

LCTPC/LPWP-12th phonemeeting

- **Date 25 October 2006**
- **Time**
 - 7:00 west coast
 - 10:00 east coast
 - 16:00 central Europe
 - 23:00 Japan
- **To join,**
Phone +494089981390 code 52872#

Agenda for 12th WP phonemeeting

(the meetings are summarized at <http://ilcagenda.cern.ch/>)

AGENDA

-1. News

- a. Formation of the LCTPC/LP Collaboration
- b. WWS-R&D-panel tracking review at Beijing

-2. WP meeting

- a. Preparation for Valencia
- b. WP meeting

-3. Future meetings

- Valencia European WS 6-10 November
- Beijing Asian WS February 3-7 February

AGENDA

-1a. Formation of the LCTPC/LP collaboration

-A first Collaboration phonemeeting was held on 20.9.2006, a second phonemeeting on 04.10.2006 and the third meeting (face-to-face) on 18.10.2006 at Munich, before the start of the Eudet meeting.

-It was decided at the first collaboration phonemmeeting that each region should independently select a Regional Coordinator, (RC) via vote by that region's CB members, to replace the interim SPs, and that the 3 Regional Coordinators would choose a chairperson who is the sole Spokesperson.

The status is:

--America: RC is Dean Karlen

--Asia: RC is Takeshi Matsuda

--Europe: the search committee, Vincent Lepeltier and Klaus Desch, will find the RC candidates one of whom will be selected by the European CB members.

-The new ingredient at Munich was a listing of LCTPC tasks shown on the next foils.

-An overview of the structure, groups, CB and TB are in the appendix for reference; they have been shown at the last several meetings.

AGENDA

-1a. Munich meeting attended by

Ties Behnke, Klaus Desch, Ralf Diener, Keisuke Fujii, Lea Hallermann, Michael Hauschild, Leif Jonsson, Dean Karlen, Alexander Kaukher, Vincent Lepeltier, Takeshi Matsuda, Joachim Mnich, Dan Peterson, Peter Schade, Oliver Schaefer, Ron Settles, Jan Timmermans, Adrian Vogel

Next step#1 LCTPC collaboration:

•LP1 construction

- Definition of tasks for building LP1 with time table**
- Establish which groups have the resources to contribute to the LP1 construction-->this requires setting up an overview of the money/manpower situation of all groups**
- Distribution of tasks for LP1 among all groups**
- Figure out what to do if something is missing**
- Set up a simple (loose) MOA for the LP1 construction**

AGENDA

-1a. Next step#2 LCTPC collaboration:

- LCTPC R&D

- Continue defining the overall four-year program of R&D needed for the LCTPC

- Identify the R&D tasks to be covered by LP1->LP2, SP, simulation studies

- See how the tasks can be distributed among the groups

- Figure out what to do if something is missing

AGENDA

-1a. Next step#3 LCTPC collaboration:

• Beijing Review

- This will probably consist of a written report before Beijing and several talks at Beijing.
- Identify a task force for putting together the written report
- There will be an open session on the R&D status and a closed session on the funding situation.
- Find out who is going to Beijing from the LCTPC groups to see who can give which talks. There may be some reports by telephone.

AGENDA

-1b. Tracking review at Beijing:

Dear colleagues,

We write to inform you of a new responsibility we are giving to the WWS Detector R&D Panel, namely to implement a systematic procedure for peer-reviewing ILC detector R&D on a world-wide basis. This new system is intended to put the detector R&D on a more even basis with ILC accelerator R&D, which is already organised by the RDB (the Research and Development Board of the GDE) into world-wide task forces.

Detailed plans are still being finalised, but the general procedure will be as follows. The Panel, operating within the existing structure of regional workshops, will organise the review of one set of topics at each workshop, starting as follows:

Beijing (Feb 2007)--tracking,
DESY (LCWS) (June 2007)--calorimetry,
Fermilab (October 2007)--vertexing and
Asia (tbd 2008)--particle ID, muon tracking, solenoid, beam diagnostics and DAQ.

By cycling through the four sets of topics in this way, over time each region will host every topic.

AGENDA

-1b. Tracking review at Beijing continued:

To help with the peer review process, we plan to invite impartial experts from outside the ILC community, as well as members of the Detector R&D Panel. Each review will start with an open session, followed by a closed session on the next day.

Every group will be invited to present a status report on their work, including past and future milestones, through to completion of their R&D goals. For these purposes, a 'group' will be taken to mean any R&D activity covered by agreements with funding sources in one country. This means that there would be, in general, one report per country for a collaborative effort involving more than one country. A programme within EUDET will also be considered a group. Large collaborations such as LC-TPC or CALICE may wish to organise their open session presentations in the form of an extended introduction, followed by presentations from each of their constituent groups, who will explain what R&D plans are covered by their national resources. In the closed session, each group will have the opportunity to discuss funding issues and other possibly confidential matters related to achieving their milestones.

After the closed session, the reviewers will write a report on the work of each group, to be made available to the group, the WWS-OC, the GDE, and the relevant funding agency. We anticipate that these reports will be useful to the groups seeking ongoing support for their work and to refine their R&D activities.

AGENDA

-1b. Tracking review at Beijing continued:

The reports will also provide input to the existing regional review processes (such as the DESY PRC in Europe), which will continue to provide important guidance. This system will cover the transition period until R&D activities become the responsibility of experiment collaborations.

We should further comment that these reviews will be held in addition to, not instead of, the existing detector sessions at the regional workshops. These sessions will continue to be important channels of communication of new results, as well as enabling young physicists to present their own work.

