



WG1 Task2

New structures, new designs,
new geometries

P. Colas

Digging in new ideas

- New materials (resistive for various applications, meshes, transparent conductors, etc...)
- New structures (double grid, MHSP for backflow suppression, μ PIC+mesh)
- New « details » : hole size, rims
- Welcome to newcomer from VECC Kolkata

R & D with GEMs and THGEMs at VECC, Kolkata

Anand Kumar Dubey

(for the VECC Group, S. Chattopadhyay et al.)

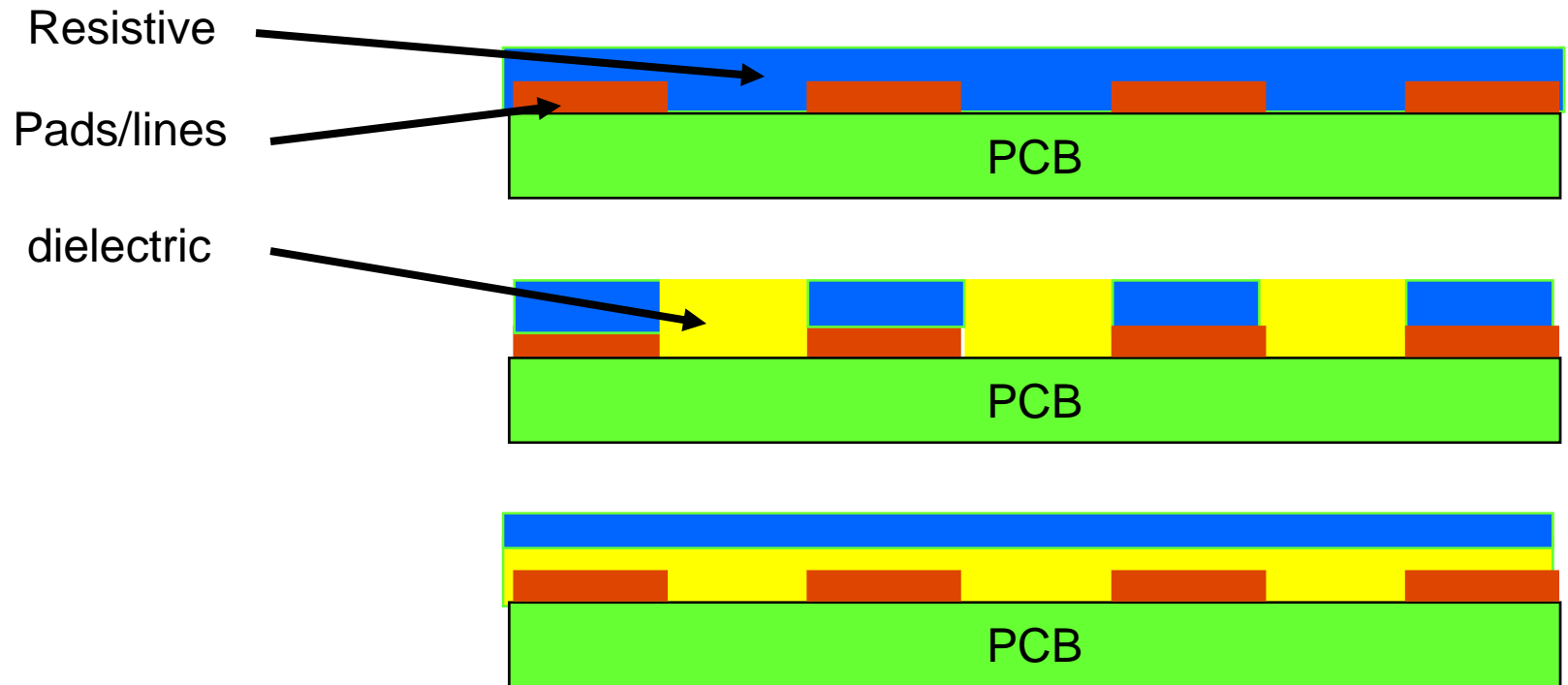
Compact Baryonic Matter muon chambers main issues:

