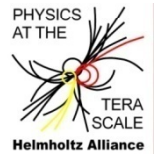


Summary of gaseous tracking session

K. Desch • University of Bonn • 12/06/2008
ECFA LC-workshop University of Warsaw

Linear Collider TPC: 4 talks

CluCou Driftchamber : 1 talk

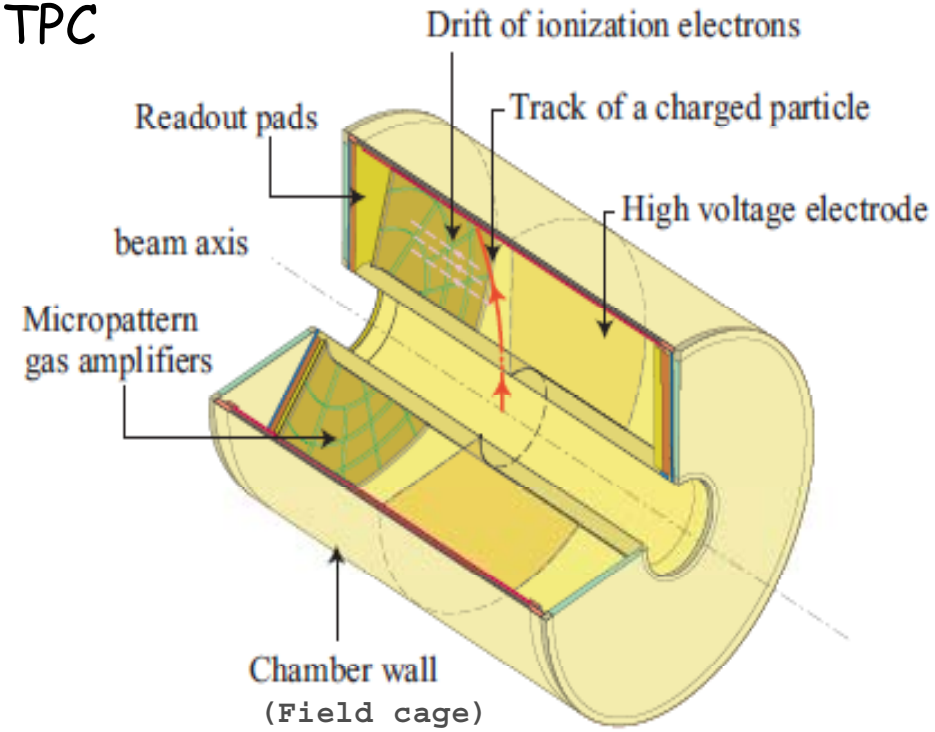
universitätbonn

Linear Collider TPC

LCTPC Collaboration
(7/11/19) Institutes from
(Am/As/Eu)

Traditional TPC with MWPC: limited space resolution,
No true 2D symmetry, ExB effects
⇒ use Micro-Pattern Gas Detectors (MPGD) ("micro" = 50-150 μm)