Sincerely,
[GDE EC, WWS-OC chairs]

AGENDA

-2a. Preparations for Valencia

<http://ific.uv.es/~ilc/ECFA-GDE2006/>

Status at Valencia: this WP meeting #13 (the lucky one) will be probably be on Tuesday evening 7 November. Paul had distributed a mail asking about other days/times. On Monday evening there is the reception, which is an occasion where people can talk to each other over a glass of beer but not a good time for holding our meeting for many of us. Wednesday evening there is the FALC roundtable (which will interest everyone) and Thursday evening is the banquet. The Valencia organizers are working on getting a room, and I have also requested the possibility of a phone connection.

2a. Valencia WP meeting

Things to be discussed/decided for LP1 at Valencia, derived from Ties' document "Project_List2_LP_TPC.doc". A much more complete listing was put together after the meeting and can be found in the meeting summary or at

http://mppmu.mpg.de/~settles/tpc/lp/wpmtg/Project_List3_LP_TPC.doc

The following shorter list was discussed at the meeting, and the feedback is included

- Magnet: >specify movements desired
- Fieldcage: >decide length
 - >confirm diameter w.r.t. Si detectors
 - >specify magnitude and accuracy of translations and rotations
- Endplate: >how many endplates should there be?
 - >decide on DP layout
 - >where should gas inlets/outlets be?
 - >decide on Martin Killenberg suggestion
 - >discuss about evolution LP1->LP1.5->LP2
- Cathode: >discuss about mounting of radioactive source

2a. Valencia WP meeting

- Gas Amplification Technology
- Electronics: >location of connectors?
- Laser: >cathode or anode entry
- Source-based calibration (see above)
- Integrated Si detector
 - >decide accuracy needed
- Slow control >identify who
- Gas system: >temperature control needed?
- DAQ, event display, analysis software >identify who
- Testbeam >identify who coordinates
- Cosmicray >maximum/minimum angles of rotation

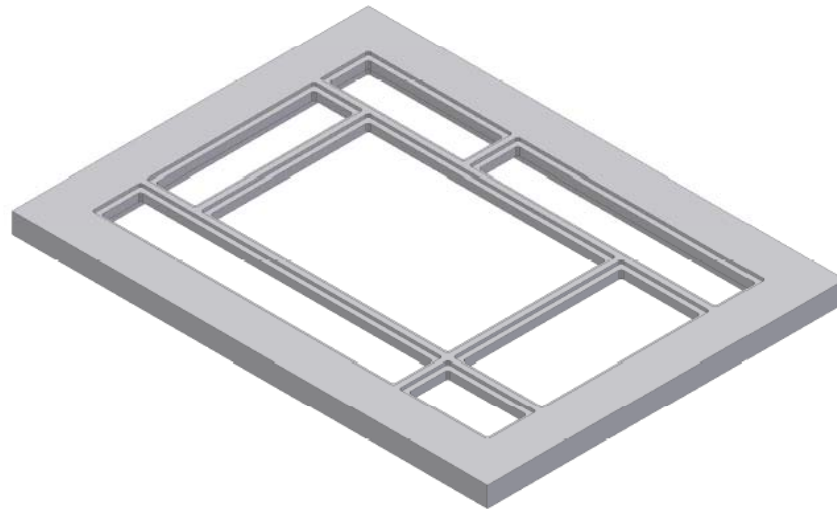
AGENDA

-2b. WP meeting

Dan has drawings of a stress-relief test model at the usual place

http://w4.lns.cornell.edu/~dpp/linear_collider/LargePrototype.html

More to come at Valencia



AGENDA

-3.Future meetings/

-Asian LC workshop Beijing (4-7 February 2007)

Website:

<http://bilcw07.ihep.ac.cn/>

AGENDA

-4. AOB

Appendix, for reference

Formation of the LCTPC/LP collaboration

The revised structure is to have:

1) Three coordinators, one chosen by each region. These regional coordinators (RC) will work with the following two boards:

2) The collaboration board (CB), consisting of one representative from each group or set of groups (the group leader, principle investigator or other chosen member). Each CB member looks after the resources for its group(s) (money and people).

3) The technical board (TB), consisting of the existing workpackage (WP) conveners. The TB will ensure the technical integrity of their WP and compatibility with other WPs while maintaining close contact with the collaboration.

The groups and names of CB and TB members are listed in the next 3 slides.

LCTPC/LP Groups (19 Sept 06)

Americas

Carleton
Montreal
Victoria
Cornell
Indiana
LBNL
Purdue (observer)

Asia

Tsinghua
CDC:
Hiroshima
KEK
Kinki U
Saga
Kogakuin
Tokyo UA&T
U Tokyo
U Tsukuba
Minadano SU-IIT

Europe

LAL Orsay
IPN Orsay
CEA Saclay
Aachen
Bonn
DESY
U Hamburg
Freiburg
MPI-Munich
TU Munich (observer)
Rostock
Siegen
NIKHEF
Novosibirsk
Lund
CERN

Other groups

MIT
MIT (LCRD)
Temple/Wayne State (UCLC)
Yale
Karlsruhe
UMM Krakow
Bucharest

25/10/2006

The CB members are:

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--Americas-

Carleton: Madhu Dixit
Montreal: Jean-Pierre Martin
Victoria: Dean Karlen
Cornell: Dan Peterson
Indiana: Rick Van Kooten
LBNL:NN

--Asia-

Tsinghua: Yuanning Gao
For the following CDC groups: Akira Sugiyama
Hiroshima
KEK
Kinki
Saga
Kogakuin
Tokyo U A&T
U Tokyo
Tsukuba
Mindanao

