Status of Micromegas Central Tracker

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SPD collaboration meeting

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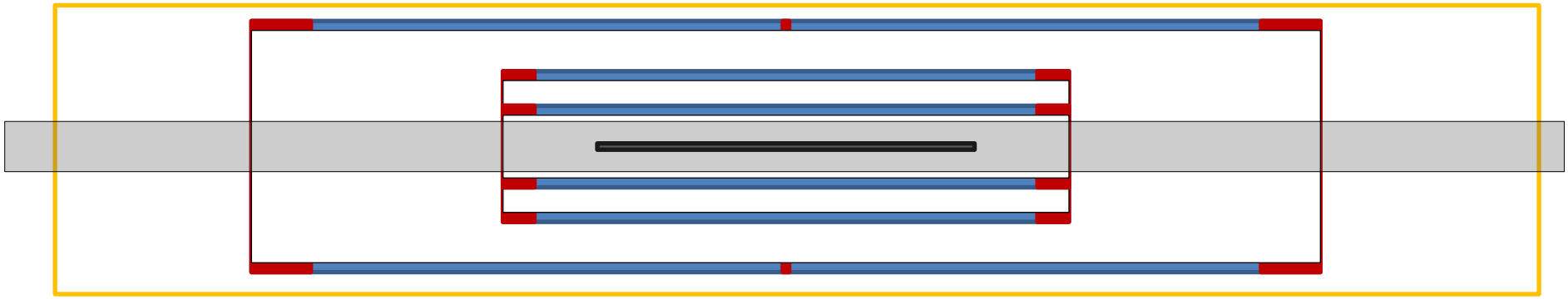
MicroMegaS Central Tracker: Layout

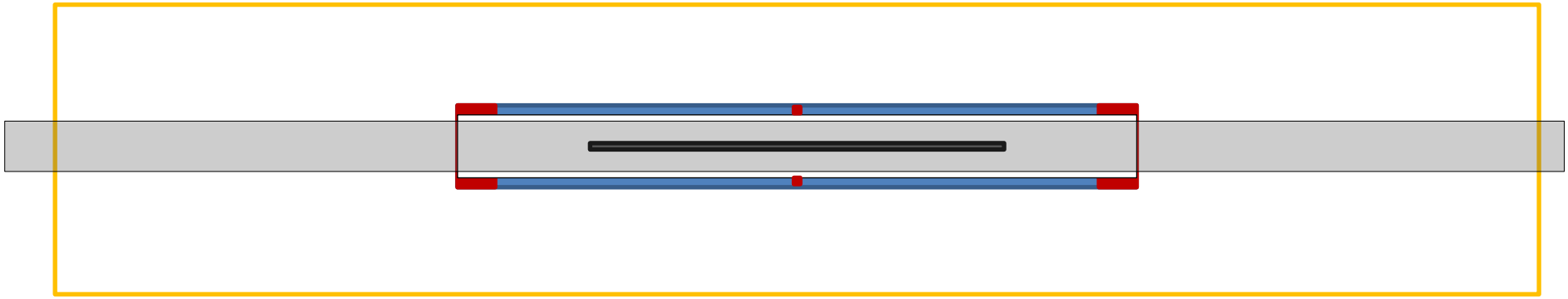
- **3(or 4) layers in 1 multilayer is main option now**
  - Same accuracy as for bigger system (multiple scattering dominate resolution)
  - Detector may be divided onto 2 part along Z => smaller occupancy and capacitance(==noise)
  - We know where to produce PCB of 1/2 size in actual situation.
  - Smaller number of RO channel (<7.5K) => additional FE electronic option: ~200 VMM3a ASICs is bought and may be used to produce FE boards

MCT layout

7layers in 3 multilayers



3 or 4 layers in 1 multilayer



MCT : material availability

- **All crucial material&resources is available now**
  - Photoresist and mesh are delivered;
  - Preliminary agreement with Minsk Institute of Power Engineering team about DLC coating production: test samples was delivered to JINR and tested last months
  - Polyimide PCB with reduced thickness of cooper layer may be produced by PCBtech company. Maximum size of 60 cm allow to produce detector with integrated signal cable => remove socket from bended detector