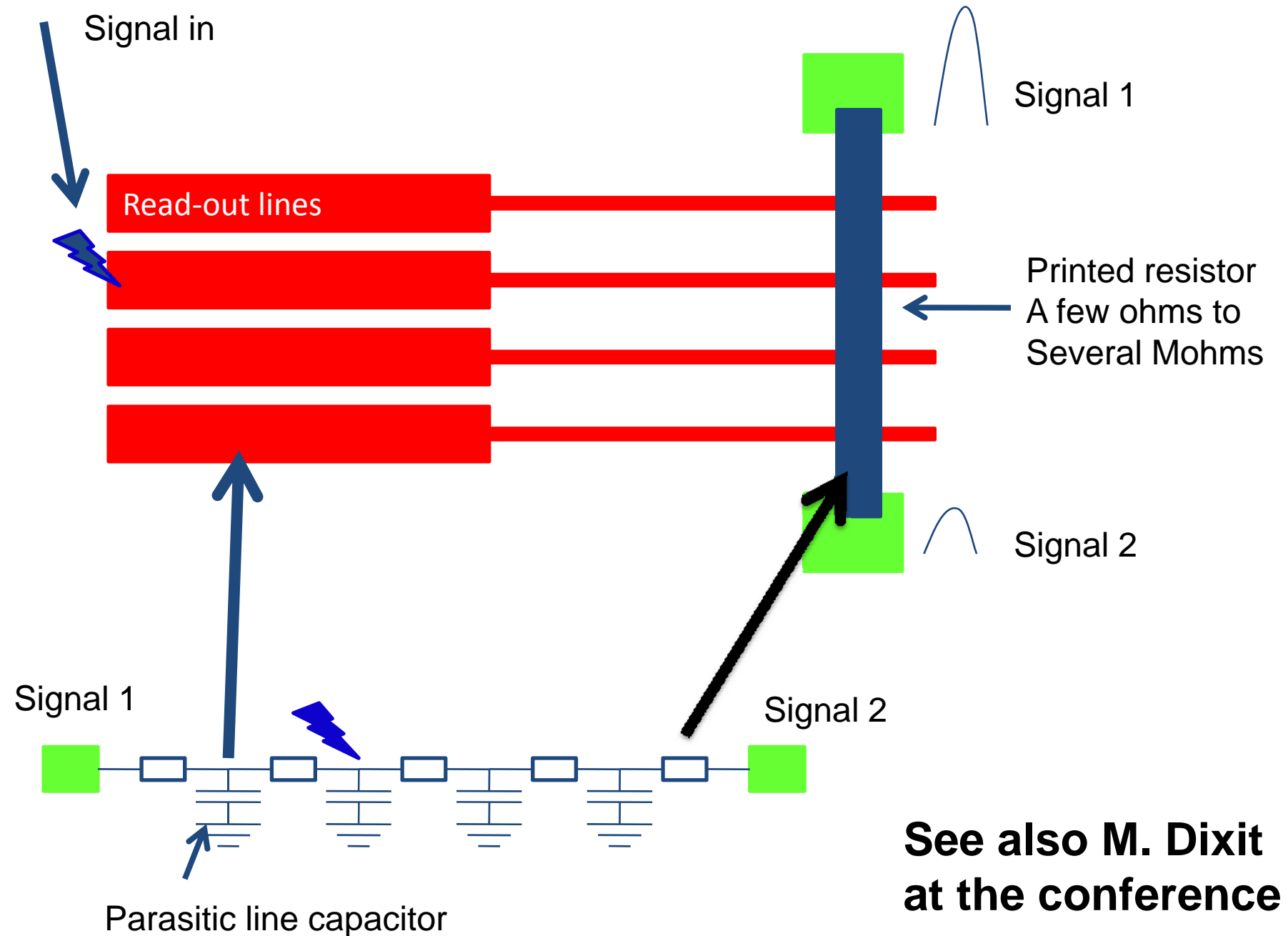
- The first plane(s) has a high density of tracks
detector should be able to cope up high
rate. $\sim 10 \text{ MHz/cm}^2$
- good position resolution
- Should be radiation resistant
- Large area detector – modular arrangement
- Should be cost effective (INDIA GOOD AT THIS)