--Europe-

LAL Orsay/IPN Orsay: Vincent
Lepeltier

CEA Saclay: Paul Colas

Aachen: Stefan Roth

Bonn: Klaus Desch

Desy/UHamburg: Ties Behnke

Eudet: Joachim Mnich

Freiburg: Andreas Bamberger

MPI-Munich: Ariane Frey

Rostock: Henning Schroeder

(deputy: Alexander Kaukher)

Siegen: Ivor Fleck

Nikhef: Jan Timmermans

Novosibirsk: Alexei Buzulutskov

St.Peterburg: Anatoliy Krivchitch

Lund: Leif Jonsson

CERN: Michael Hauschild

(deputy: Lucie Linsen)

--Groups with Observer status-

TU Munich: Bernhard Ketzer

Purdue: Ian Shipsey

--Since replies are still missing from:

MIT

Yale

Karlsruhe

Krakow

Bucharest,

these groups are included as

"observer groups" at the moment

The TB members are:

=====

- | | |
|---|----------------------|
| 1) Workpackage Mechanics | Ron Settles |
| a) LP design (incl. endplate structure) | Dan Peterson |
| b) Fieldcage, laser | Ties Behnke |
| c) GEM panels for endplate | Akira Sugiyama |
| d) Micromegas panels for endplate | Paul Colas |
| e) Pixel panels for endplate | Jan Timmermans |
| f) Resistive foil for endplate | Madhu Dixit |
| 2) Workpackage Electronics | Leif Jonsson |
| a) "Standard" RO/DAQ system for LP | Leif Jonsson+Postdoc |
| b) CMOS RO electronics | Harry van der Graaf |
| c) Electronics for LCTPC | Luciano Musa |
| 3) Workpackage Software | Peter Wienemann |
| a) LP SW, simul./reconstr.framework | Peter Wienemann |
| b) TPC simulation, backgrounds | Stefan Roth |
| c) Full detector simulation | Keisuke Fujii |
| 4) Workpackage Calibration | Dean Karlen |
| a) Field map | Lucie Linssen |
| b) Alignment | Takeshi Matsuda |
| c) Distortion correction | Dean Karlen |
| d) Radiation hardness of materials | Anatoliy Krivchitch |
| e) LP Gas/HV | Eudet Postdoc |

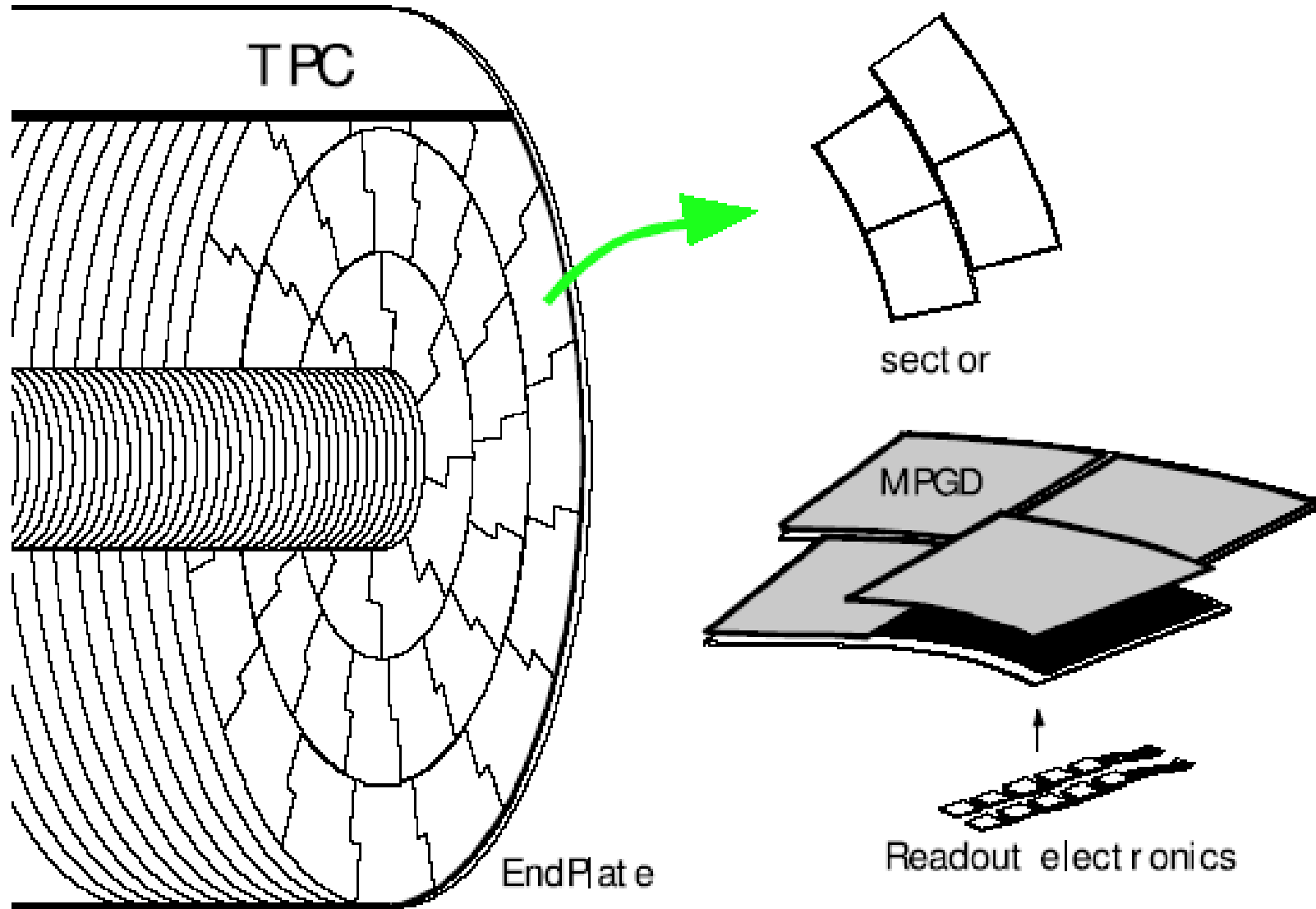
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Akira Sugiyama - GLD DOD

