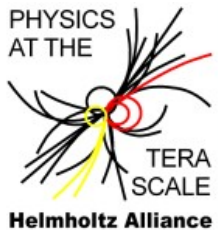


# Plans of Bonn group for CERN test beam in October



Jochen Kaminski  
Universität Bonn

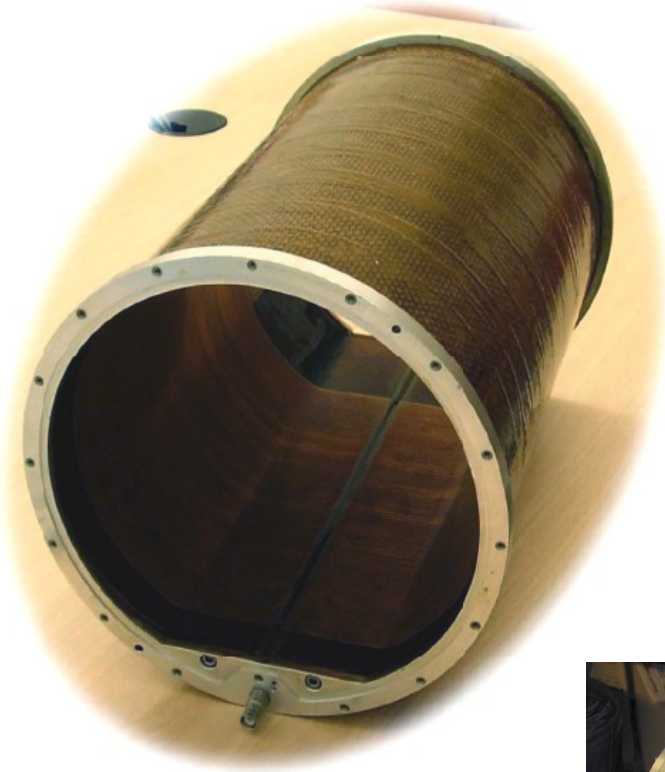


GEFÖRDERT VOM



RD-51 mini-week, WG-7  
CERN, 24. September 2009

# TPC Prototype at Bonn



## Drift cylinder:

- drift distance: 26 cm
- inner diameter: 23 cm
- material budget: 1 %  $X_0$

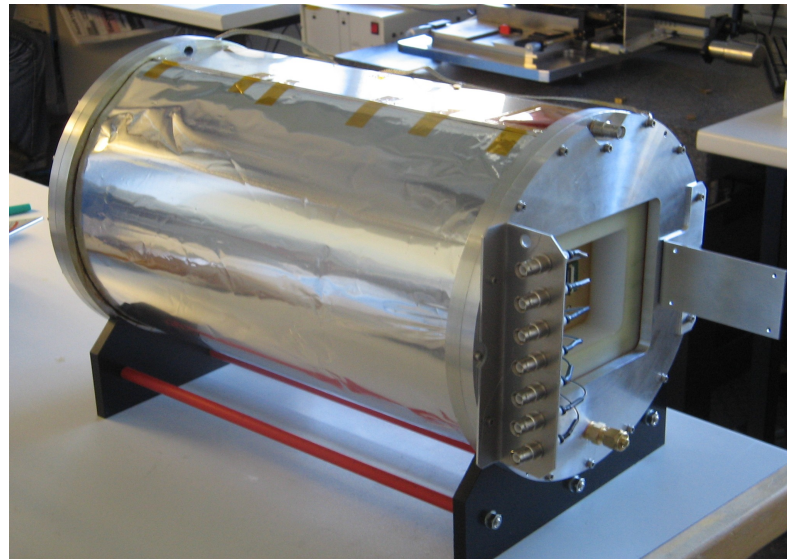
## Gas amplification:

- 3 GEMs 1mm apart  
415 V across each GEM

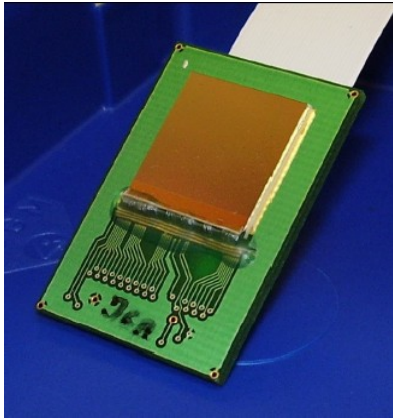
## Currently:

He : CO<sub>2</sub> 70:30

$E_{\text{drift}}$  : 500 V/cm



# Detector: TPC

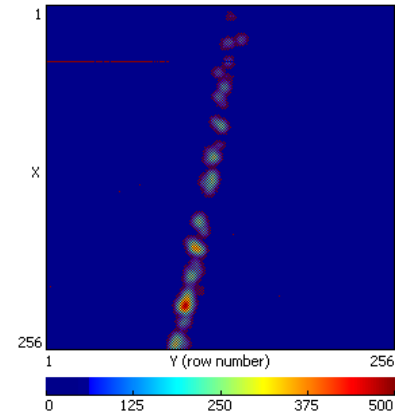


256 · 256 pixel

pixel size:  $55 \cdot 55 \mu\text{m}^2$

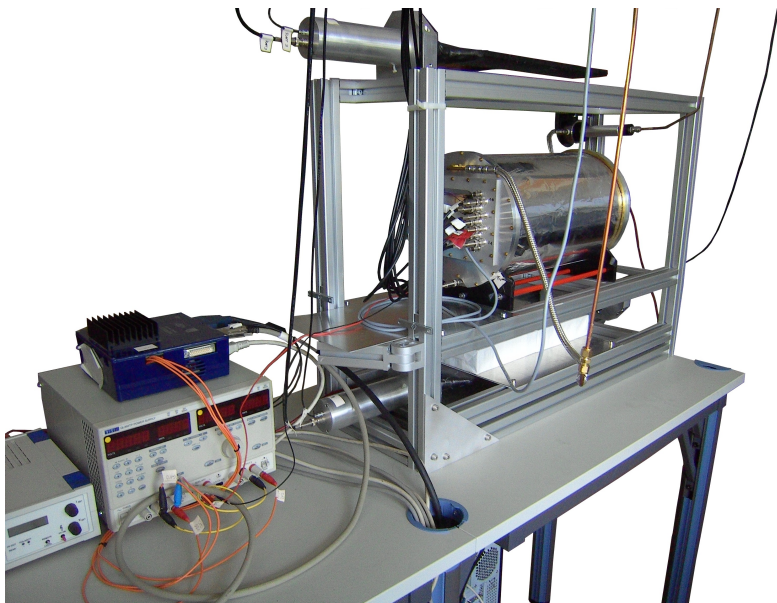
chip dimensions:  $1.4 \cdot 1.4 \text{ cm}^2$