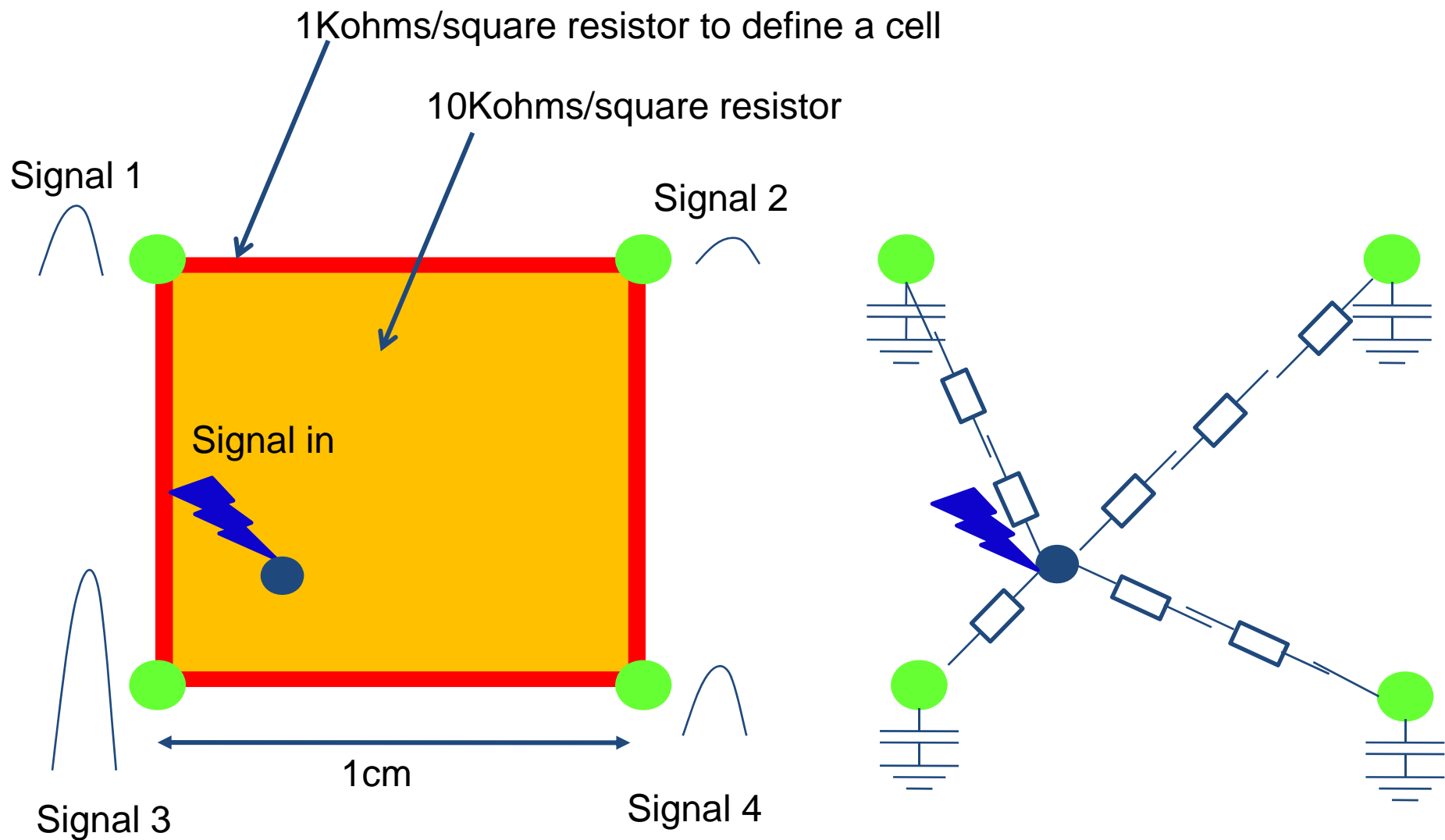
**suitable option → micropattern gas detectors
GEMs, THGEM, micromegas**