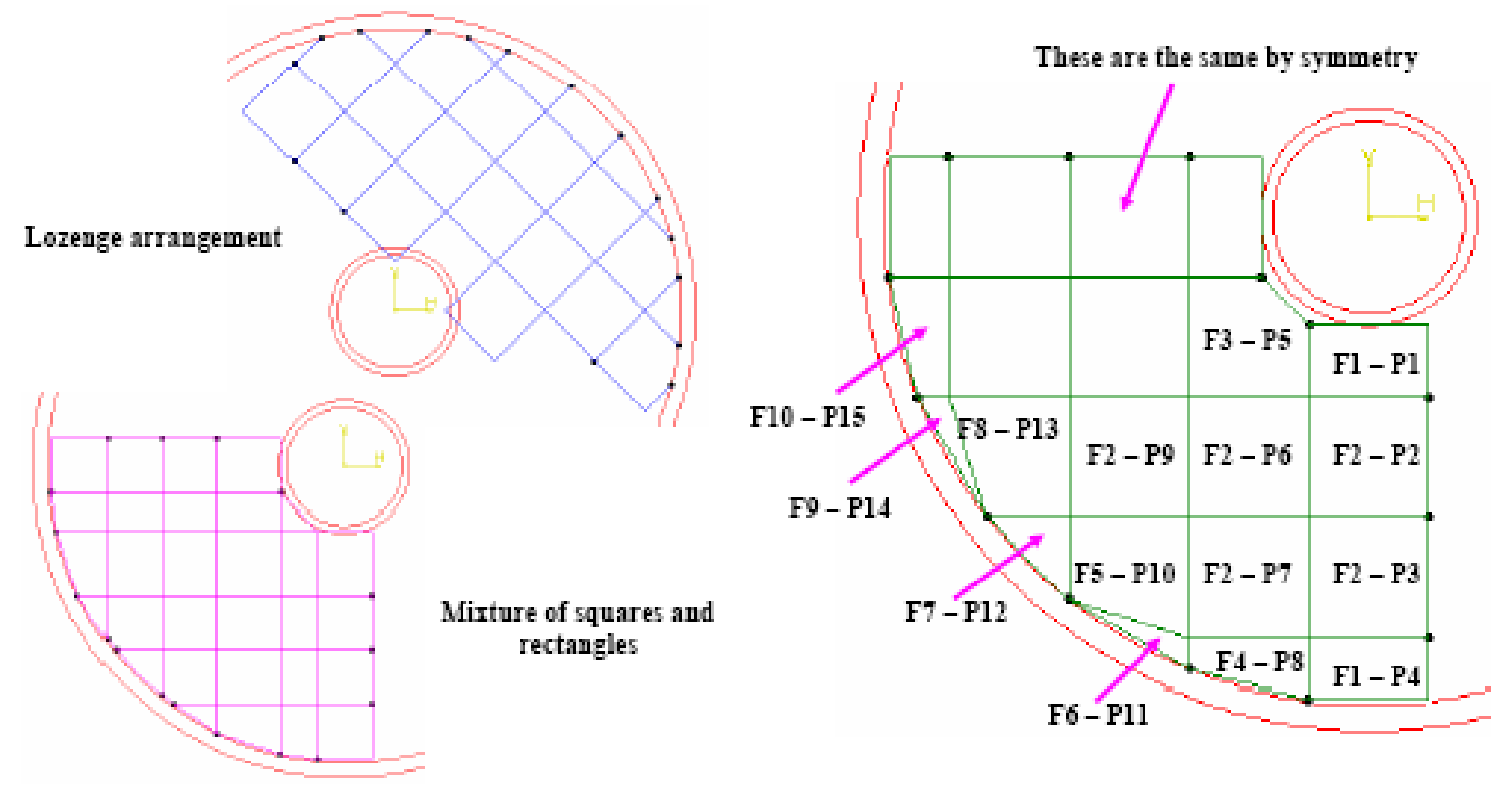


RS study - LDC DOD - together with

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



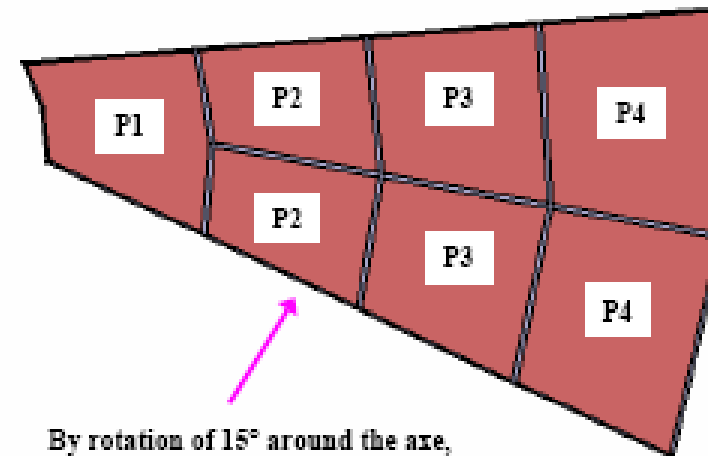
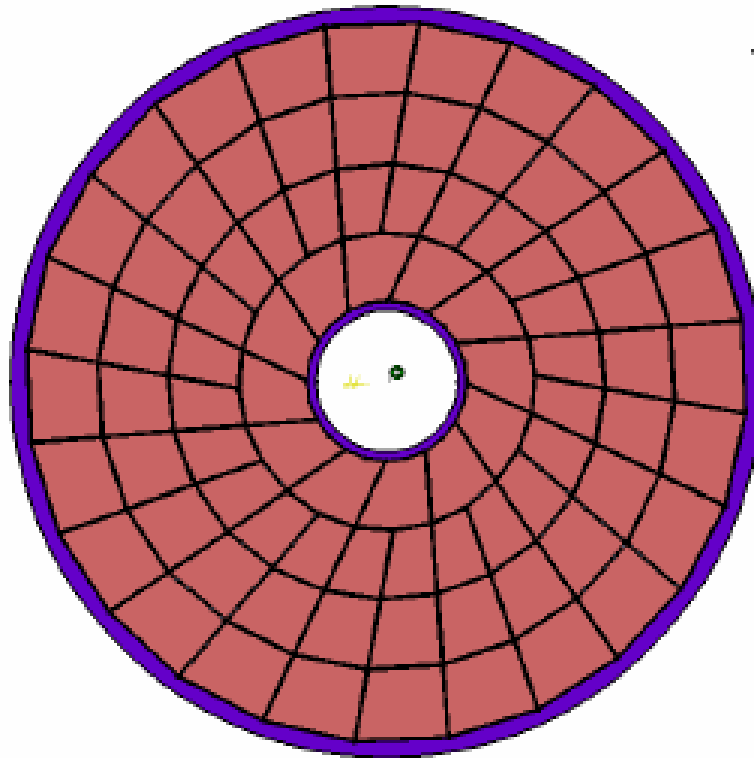
These arrangements need too much different sorts of frames and PADS boards, even if the right drawing is the simplest

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