Operated in checker-board pattern of  
TOT (charge) and Time

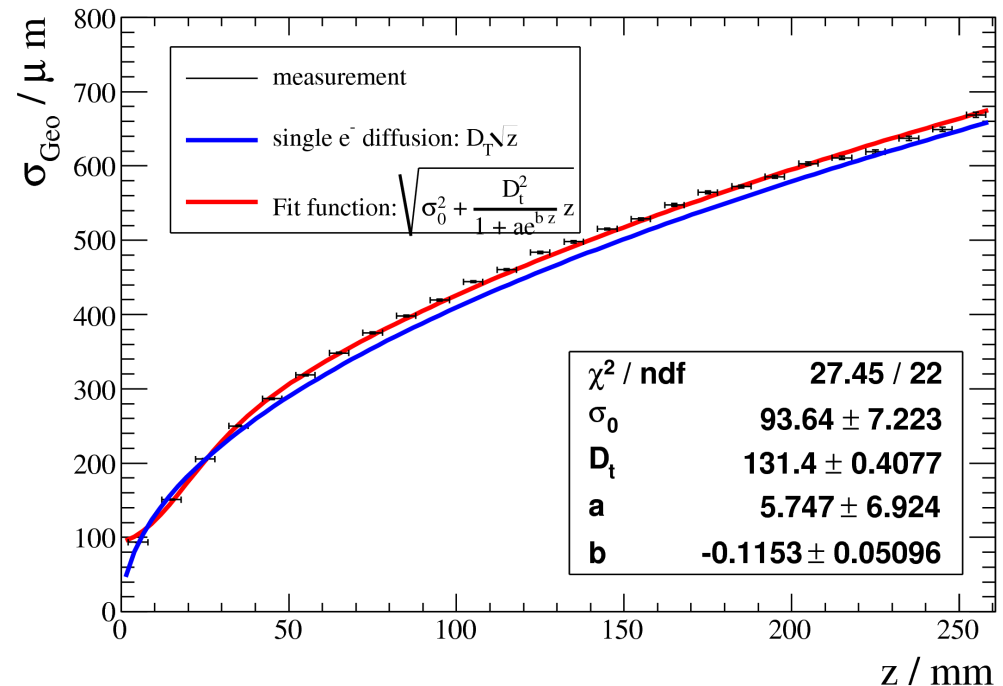


Cosmic ray test stand:

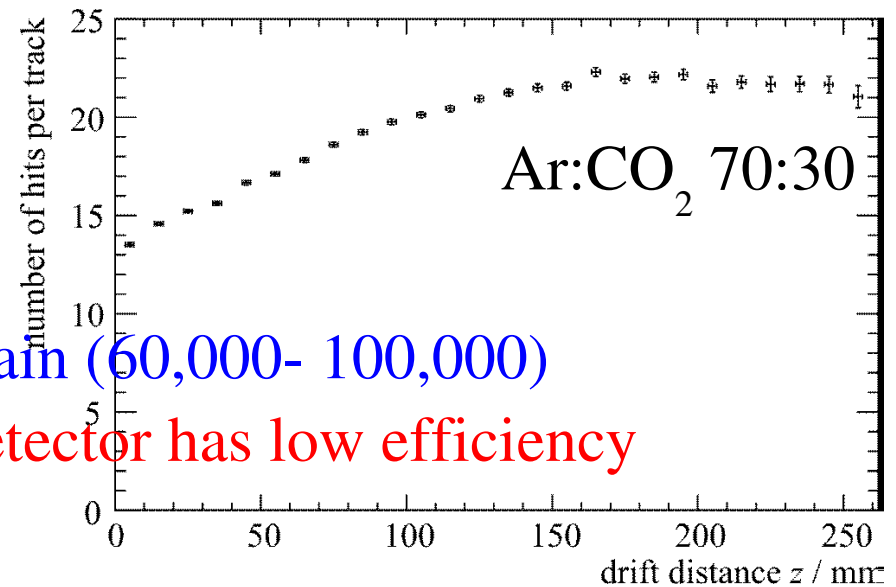
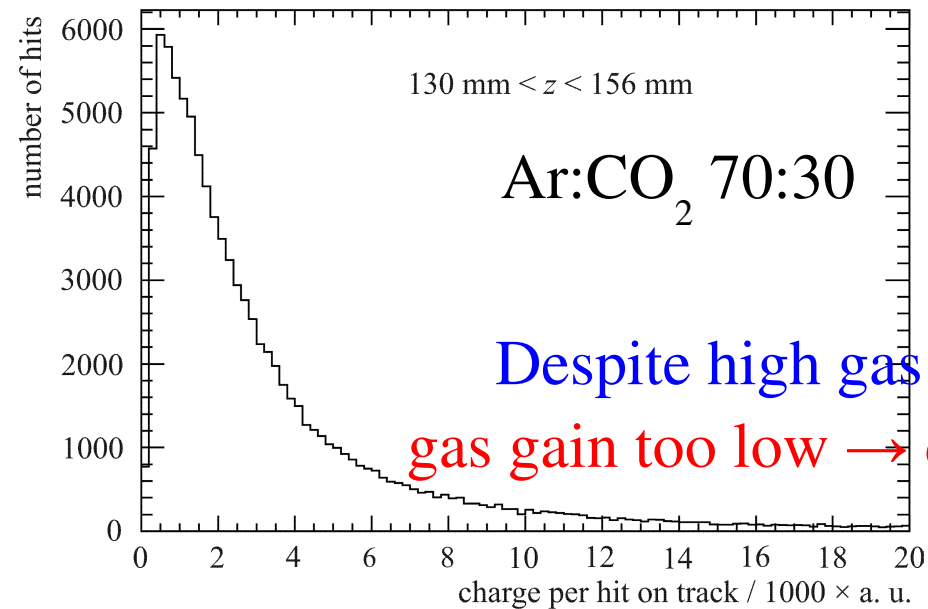
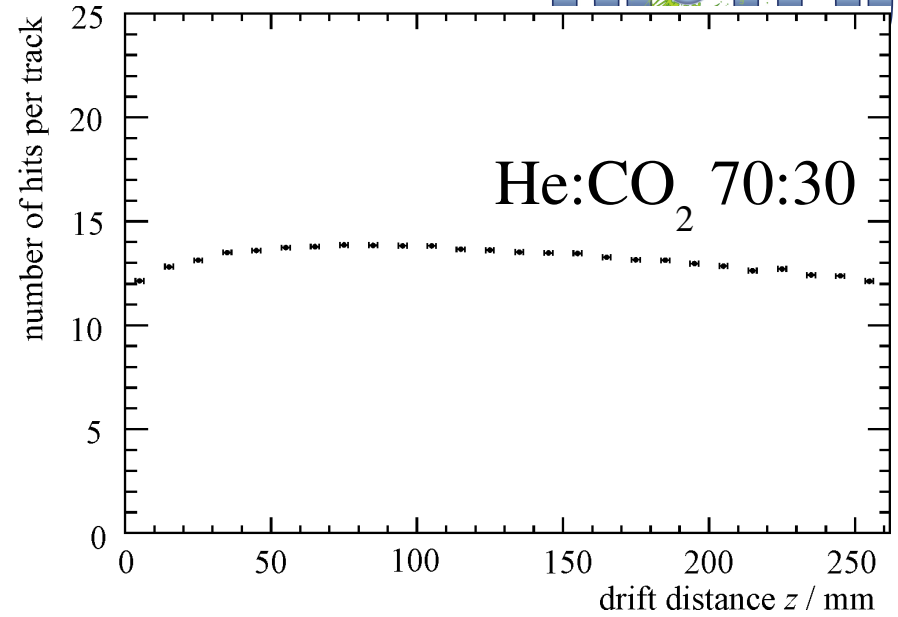
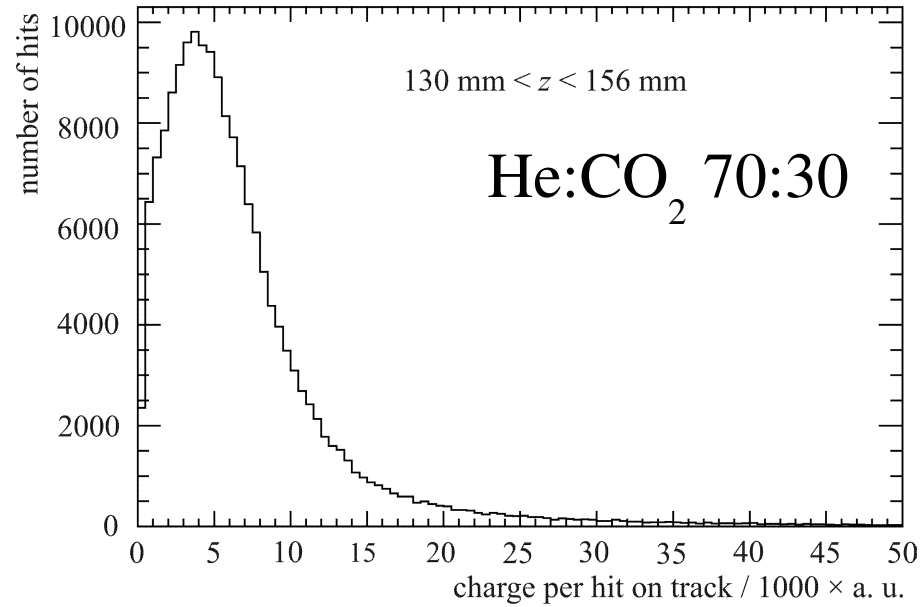
~ 1 month for 80,000 tracks