ALSO medical imaging

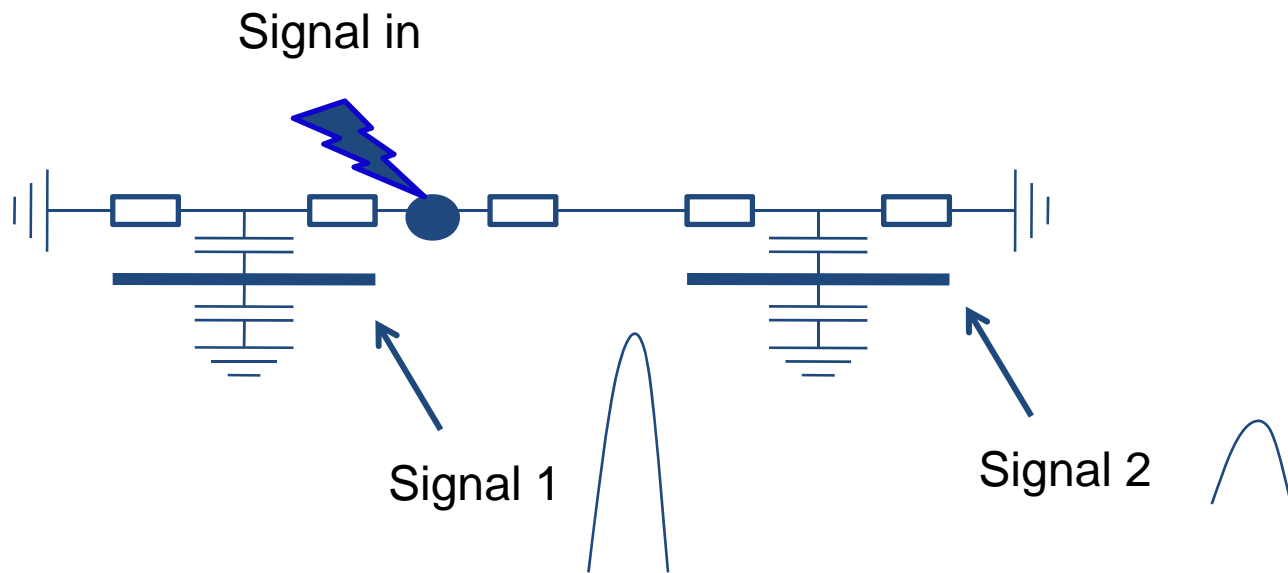
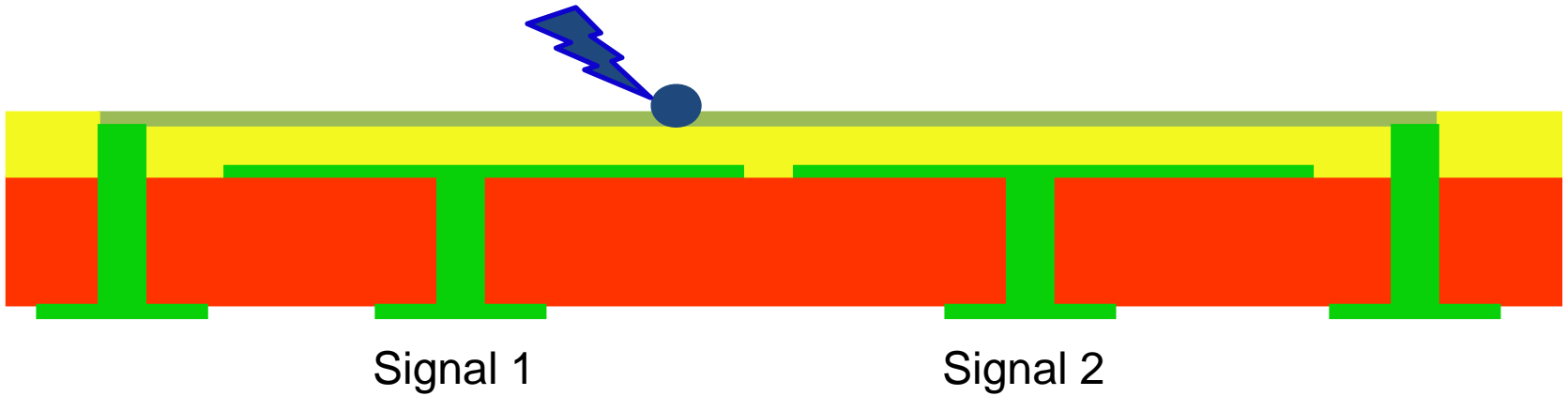
Spark protection





