

Status report from TPC-Group Desy-Hamburg



TPC R&D in Hamburg



Overview

- The new Mini-TPC for current measurements
- High Voltage Tests on Field cage Samples
- Resolution Measurements
- Summary and Outlook

The new Mini-TPC for Current Measurements

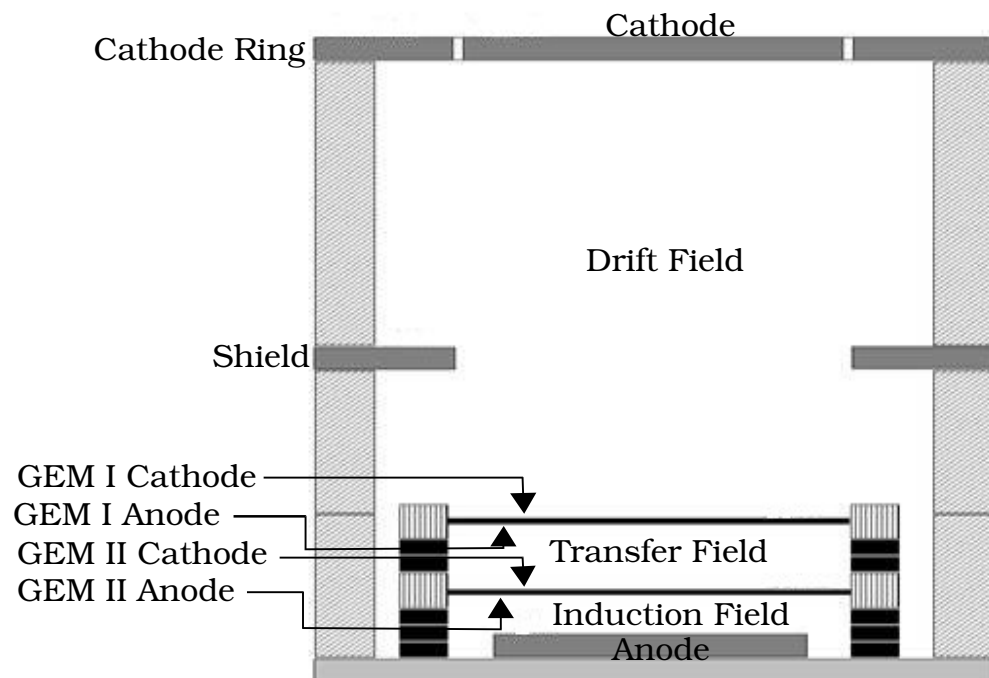


Fig.1 GEM-Tower (schematic)

Application

- Replacement for existing Mini-TPC (too large)
- Current measurements in high magnetic field
- Measurements with GEMs from Novosibirsk

Setup of the Mini-TPC

- Double GEM detector
- Shield for more homogenous drift field - 'one ring field cage'
- Drift space $\sim 16\text{mm}$
- Transfer and induction space $\sim 2\text{mm}$
- HV connections for each electrode

