

Items we should consider when we make LP panel

how do we collaborate each other ?

Pad plane

GEM plane

Assembling method

mounting GEM/ to EP

HV supply

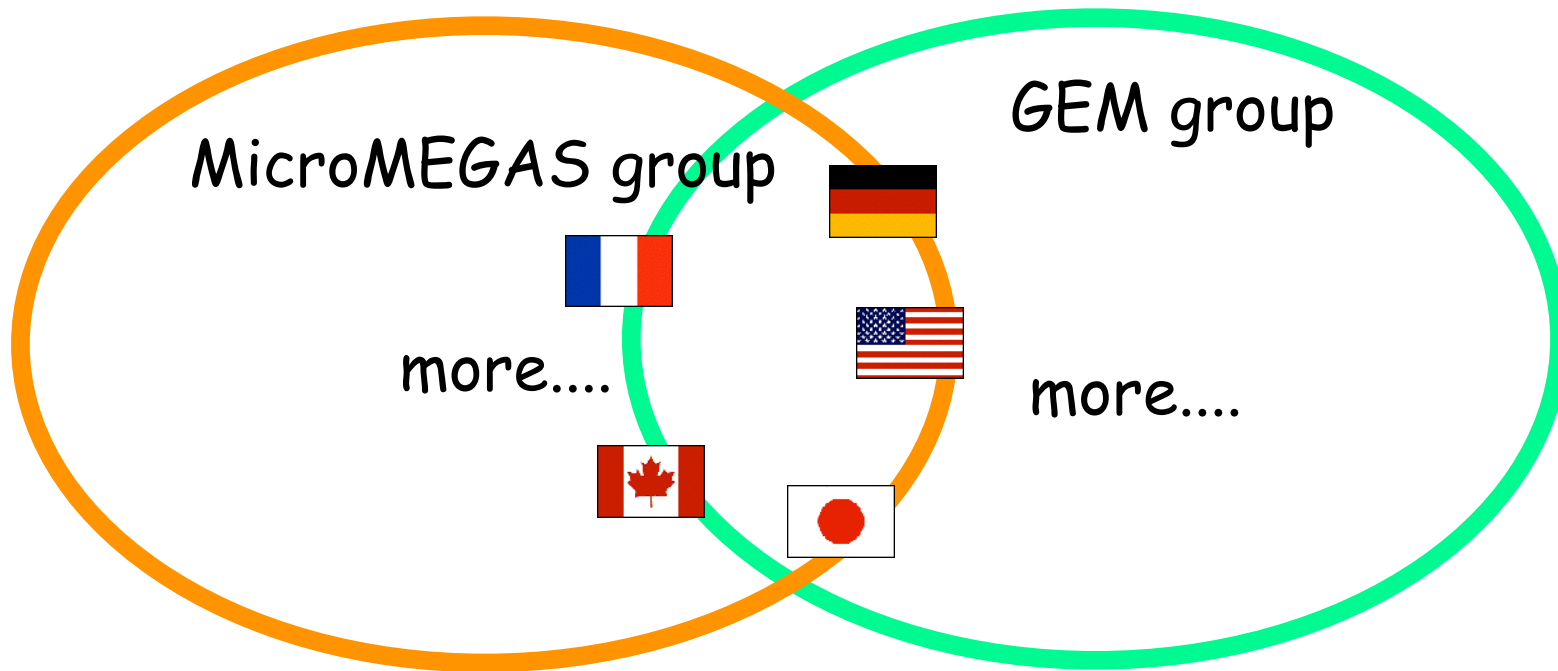
readout - connectors (on going)

replace

HOW??

Each group/inst. may have own plans.

We should try to keep contact with each other
to share the information/work.



Pad plane

Pad size

width ~ 1mm ? -> tr. gap

length ??