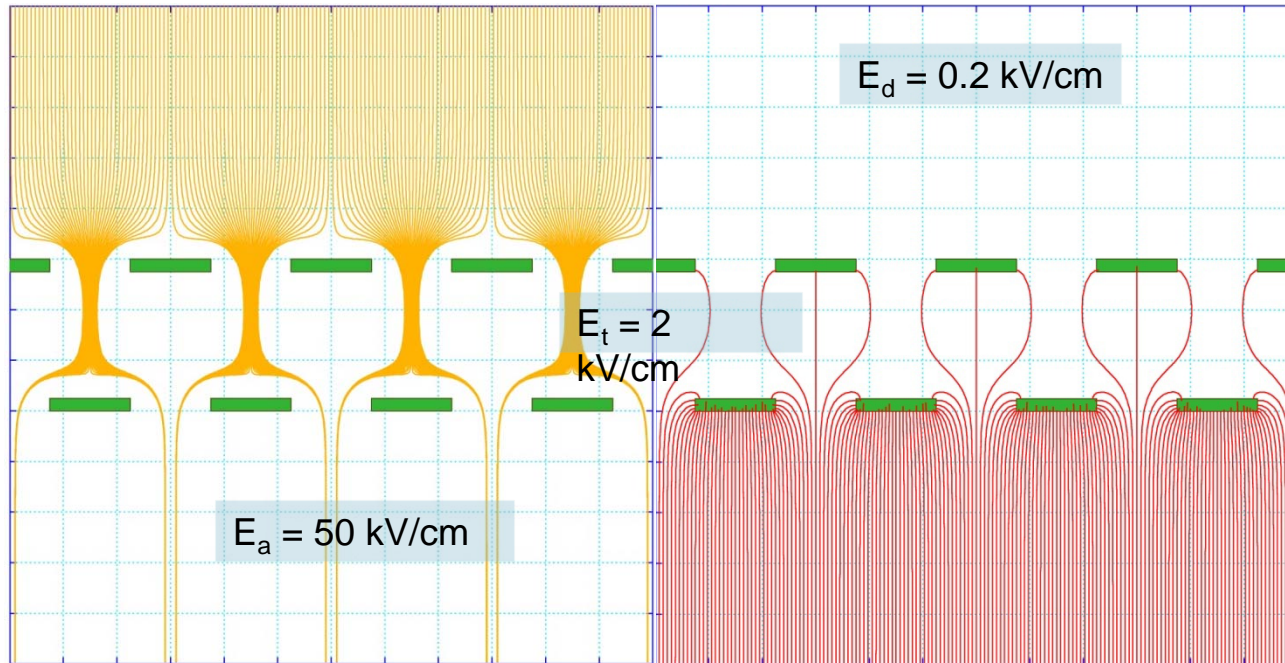


Nuclear instruments and Methods in Physics Research A 523 (2004) 287-301

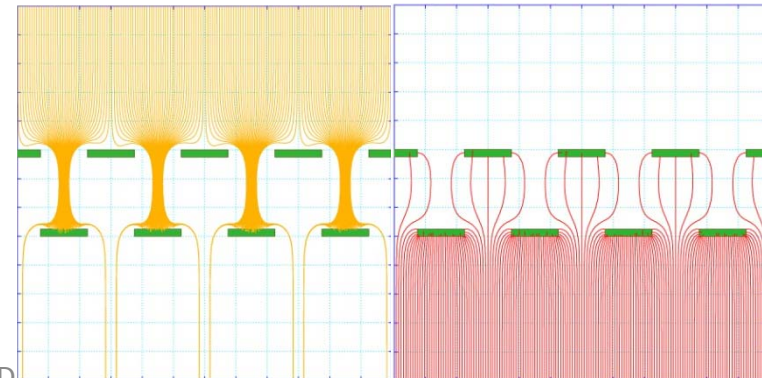


- Exploring all these possibilities is very promising for many applications.
- Example: make a detector faster by cutting out the ion tail (using the RC circuit as a filter)

Ion gating with a double-mesh device

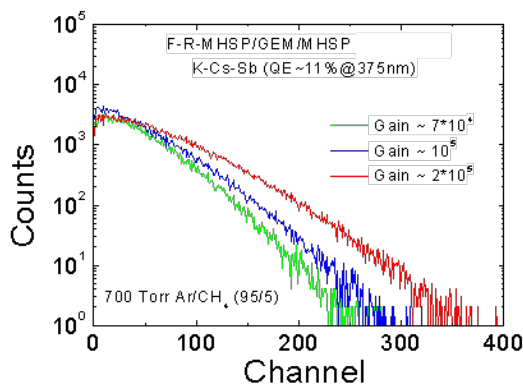
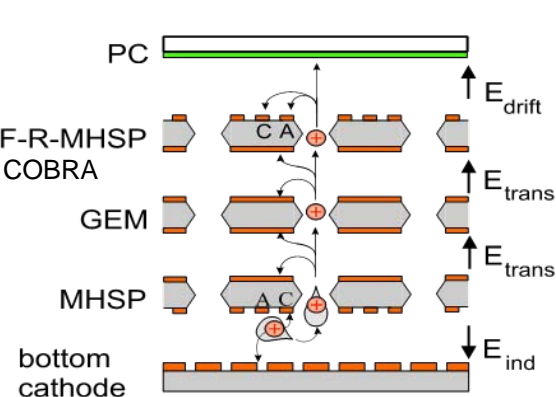