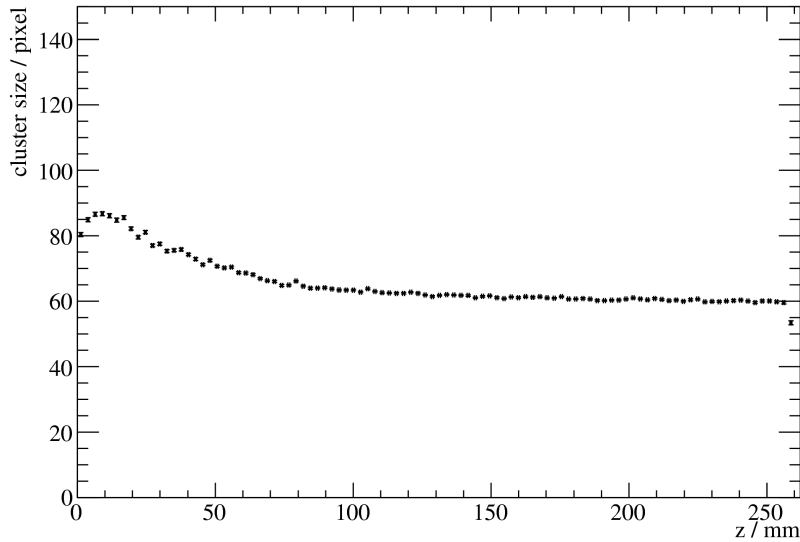
Distribution of Geometric Mean Resolution



# Comparison



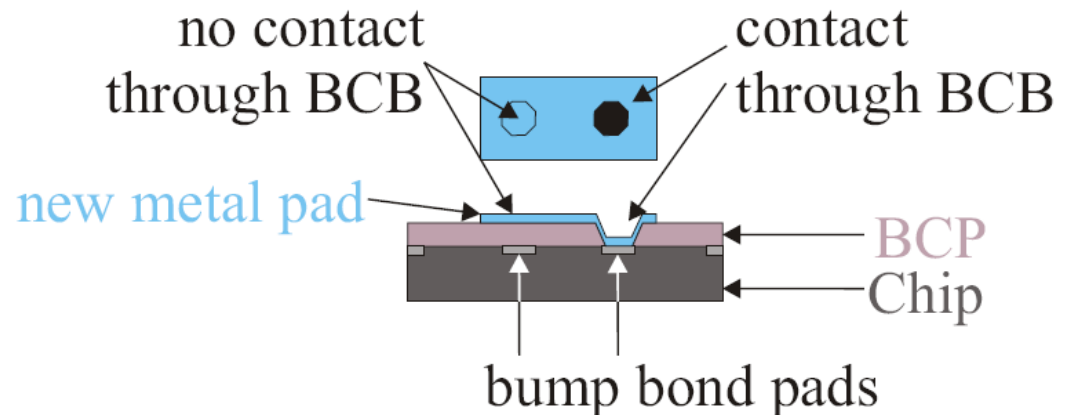
# Goal 1 for Test Beam: larger Pixel Sizes



Charge depositions are spread over ~60 pixels  
=> pixel sizes are too small for the charge clouds generated by a triple GEM stack  
=> high gains are necessary for the signal to pass over threshold of pixels