TPC

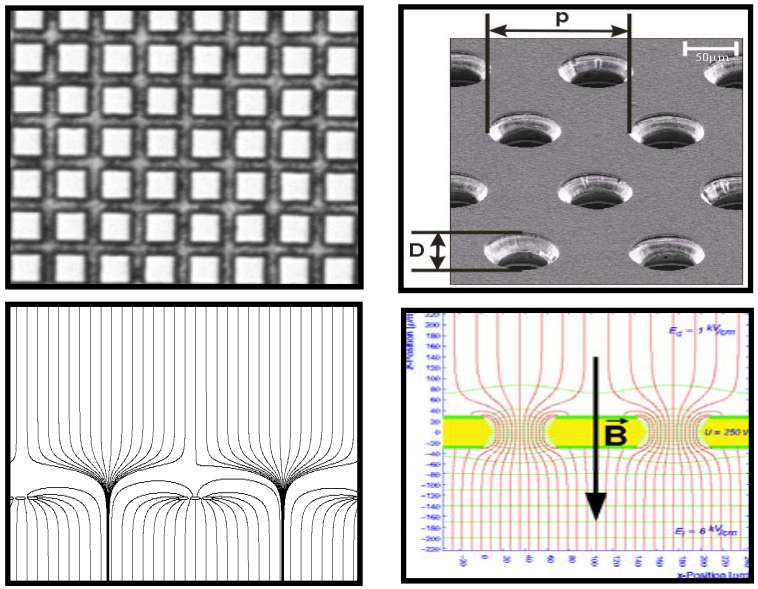


LC TPC: R=2m L=4-5 m

Gas amplification: 2 choices

Micromegas

GEM

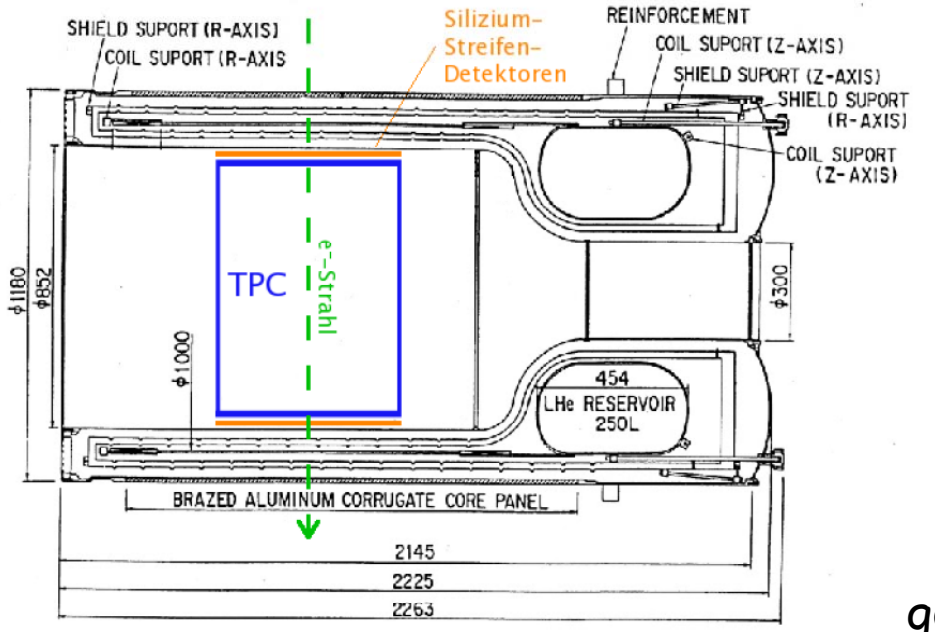


Readout schemes: 2 choices

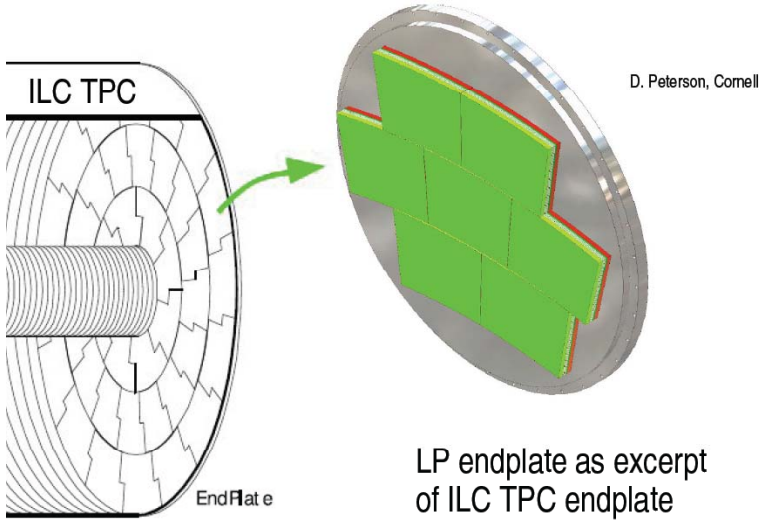
- small pads (~1x4mm^2)
- pixels (~100x100μm^2)