- Aim : gate the ion drift lines escaping the amplification gap
- Transparency depends on the field ratio



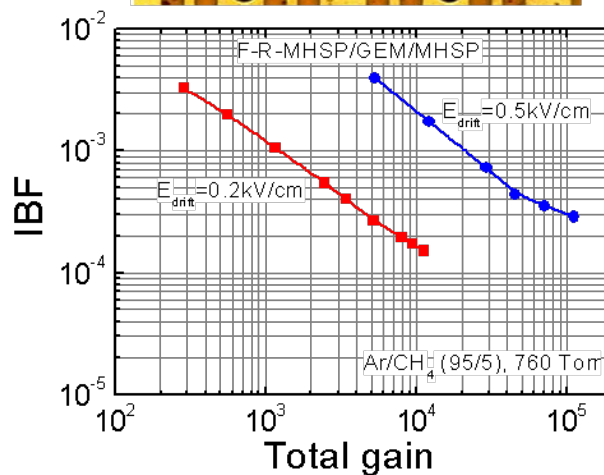
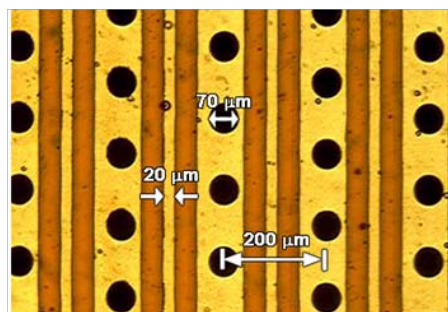
IBF Achievements with MHSP and COBRA

- Achievements with the F-R-MHSP shows IBF level needed for visible sensitive GPM.
- Also with COBRA, but this one with limited collection efficiency.



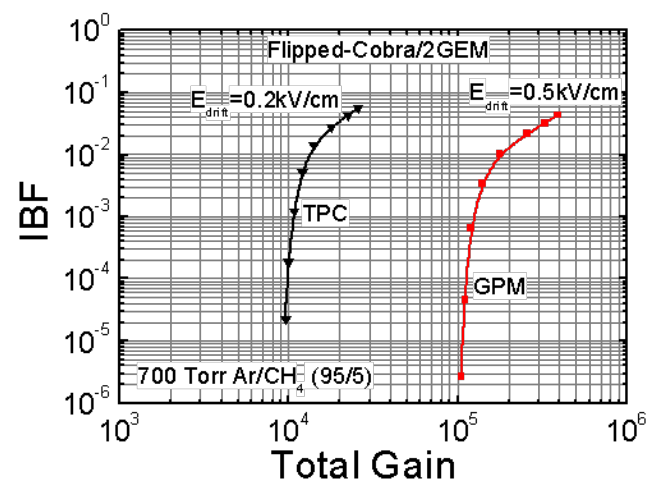
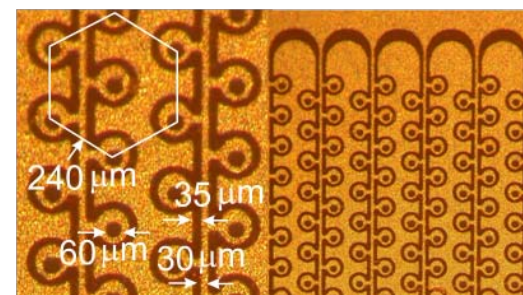
A. Lyashenko et al., NIMA 598(2008)116
 A. Lyashenko et al., NIMA JINST(2009), in press