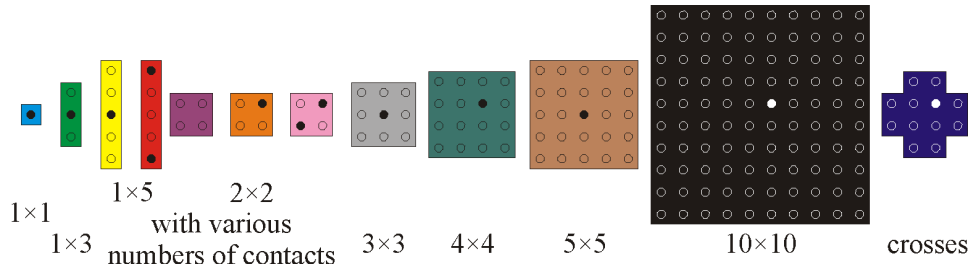
## TEST CHIPS WITH LARGER PIXELS

→ Expensive to design new chips,  
BUT COMBINE PIXELS BY ADDING NEW LAYERS

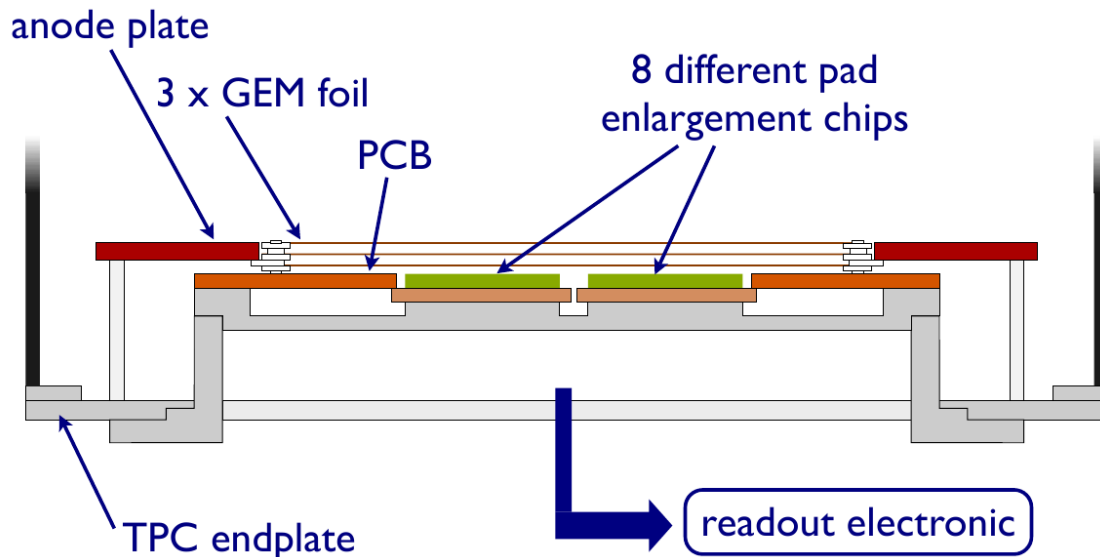
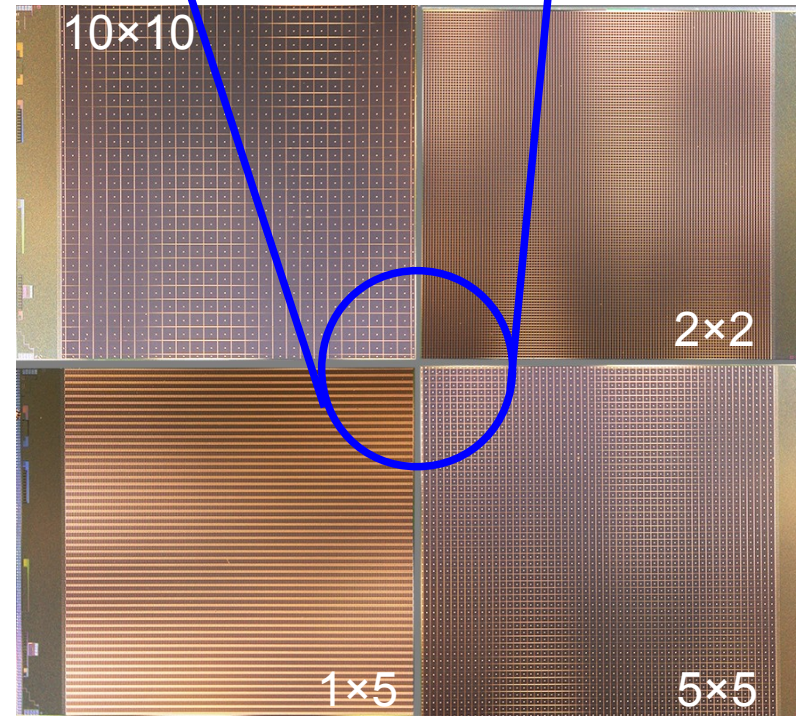
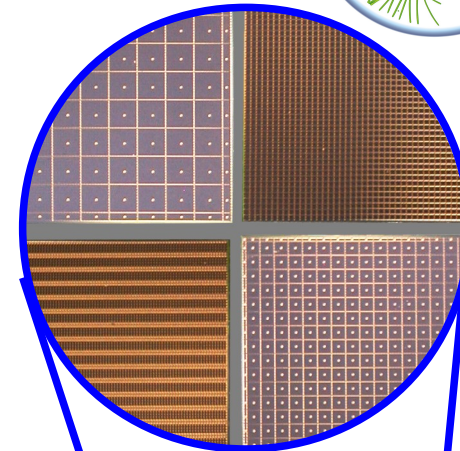