EUDET Setup

P.Schade,DESY



BALLOON-BORNE EXPERIMENT WITH A SUPERCONDUCTION MAGNET SPECTROMETER, Akira Yamamoto, KEK, 01.12.94



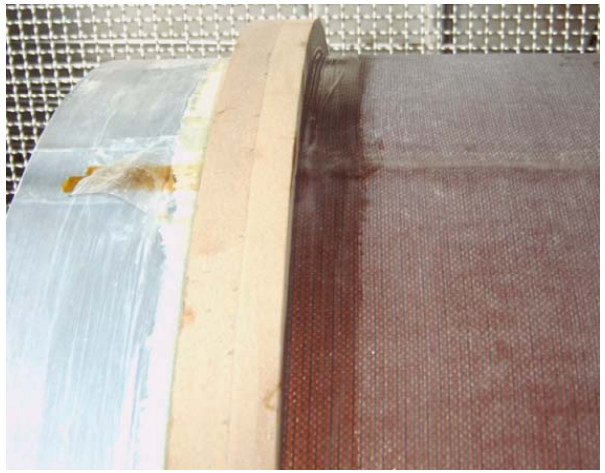
- Common prototype for 37 groups
- Drift length 60 cm
- Diameter 80 cm
- 7 exchangable modules

goals:

- evaluate different r/o techniques under same conditions
- prove feasibility of MPGD r/o in realistic prototype (several r/o modules) with B-field (1T)
- (some) engineering aspects

Field Cage construction

P.Schade,DESY



1.3% X_0

- field cage (EUDET infrastructure) under construction with industry at DESY
- cathode + anode plate under construction
- commissioning (HV, gas, electronics, DAQ,…) under way
- first operation in beam + 1T field planned for September

Micromegas Modules

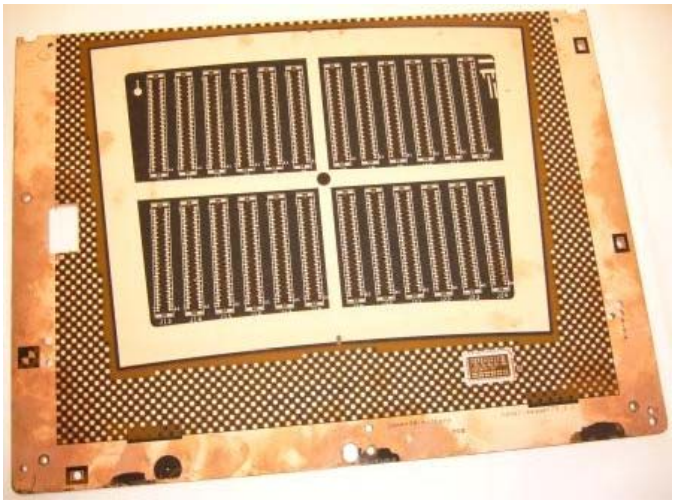
P.Colas,
Saclay

1st module to be ready for beamtest in September – well under way

pad panel:

front

back



T2K electronics (AFTER)