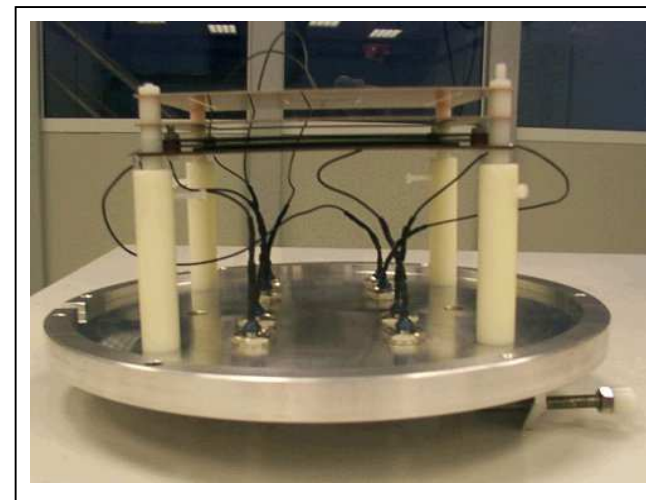


Fig.2 GEM-Tower

The new Mini-TPC for Current Measurements

Checking the operation with cosmic radiation

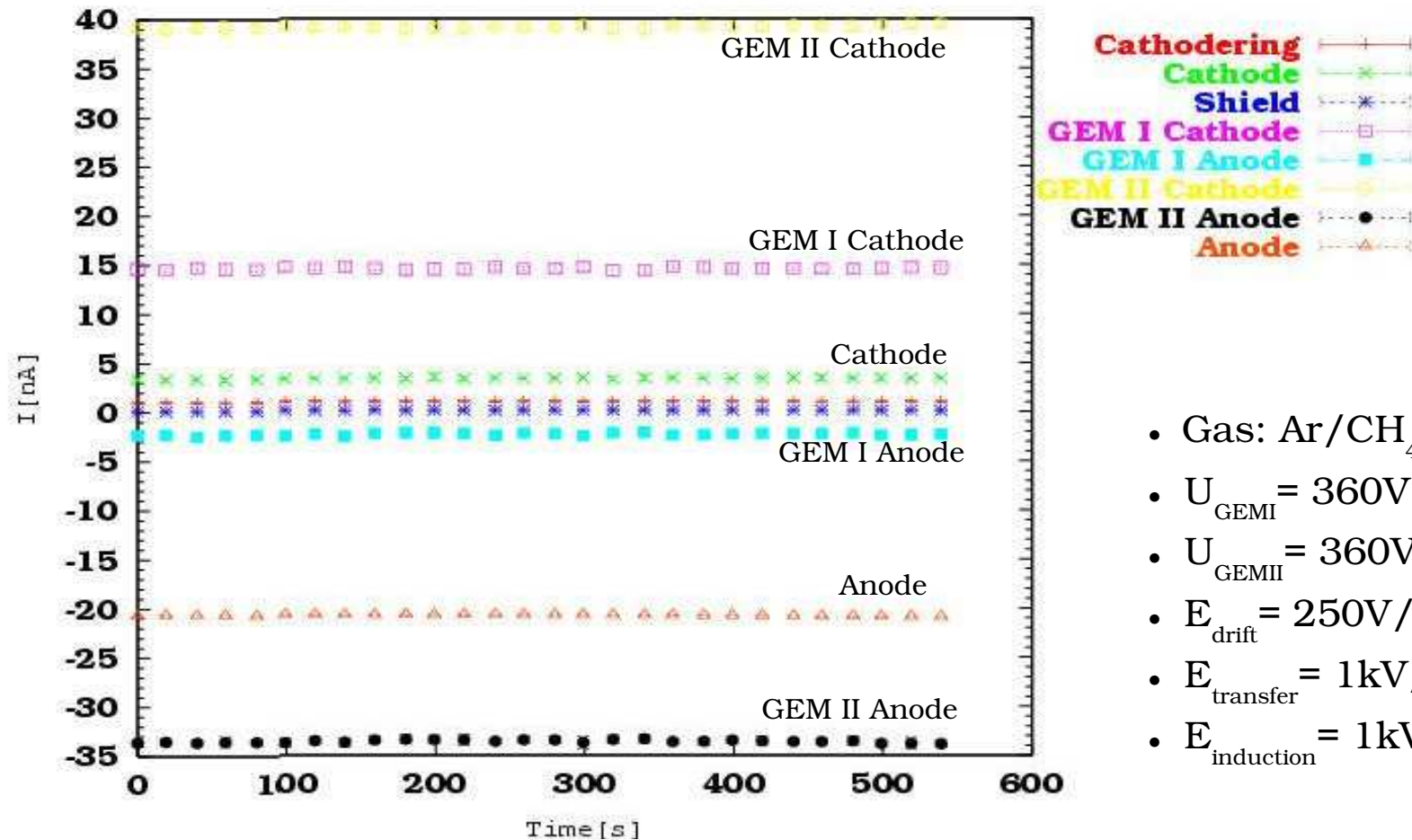


Fig.3 The new GEM based Mini-TPC for current measurements in the 5 Tesla magnet

- Gas: Ar/CH₄/CO₂ (93/5/2)
- Voltages and Fields set to:
 - $U_{\text{GEM I}} = 400\text{V}$
 - $U_{\text{GEM II}} = 400\text{V}$
 - $E_{\text{drift}} = 250\text{V/cm}$
 - $E_{\text{transfer}} = 1\text{kV/cm}$
 - $E_{\text{induction}} = 1\text{kV/cm}$
- Readout with oszilloscope
- Getting signals with pulse height of several mV
- Pulse length about 40ns
- Conclusion:
 - the chamber works fine