# Timepix with Larger Pixels



- Various geometries have been produced by IZM, Berlin.
- They will be placed on 2 quadboards.



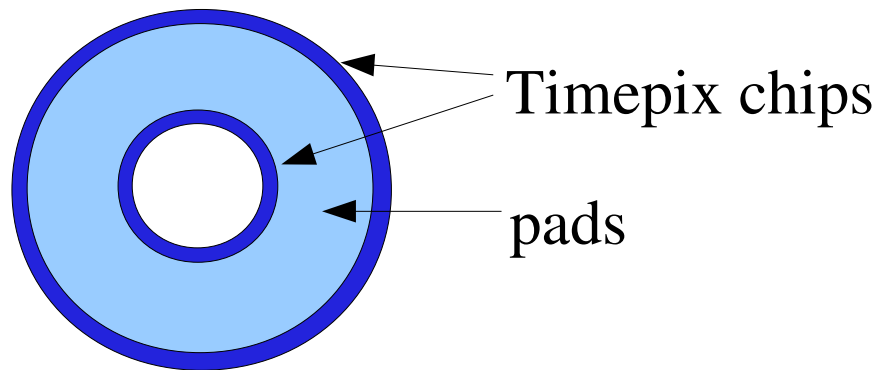
# Goal 2 for the test beam:



## Combination Pads and Pixels

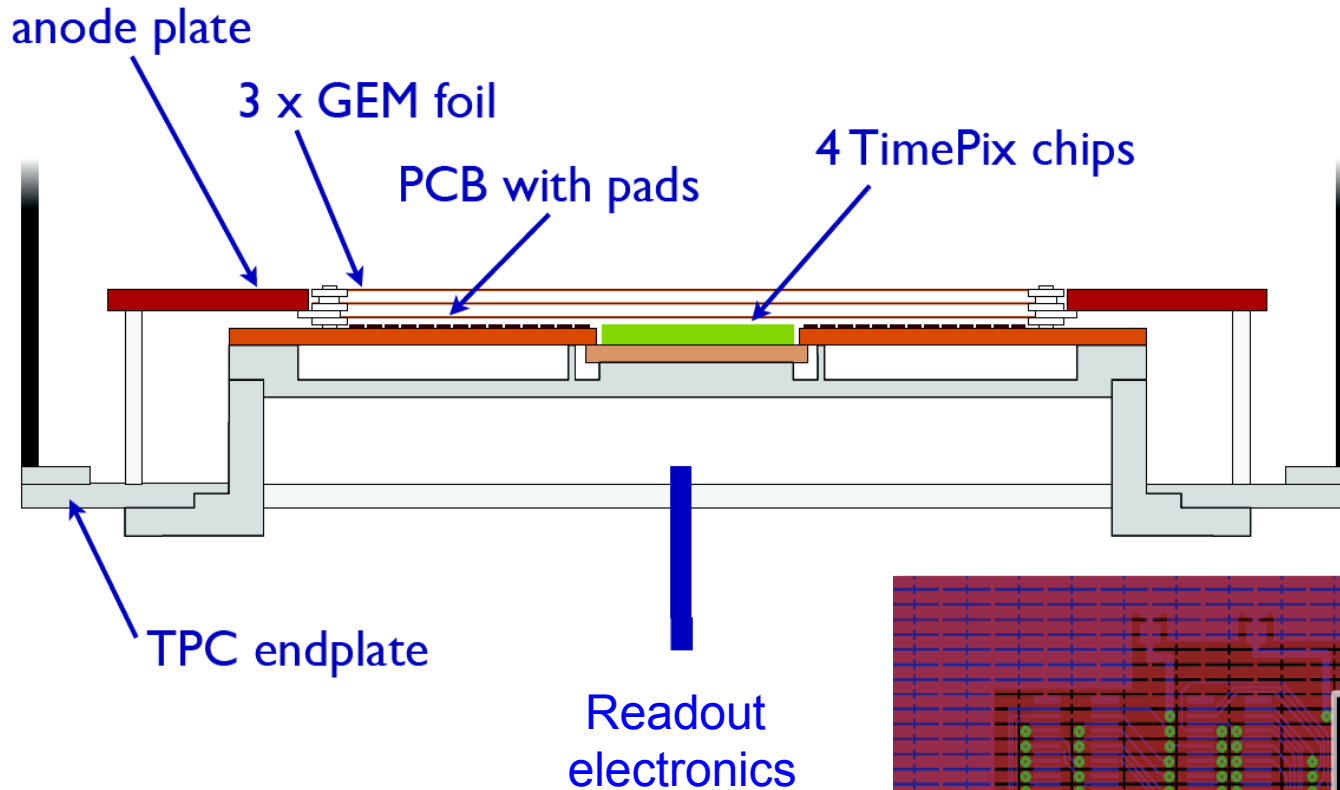
Large number of pixels may not be necessary everywhere on the TPC endcap.