Micromegas Modules: Charge Sharing

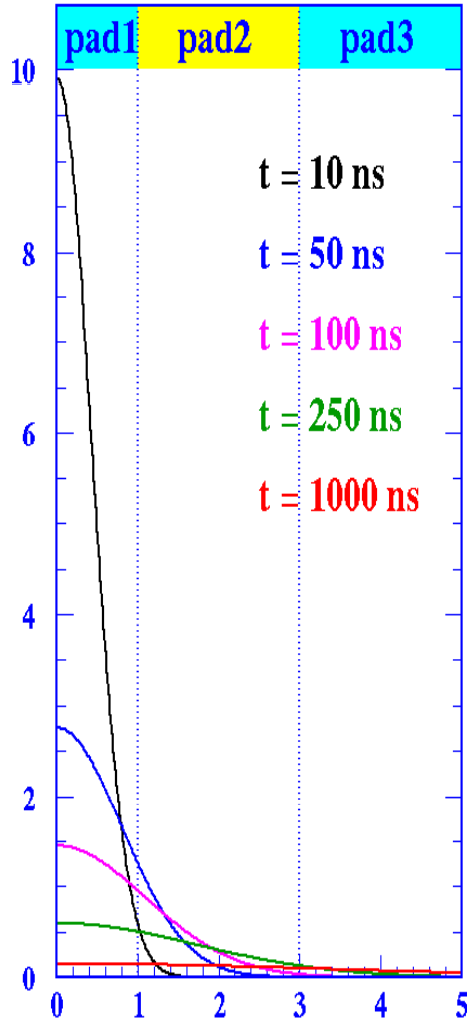
P.Colas,
Saclay

Small (o(10)μm) size of avalanche in Micromegas
⇒ resolution limited by pad pitch

Improve space-point resolution by resistive layer on top of pad-plane to spread the signal (+ spark protection effect)

R&D on different techniques for resistive coating

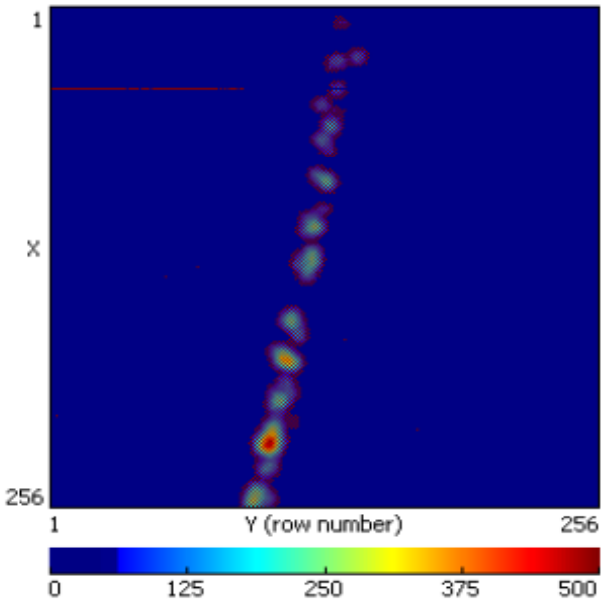
- resistively covered kapton
- carbon loaded kapton
- screen printing
- thin layer deposition



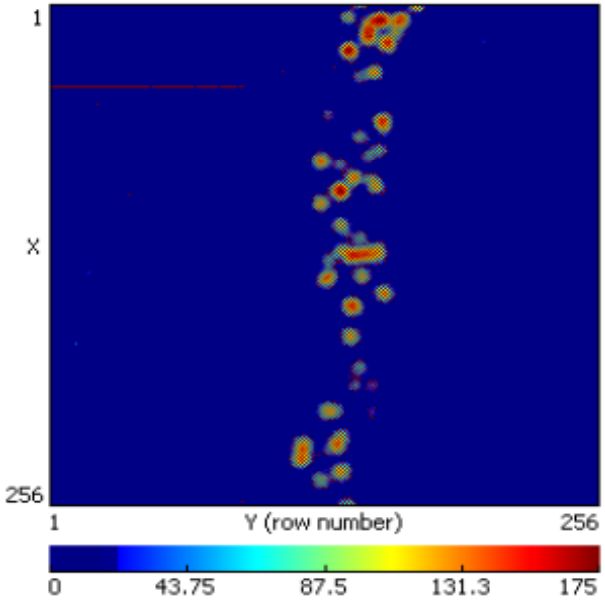
Gem + Timepix

M.Killenberg, Bonn

- first „small" prototype with long drift distance (25cm) in operation
- tested with cosmics + Sr source
- beamtest in Bonn (3 GeV electrons) this month
- analysis with MarlinTPC ongoing