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

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

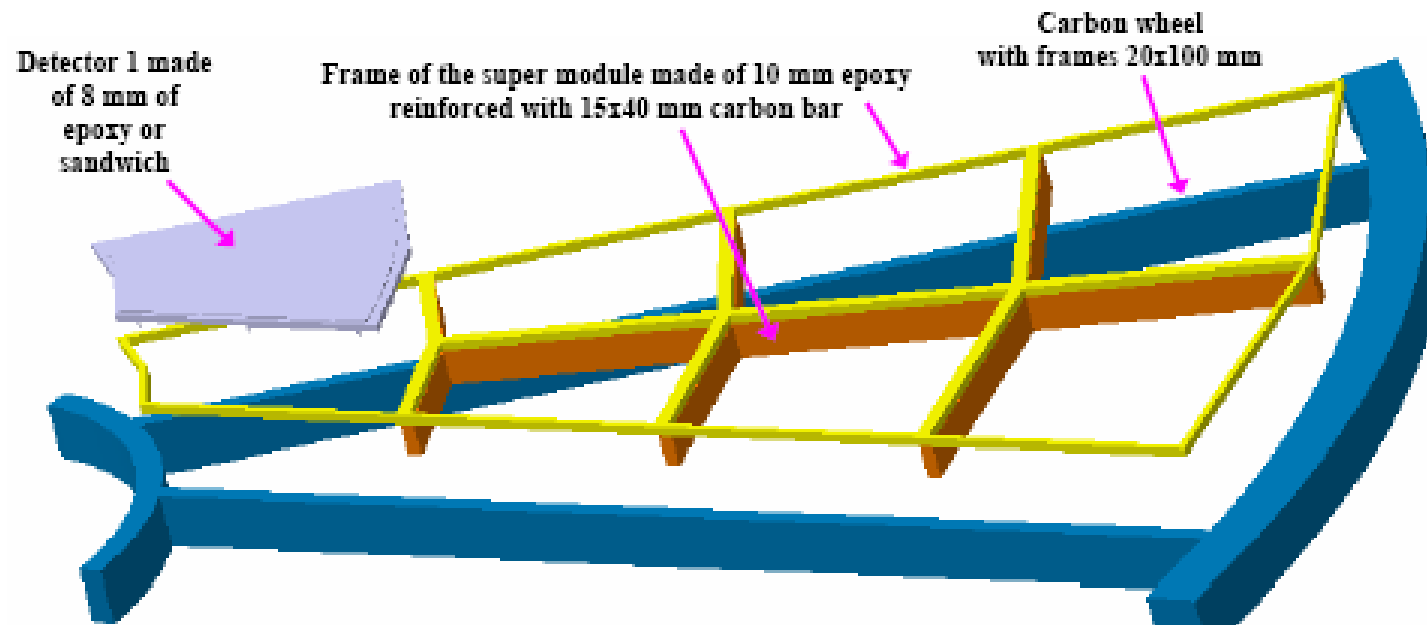
On each, 7 modules are fixed
The sizes of detectors are varying from 180 to 420 mm



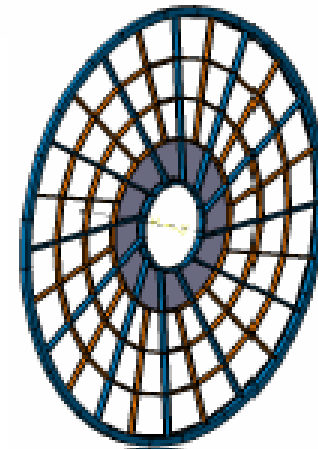
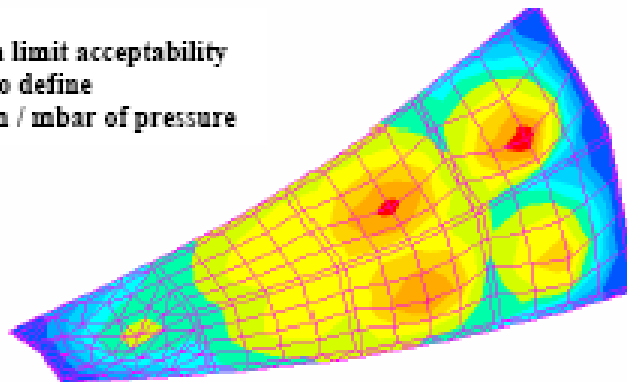
By rotation of 15° around the axis,
these frames are the same