The new Mini-TPC for Current Measurements

First current measurement

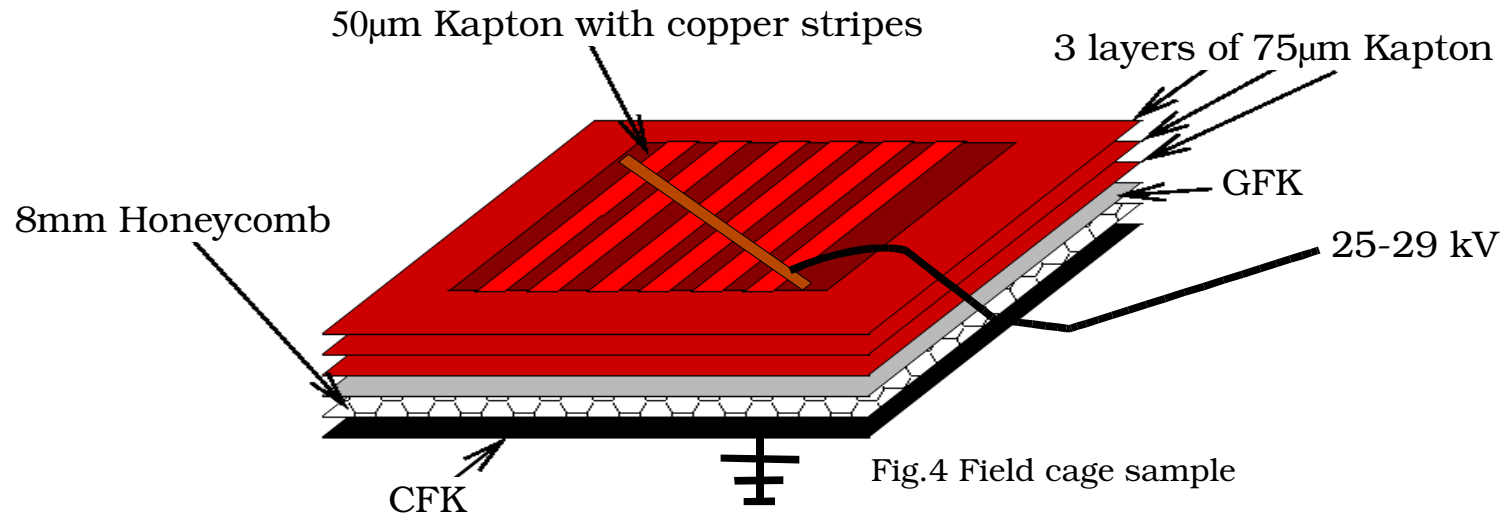


- Gas: Ar/CH₄ (95/5)
- $U_{\text{GEMI}} = 360\text{V}$
- $U_{\text{GEMII}} = 360\text{V}$
- $E_{\text{drift}} = 250\text{V/cm}$
- $E_{\text{transfer}} = 1\text{kV/cm}$
- $E_{\text{induction}} = 1\text{kV/cm}$