MHSP



IBF close to 10^{-4}
 Full ECE

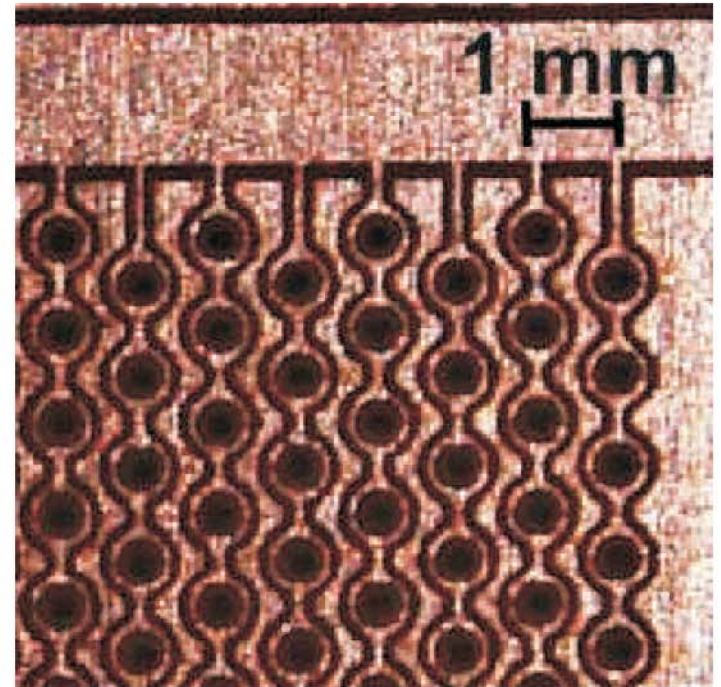
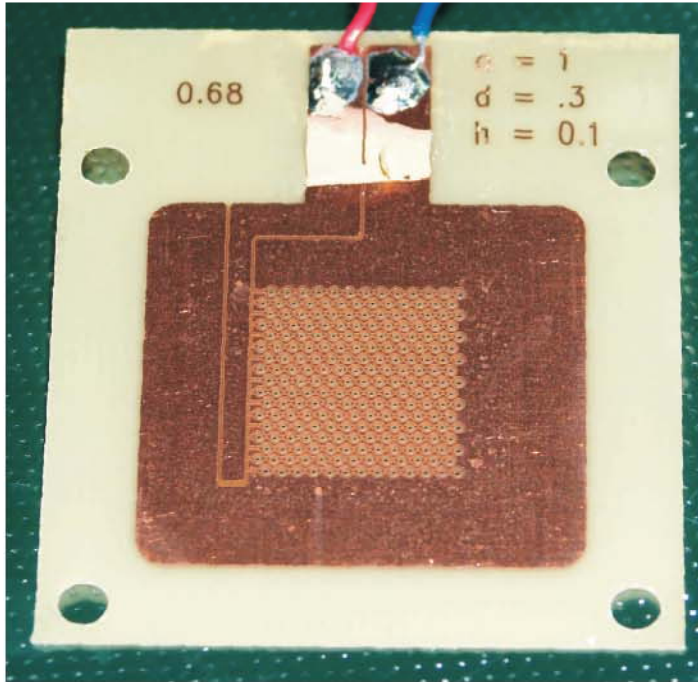
COBRA



IBF 1000 x lower than with GEMs
 At the expense of ECE (20%)

Thick-MHSP Structure – large areas

- In order to apply the same principle, it was produced a new Thick-structure with the goal of reduce IBF in cascade Thick-structures.
- Same principle of Thick-GEM production....