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

Principle for a Super Module equipped with detector 1

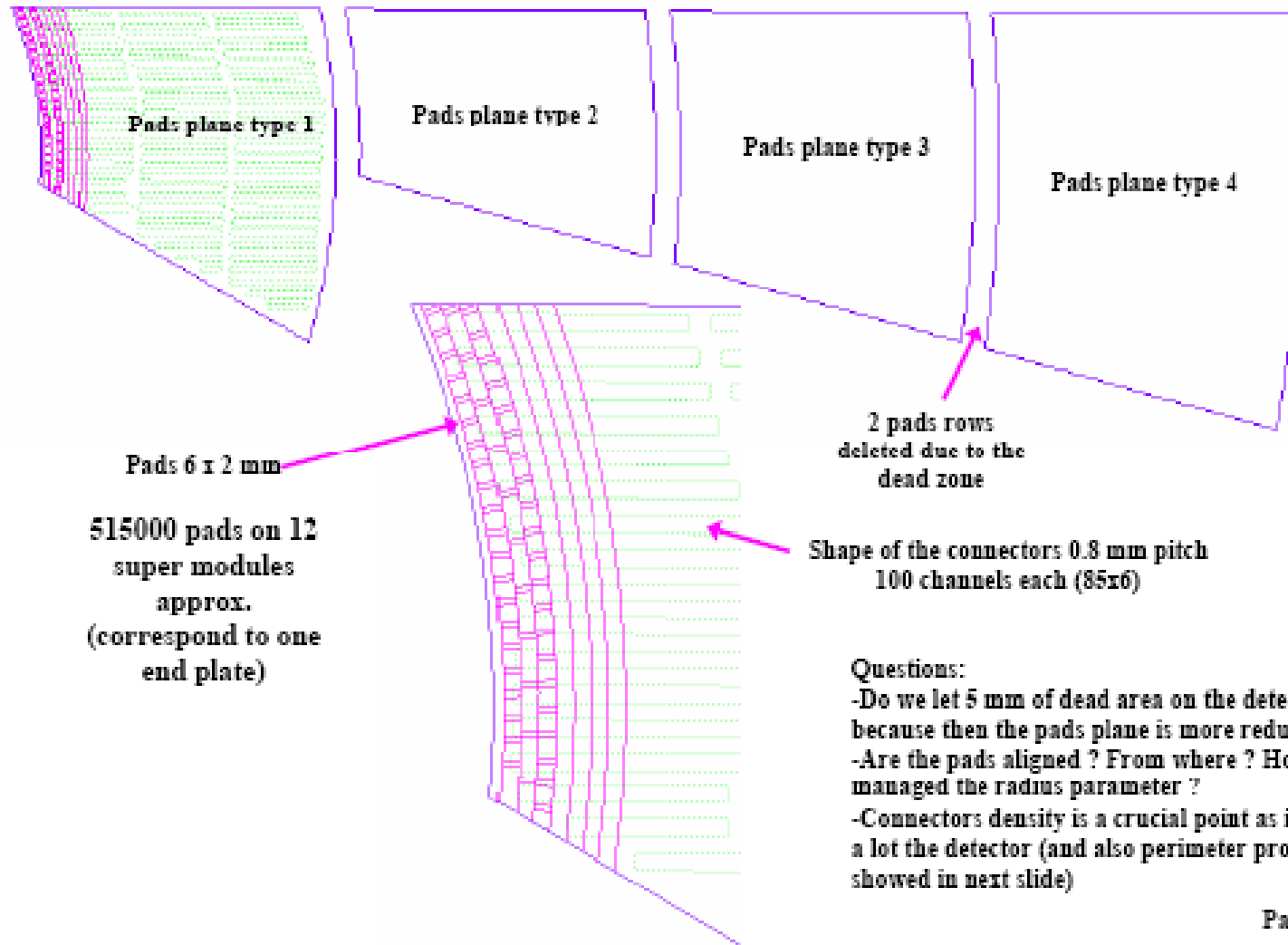


Deformation limit acceptability to define
Here is 20 μm / mbar of pressure



Complete wheel with 12 super modules

Principle for the 4 types of Pads plane



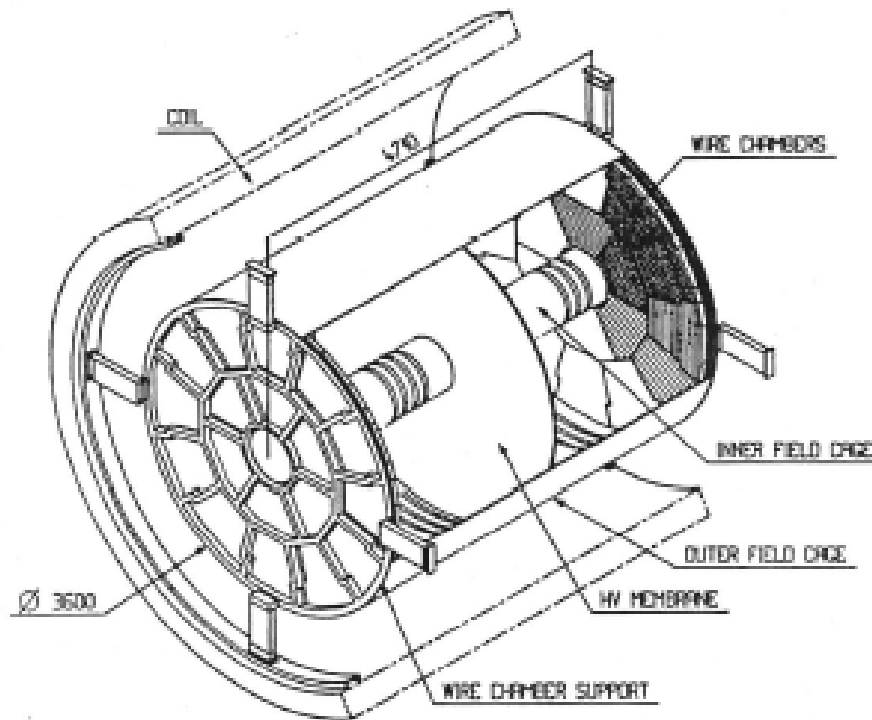
Aleph Endplate