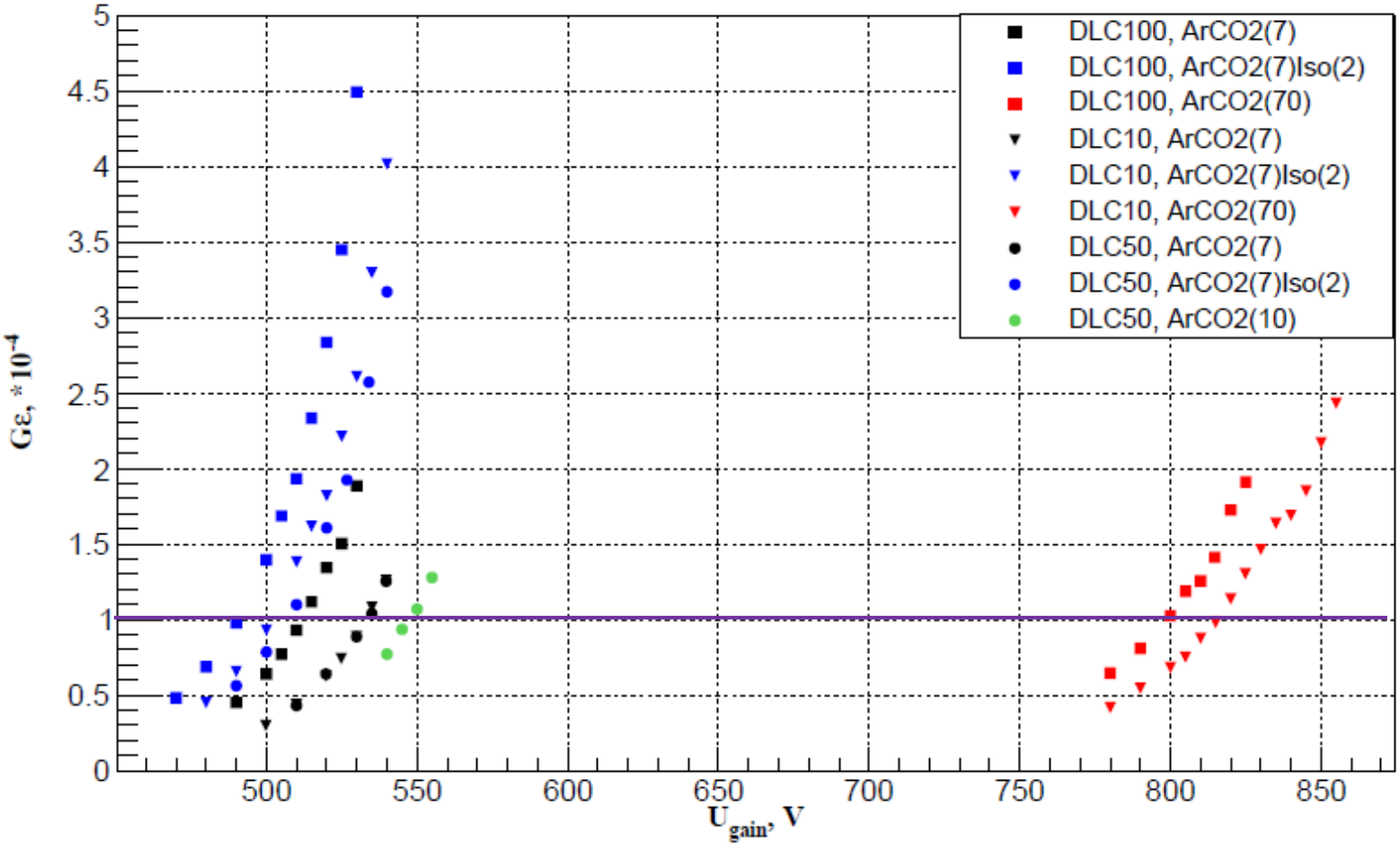
Prototypes production and tests

- 5 test PCB with DLC coating were supplied Minsk Institute of Power Engineering group and was used to produce test MM module. Active area 8x8 cm^2, ρ_{sq}=10-100MΩ
- There were some technical issues, mainly solved now.
- Last 3 MM chambers was produces successfully, with stable result
- Produced MM modules were used for gas mixture test