short drift distance

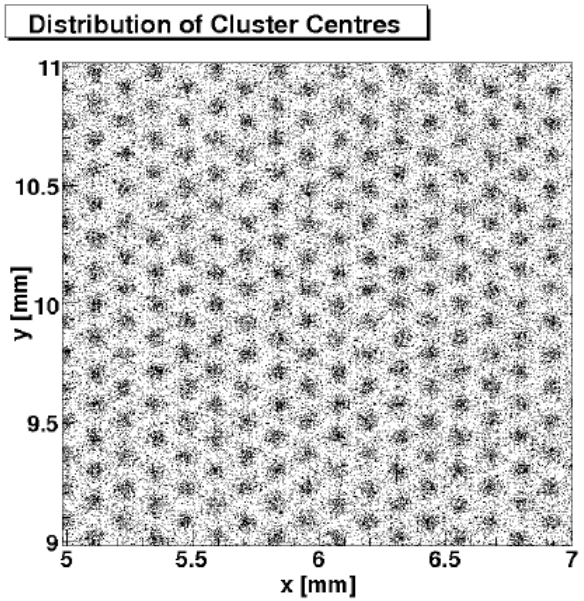


long drift distance

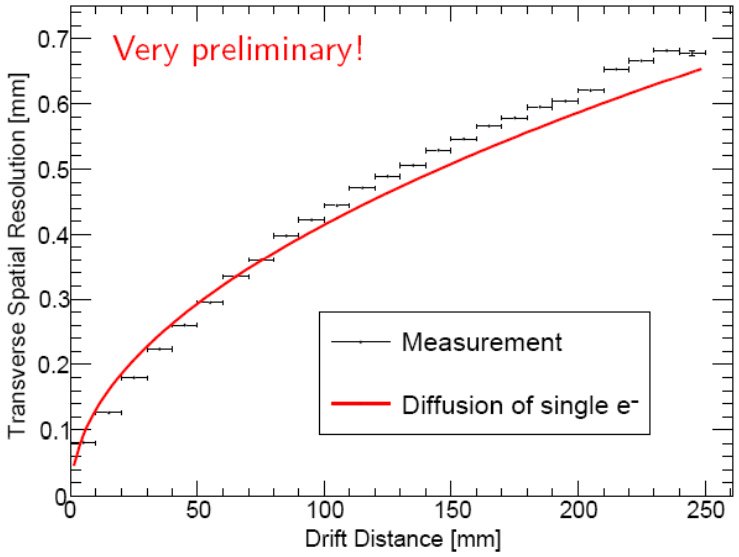
evidence for single-electron senistivity

Gem + Timepix

M.Killenberg, Bonn



GEM holes visible in cluster reconstruction



Prel. space point resolution looks ~ok

Next steps:
EUDET (Large Prototype) modules

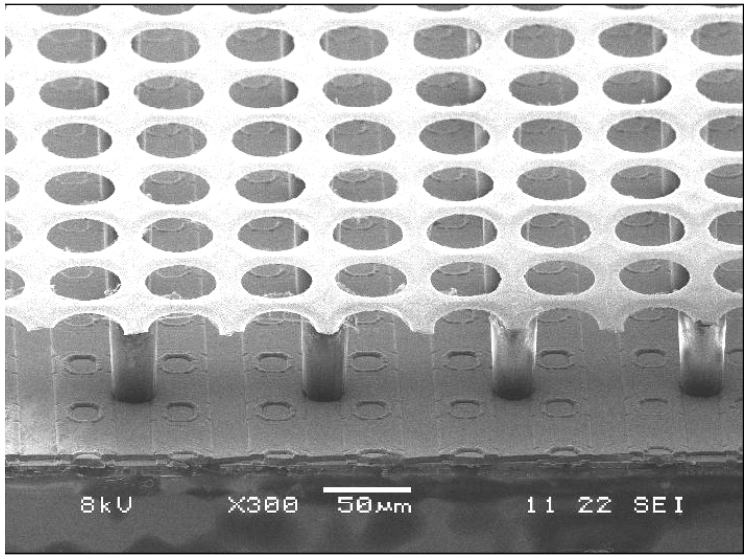
- Panel with 8 (2x4) Timepix chips
- Pad (1x4mm^2) Panel with standard GEMs
- Dummy-Panels