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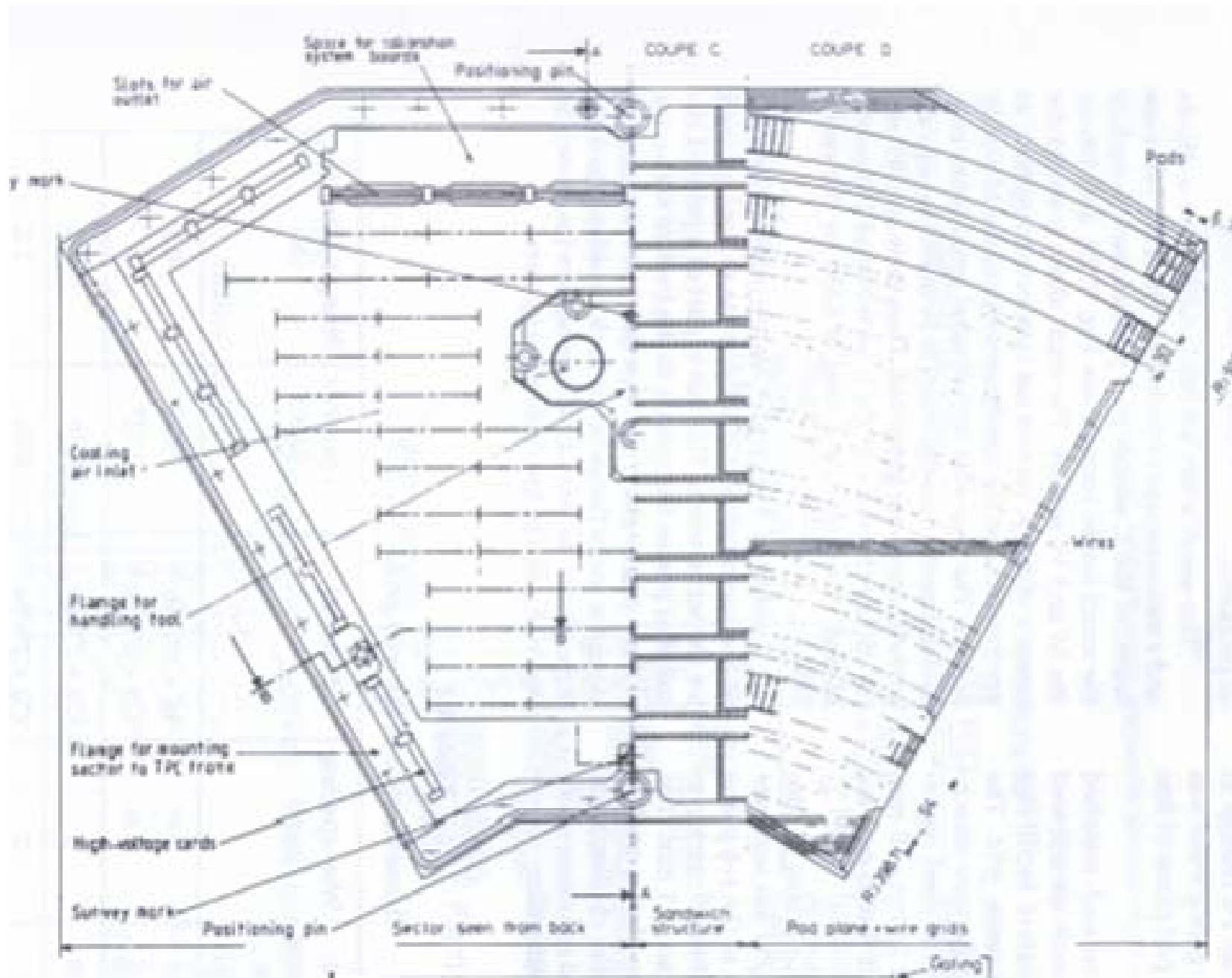
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TPC



- $r\phi$ 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 $2 \times 2.2\text{m}$
- Up to 21 space points / track
- 18 wire chambers / endplate
- 47340 channels in total
- $B = 15 \text{ kG}$
- 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 $|\cos\theta| \leq 0.97$