Maybe only 2 rings are sufficient:

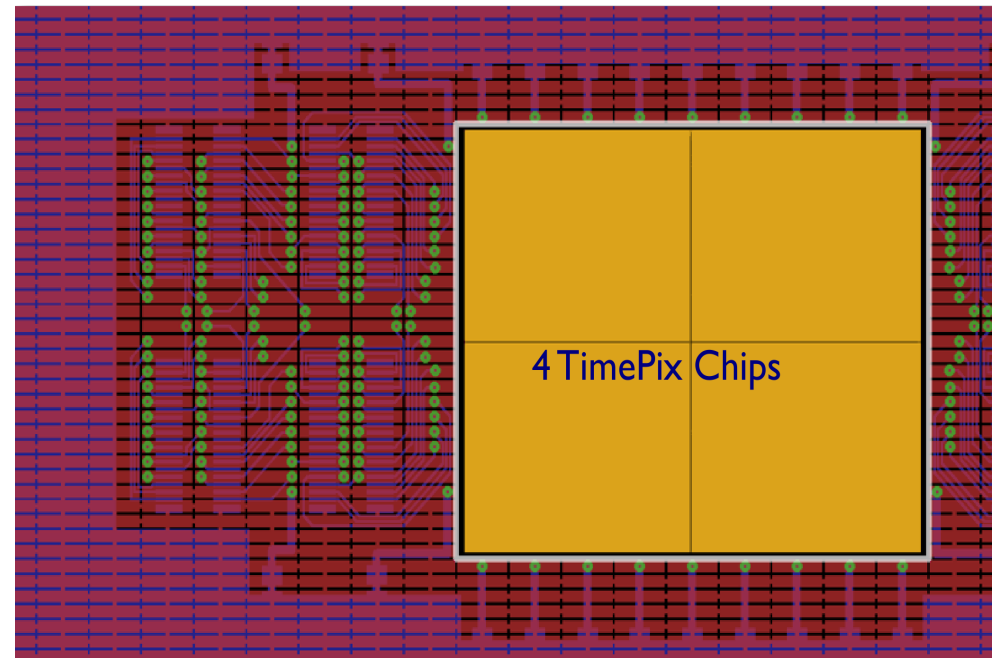


Combination of both pixels and pads on one endcap.

# Test Combination of Pixels and Pads



- Pad sizes  $4 \times 1 \text{ mm}^2$   
connected to 256 channels  
of ALTRO electronics
- 4 Timepix chips in the middle





# Setup