Ingrid (Timepix w integrated Micromegas)

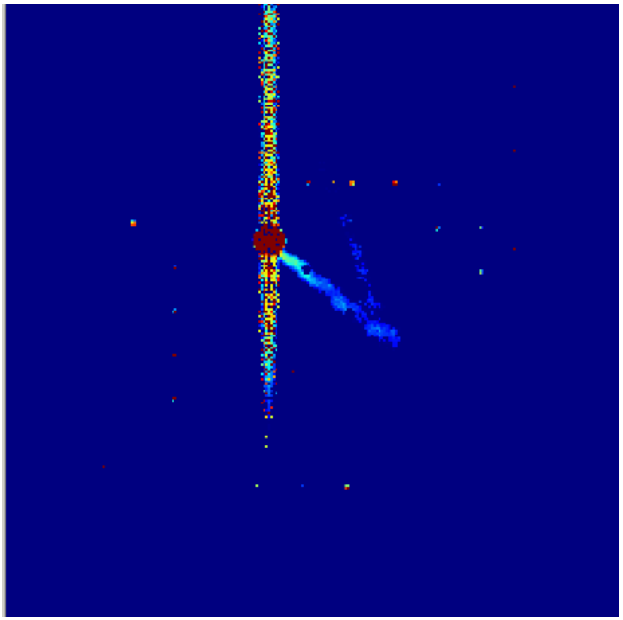
J.Timmermans,
NIKHEF

Timepix 256x256 pixels

Ingrid: MESA+, UTwente
aSiH (SIPROT): IMT Neuchatel



spark proof:
survives α-induced discharges

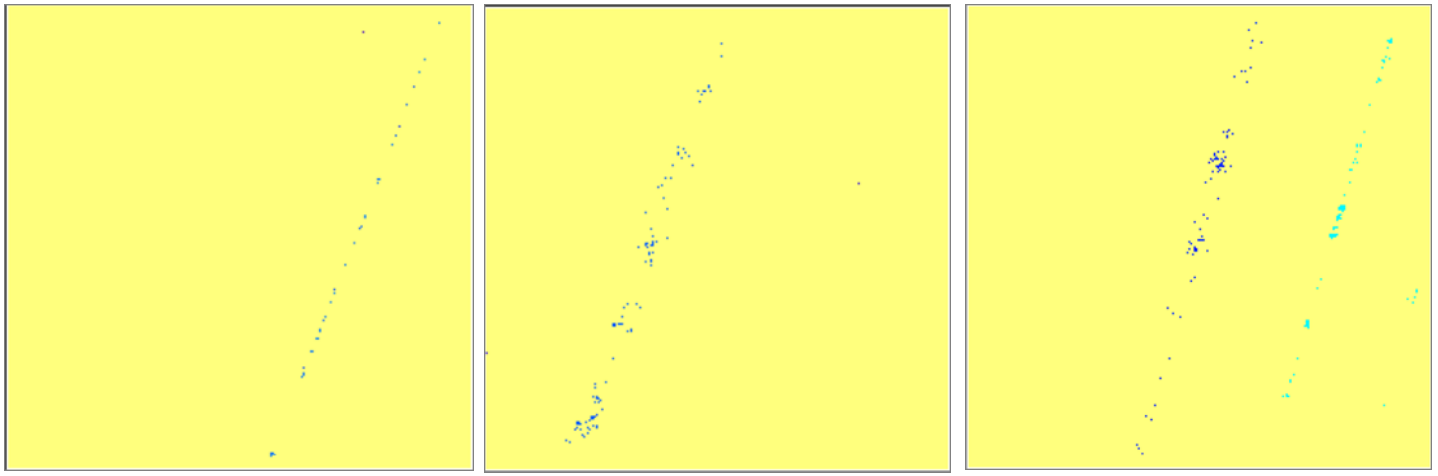


New:
- Setup in Magnet
- Beamtest at CERN in May
  (data to be analyzed)

Ingrid (Timepix w integrated Micromegas)

J.Timmermans,
NIKHEF

CERN Testbeam events