- Chamber operates stable in a timescale of several minutes

High Voltage Tests on Field cage Samples

Preparation of a field cage for the new TPC Prototype



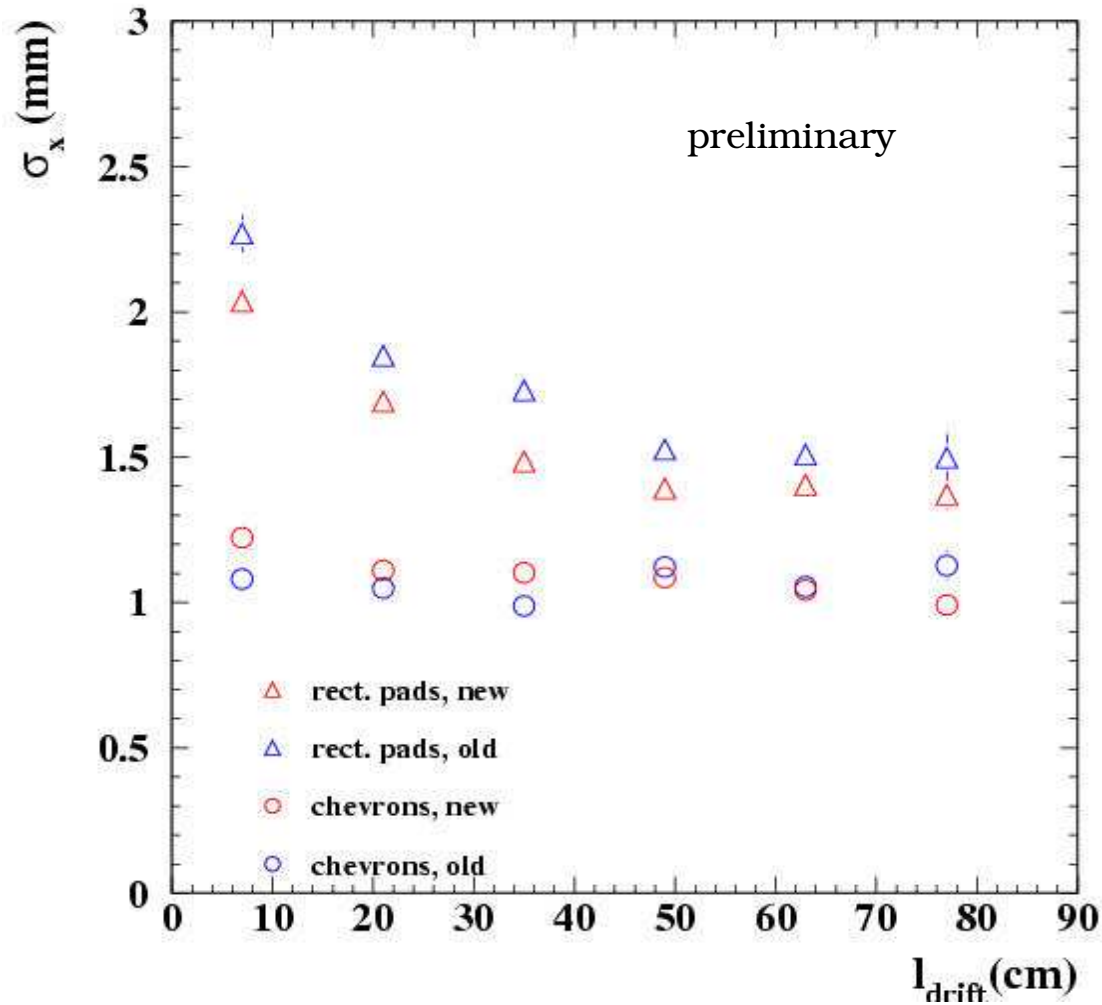
- Structure: Kapton – GFK – Honeycomb – CFK
 - stable for 10 days on 25kV
 - HV increased to 29kV – stably for 4 days
 - Conclusion: fits our requirements for a prototype
- Structure: Kapton – Honeycomb – CFK
 - stable for 10 days on 25kV
 - running for 2 days at 29.9 kV
- Structure: Kapton – CFK (– Honeycomb – CFK)
 - has to be done



Fig5 Field cage test

Resolution Measurements

Data from Big TPC Prototype



- Old data were taken with pads on HV
- New data were taken with pads grounded
- Work on new fit which takes charge distribution into account is in progress

Summary and Outlook

Summary

- New operational Mini-TPC for current measurements
- Two high voltage stable field cage samples
- New data from Chevron read out pads

Outlook

- Do current measurements without and with magnetic field
- magnetic field will be available in May
- Build field cage for the new TPC prototype
- Analyse data from different pad geometries