cm, drift ≥ 100cm), with EUDET infrastructure as pedestal, to test manufacturing techniques for MPGD endplates, fieldcage and electronics. Design is starting---building and testing will take another ~ 3 years.
- 3) Design phase
  - After phase 2, the decision as to which endplate technology to use for the LC TPC would be taken and final design started.