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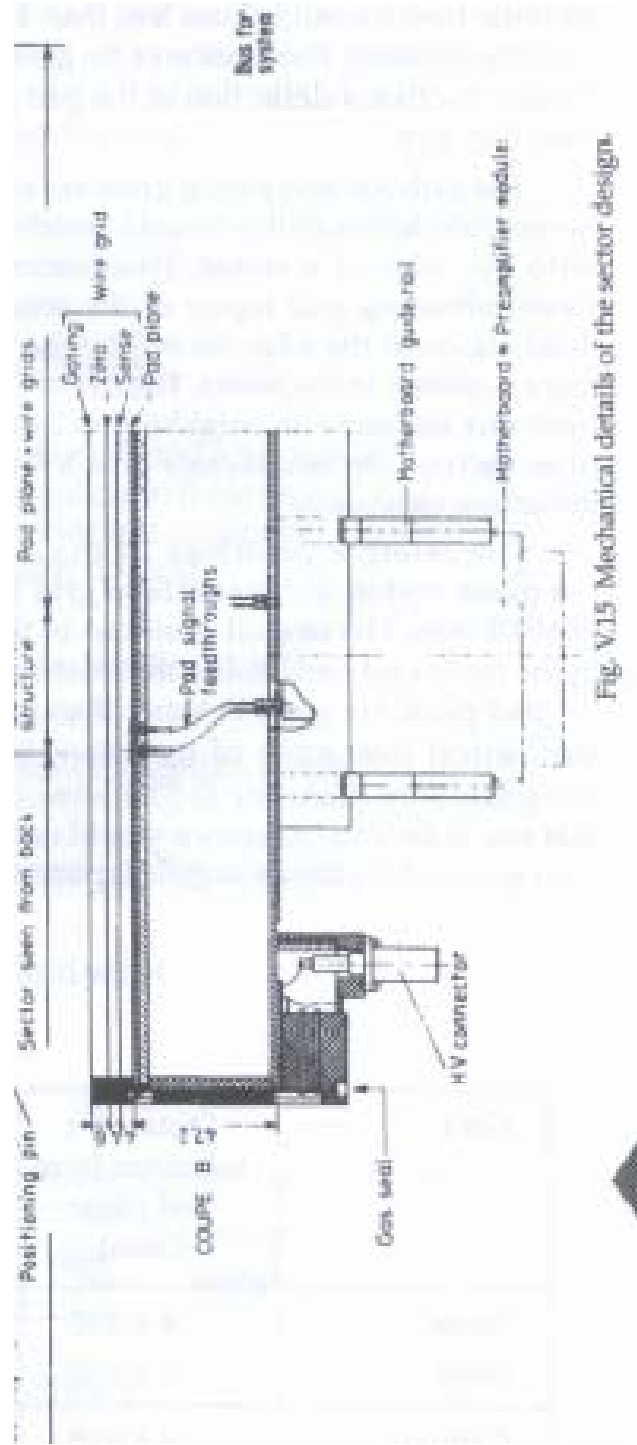
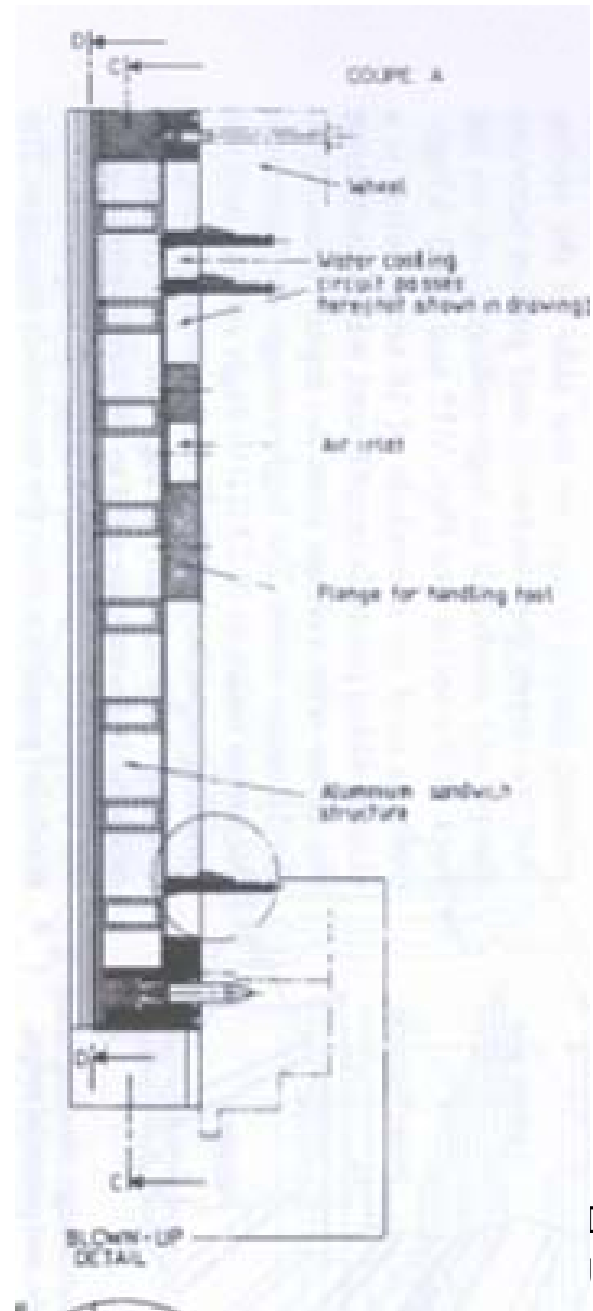


Fig. V.15 Mechanical details of the sector design.



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DESY
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Some features

- Zigzag structure prevented loss of tracks $\theta \sim 22^\circ$
- 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 $\sim 25\%X_0$ (average) w/o cables
- Bending of endplate
 - 20 micrometers due to 7mb overpressure
 - 5 micrometers due to wire tension

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, ($\varnothing \geq 75\text{cm}$, drift $\geq 100\text{cm}$), 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.