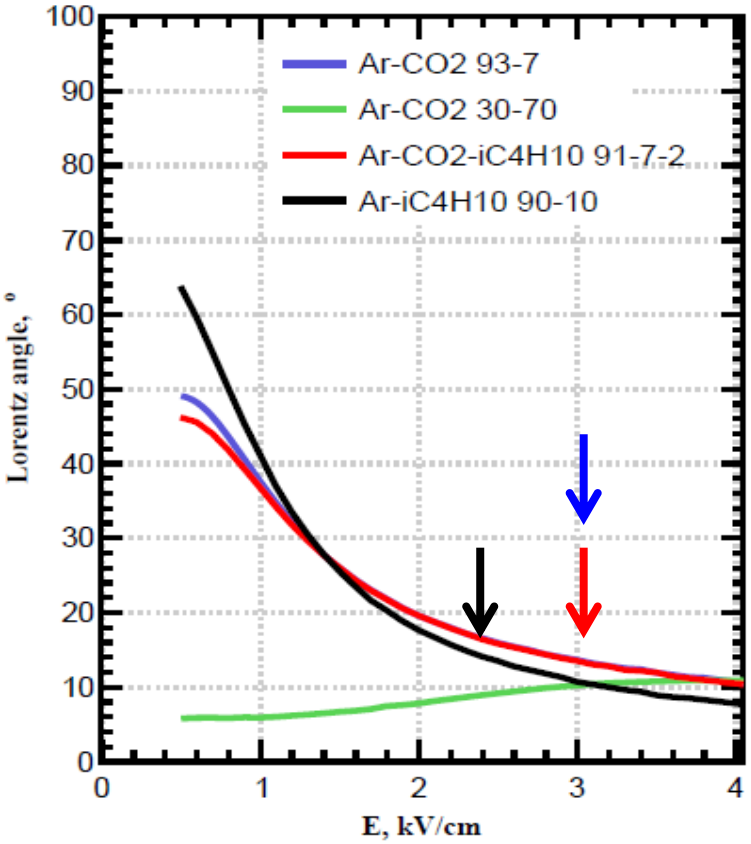
Detector&gas requirements

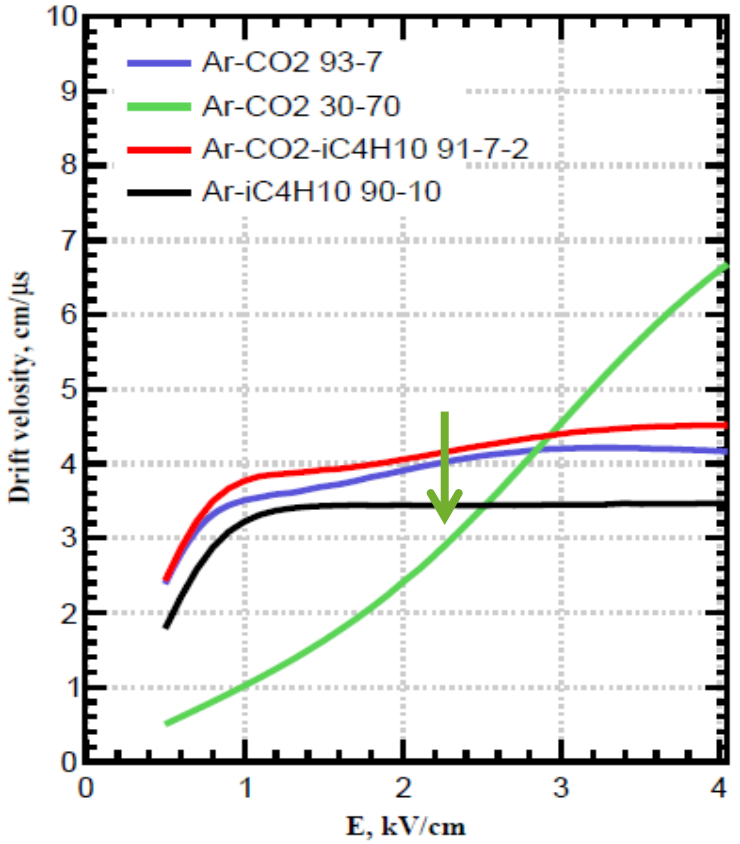
- Stable operation with gas gain $G = 10^4$
- Lorentz angle $\sim 15^o$@B=1T or smaller
- Electron drift time ~100 ns for 3 mm gap, ion collection time within 200 ns