Pad geometry

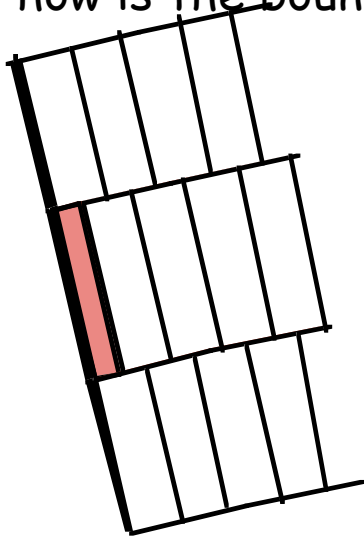
constant pad width ?

#of ch. /row is $\$ \#U \#T\%$

constant # of pad ?

pad staggered every other layer ?

how is the boundary of panel ?



Acceptable boundary area ?

in R dir., in r-phi dir.

Multi-layered PCB

do we need GND layer ?

the most of pad should be

terminated to GND

as limited # of elec.

Where is proper GND ??



Stiffness of PadPlane

???

Cooling ? No !

GEM Panel

0) GEM structure

Triple -GEM structure is necessary?
one transfer gap is necessary to defocus electrons.
induction gap must exist to readout

2nd transfer gap is necessary?? just for safer operation?
If 1st GEM provide enough gain, we can avoid 2nd GEM.
(triple structure may help to reduce Ion Back Drift)
100um thich GEM can provide equivalent gain as double 50um-thick GEM does.



OR



Comment from F.Sauli

Double GEM is good enough for gain(a few $\times 1000$) but quality must be good ! = cost
heavy ion bkg : discharge is no problem with proper segmentation

- With a proper design, and based on the experimental results, it should be easy to make a three-GEM detector where one foil can be removed, if it turns out not to be needed. If one starts with two, it might not be straightforward to add more

Reasonable comments!!

Base design must be done with 3 GEM + 1 GEM(?) gating structure.

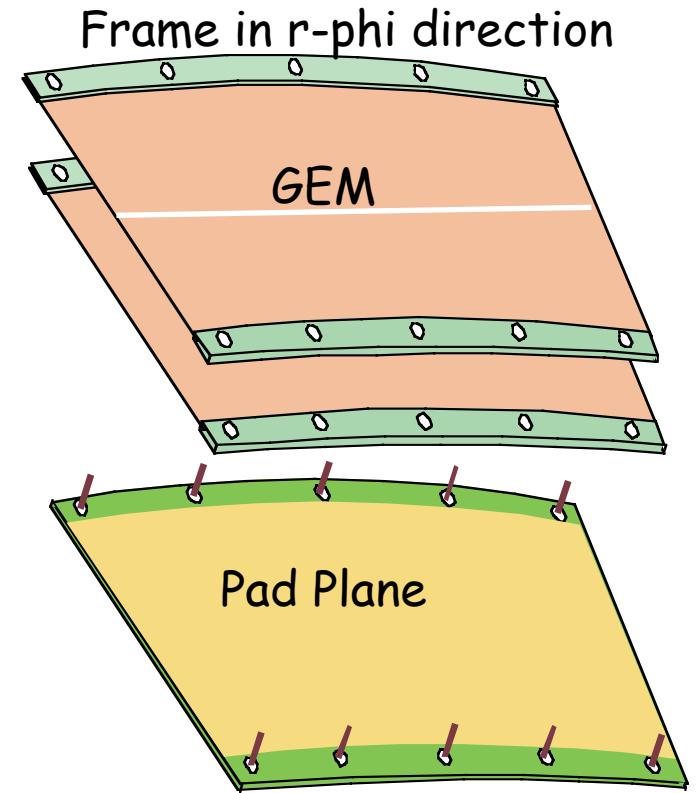
1) GEM mounting method

Frame/mechanical support

The most weak point (comparing to bulk-Micromegas)

In order to reduce dead region originating from support frame of GEM, we should try to remove/minimize frame in Radial direction.

Stretching mechanism of GEM sheet is necessary in mounting system.