Ar/CO_2 (70/30) Ar/CF_4/iBut (90/3/2) Xe/CO_2 (70/30)

Testbeam analysis started

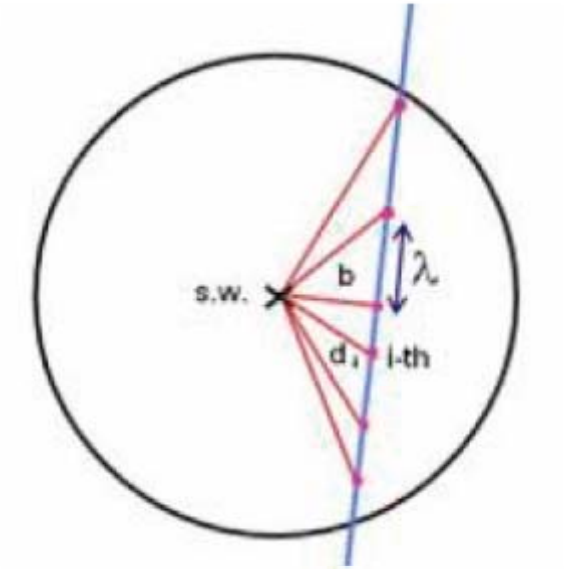
Next: larger planes (8/4 chips) for EUDET (Saclay/NIKHEF)

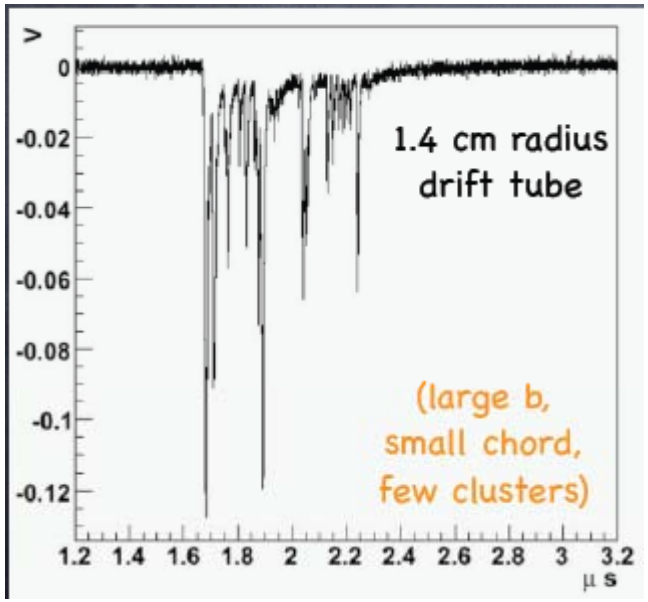
Longer term:
- towards a 64-chip plane
- Started planning for Timepix2 chip

Tracking in 4th: CluCou Drift Chamber

F.Grancagnolo,
INFN Lecce

Idea: improve space resolution + dE/dx by
measuring pulses from individual primary electrons/clusters