Prototypes&gases test results

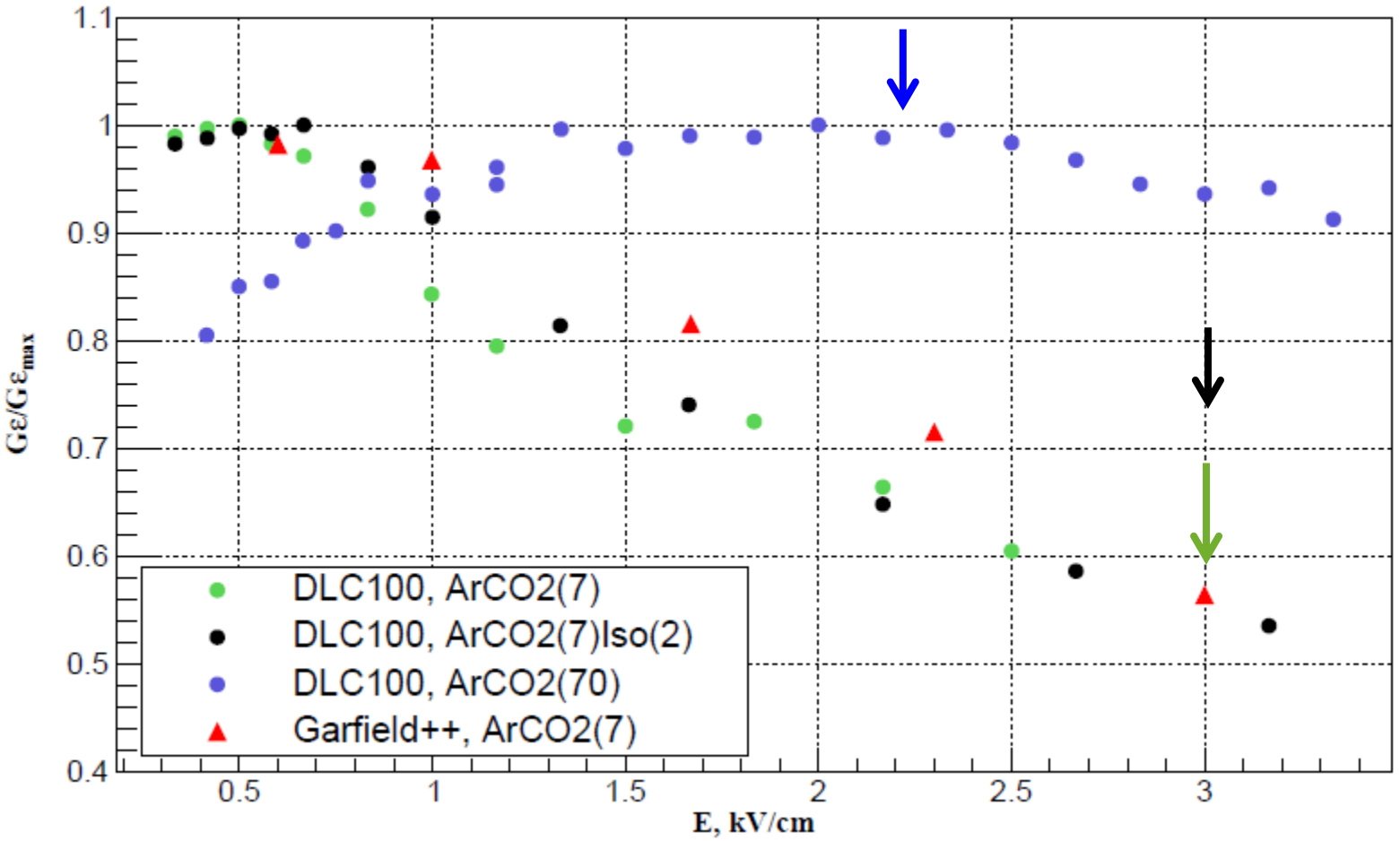


Drift field requirements





Prototypes&gases test results(2)



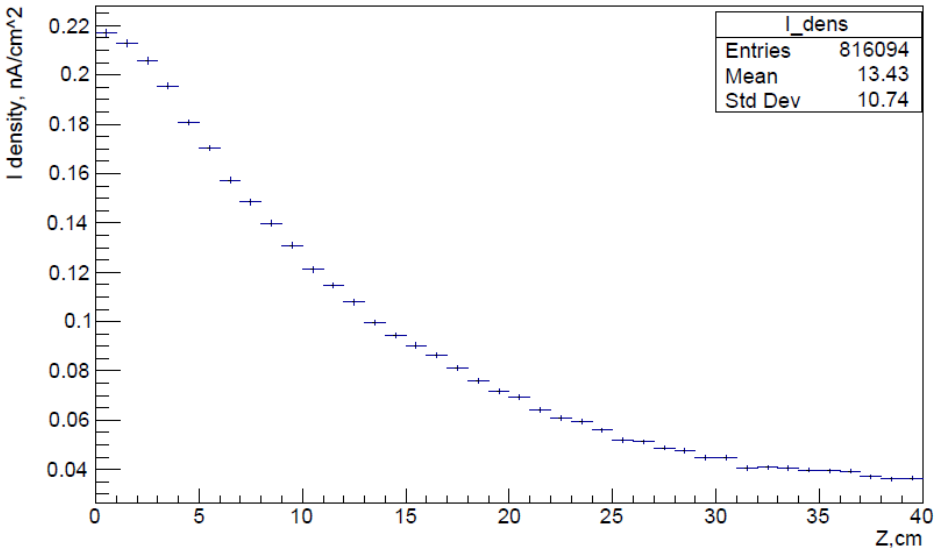
Prototypes&gases test results(2)

Gas mixtures Ar-CO_2-C_4H_{10}	Max gain, $\times 10^4$	Edrift kV/cm	Mesh transp.	$G\varepsilon$	$N_{cl}\varepsilon$
93-7-0	1.5	3	0.57	0.85	4,4
91-7-2	3.5	3	0.63	2.2	4,8
30-70-0	1.6	2.2	0.95	1.5	8.8
23-75-2	bad				
90-0-10	?	2.5	0.8	?	6.8

- Ar-iC4H10 mixtures must be tested to choose best one

Resistance of DLC coating

- Voltage drop was estimated semi-analytically, using next: approximation
  - Gas gain G=10^4 , primary ionization is defined by track angle, particle type and momentum
  - Current density is uniform and is equal to maximum current obtained by simulation



$$\Delta U = \frac{1}{8}\pi^2 R^2 j \rho_{sq}$$

$$\Delta U[V] \approx 7 \times 10^{-3} \rho_{sq}[M\Omega]$$

Few tens of MΩ is OK!

Beamtest in CERN(July, October)

- StrawTracker team offer us to test MM prototypes in real beam condition in July and October

- We plan to produce 3 new resistive MM, 0.45mm and 0.6mm pitch combined in 1 chamber to check space resolution vs strip pitch.

- PCB is ordered. If all will going smooth, we have a chance to prepare MM before mid of July.

Bended prototype preparation

- For bending MM must have very low mesh tension, standard mesh tensioning machine do not fit the requirements
- Drawing of special tensioning machine is prepared by JINR engineering office, parts and materials are prepared, production will start soon
- We hope to build 1st bended MM prototype end of this year