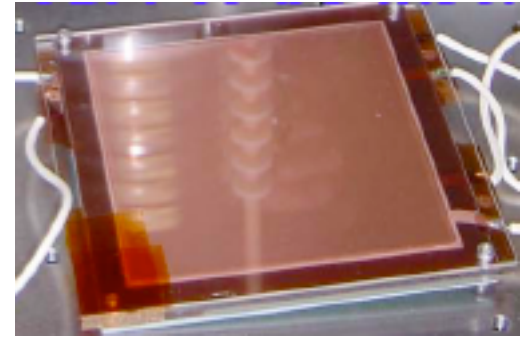


2) Large area GEM

Large area GEM needs to be separated to reduce high capacitance.
it should not be divided in Radial direction. (possible??)

F.Sauli suggest to use small ones with mosaic patch work
< 70cm² in order to avoid damage @ discharge
(same as Dan's first proposal)
cost effective

~ meter	30cm	10cm
need investment	available(CERN,3M,Japan)	available
very expensive	rather expensive	cheaper
segment	panel boundary	panel+GEM boundary
??	segment in R (~150cm ²)	no segment (100cm ²)



2.1)cutting GEM ??

Do we need to make each mask pattern ??

Is there any method to cut GEM as we like

2.2)connecting GEM foil ??

without dead area/ with min. dead area

3)HV supply

should be integrated in frame/mounting system.

4)Easy to Repair

GEM structure could be replaced.

Milestone ahead

12/2006 fix design of EndPlate

12/2007 FieldCage/1000 ch. elec. ready  One of panel must be ready until this time

Only ONE year for
designing/prod. of panel !!!

GEM production : a few month to make
quality/stability check : a few month
R&D for assembly

ONE year is too short to finish many R&D

Japanese group may start R&D soon
though it may not meet the design of Dec.'06

14x23 cm² GEM foil w/ 50um, 100um thick
pad plane

to make clear what we can/cannot do right now

This is related to budget profile in Japan.....

Budget Profile in Japan

unit 10000yen = 0.66 k Euro

year	2006	2007	2008	2009	2010
equip.	500	900	600	400	0
mater.	500	900	500	230	230

basic equip.
pre-proto panel

FieldCage (~600)
~40k Euro@ reasonable CHANGE

panel prod.

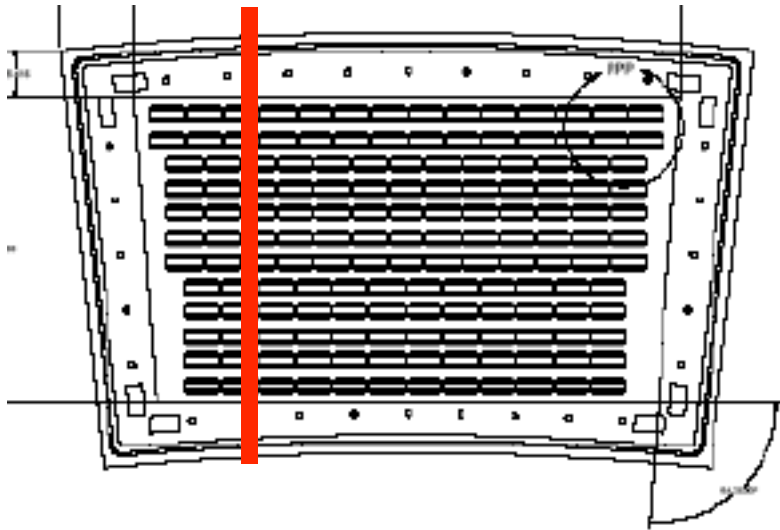
We can covert this to elec.
if it works for LP collab.

How many readout channel ??

Even we don't have any possibility to read all channel of 10(6) panels,
do we prepare the pad plane to be readable??

bunch of connectors(most of them will not be connected to elec.)

limit design of PCB



How many layers in PCB
GND plane?

12 connectors row / panel

24 pad row /panel

x 4 panel/ LP

=> 96 pad rows

If 1000 readout ch.

-> only 10 pads/row is readable

=> 1cm wide path

We should make it clear

what we really want to do @LP1