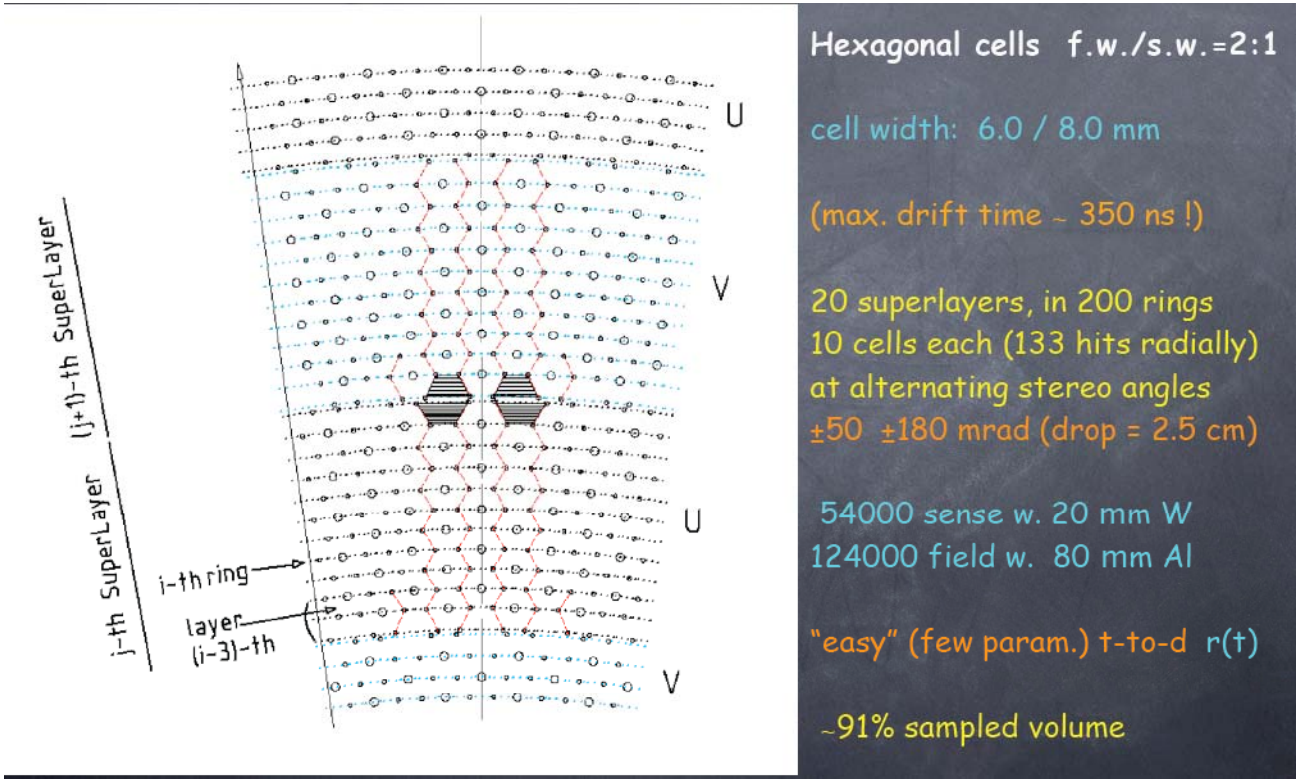


- low-ionisiation gas (He)
- high sampling rate (1-2Gs/s) – high bandwidth digitization (1GHz)
- efficient counting algorithm

Tracking in 4th: CluCou Drift Chamber

F.Grancagnolo,
INFN Lecce

- deriving from KLOE drift chamber
- He based gas mixture, small cells (6 mm, 350ns max drift time)



- Digitization prototype chip available
- R&D on metal-coated low X_0 (carbon,polyimide,…) wires
- small prototype planned for next year

Summary of Summary

- LCTPC collaboration on a good way to the first Large Prototype testbeam in fall

- progress on Pixel readout of TPC

- CluCou drift chamber for 4th concept