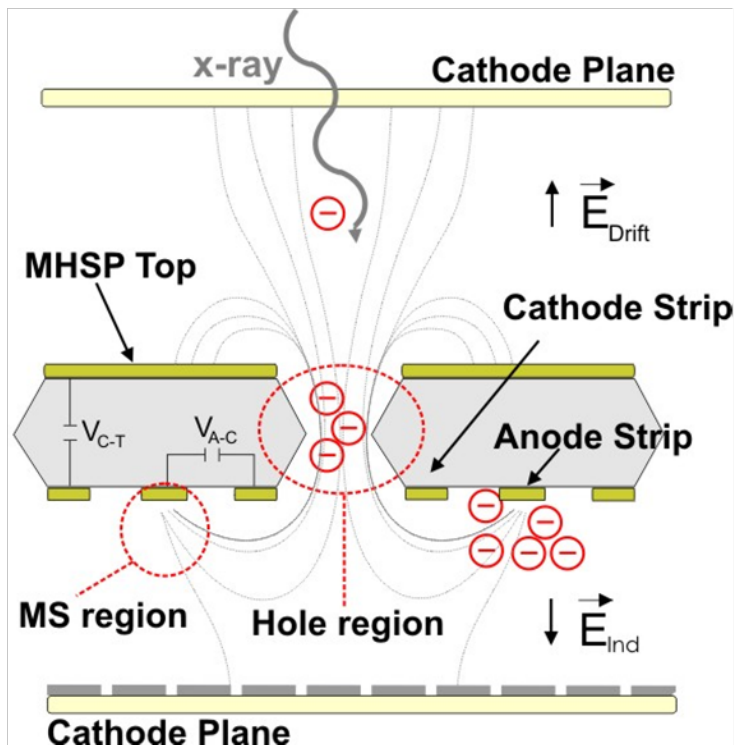
- Cathodes “strips” with a circular shape surrounding the holes;
- holes (0.3 mm diameter with a 0.1 mm rim), are placed in an hexagonal lattice with a pitch of 1.0 mm;
- anodes (0.3 mm wide), running between each pair of cathodes.

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Thick-MHSP

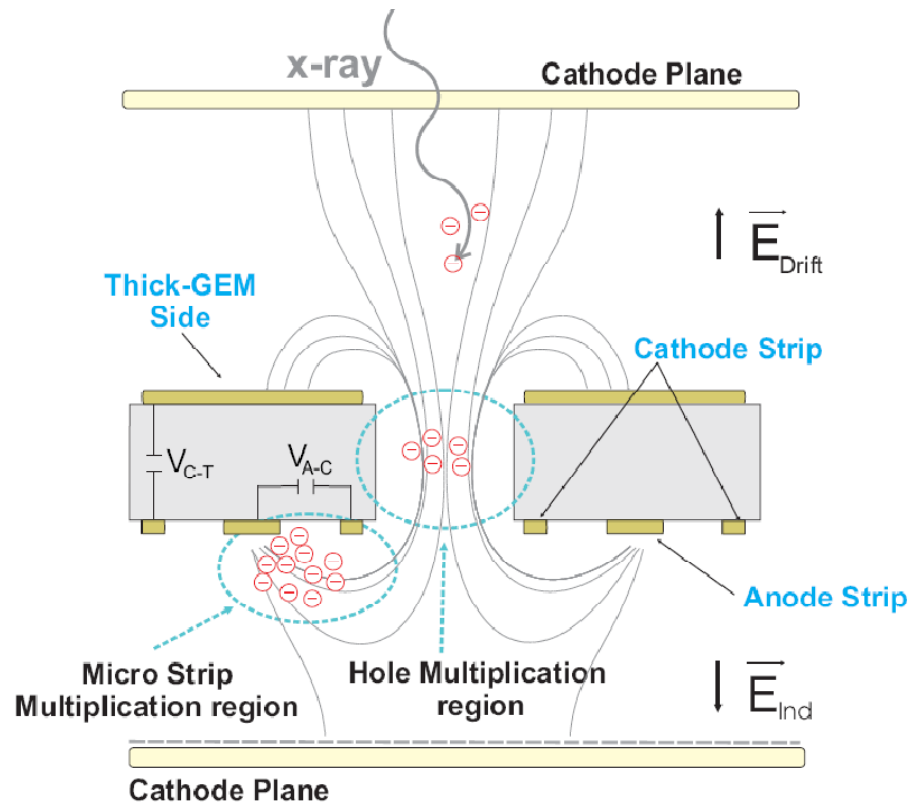
- Before starting IBF studies we have polarized the structure like in a MHSP standard operation.
- Polarization scheme similar to MHSP

MHSP



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Thick-MHSP



Both, experimental and simulation results are in course

GAIN

- Good gas gains, good single photon detection.
- More studies are needed for better understanding the avalanche development and the resulting gain increase when polarizing the extra electrode.

IBF

- GPMs operating in Thick-GEM cascades: semitransparent or reflective PCs.
- Experimental studies of:
 - IBF,
 - collection efficiency and;
 - gain.

Using the Th-structure in reverse mode or flipped reverse mode are in course.

- Preliminary simulation studies indicates that good IBF reduction could be possible.
- Depending on the results for IBF, this structure will allow to increase the lifetime of this photodetectors in the same order of magnitude as the out-coming results for the IBF reduction.

Thanks for your attention

