Jing Dong

some past background…

PhD (Dec.2009)

cooperatively trained by Lanzhou University and Institute of High Energy Physics, Chinese Academy of Sciences

The Study of Two-dimensional Position Sensitive X-ray Gas Electron Multiplier

P.R.C nationality

Present status:

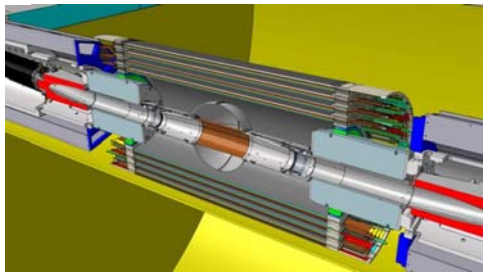
ITN Marie Curie fellow@ INFN LNF, Frascati, Italy

Started at: 8th Dec.2009:

P4:Micro Pattern Gas Detector

Supervisor:Giovanni Bencivenni

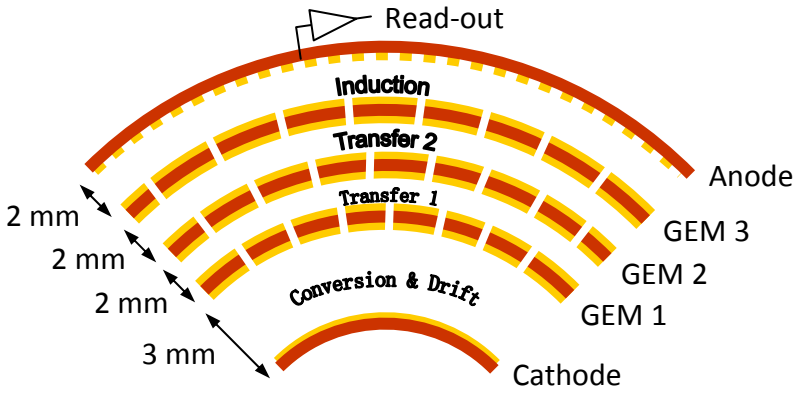
Development of large area GEM detectors for the KLOE2 upgrade



- **Innovative technology: cylindrical GEM for the Inner Tracker of the KLOE2 experiment** (5 cylindrical electrodes with very low mass)
- **Preparation of large area GEM electrodes** (> 700 mm active length) **with splicing technology**
- **Extremely low mass system** (1.5% total radiation length) **in the active region with Carbon Fiber supports**

Fall-outs of this new technology in several areas (High Energy Physics, medical, radiation monitoring, etc…)

Cylindrical Triple GEM



The activity:
(done as defined in P4 description)

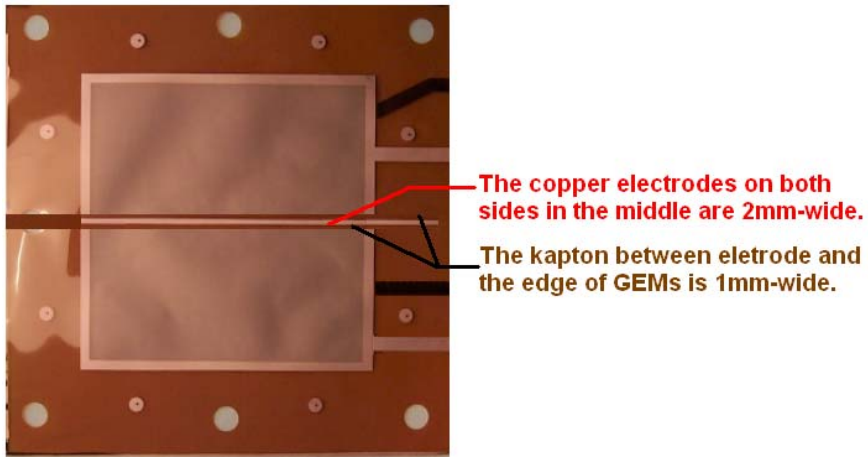
- Construction and test of the large area planar GEM (300×700mm^2) with a source, to study the pre-production of the large area GEM foils.
- Test of the detection efficiency and performance around gluing region of the GEM foil.
- Mechanics studies: Participation to these studies aiming to finalize the CGEM project including the structure of cathode and embedded anode and simulation of the construction of Inner Tracker.

- Milestones: First layer C-GEM available in Dec.2010.

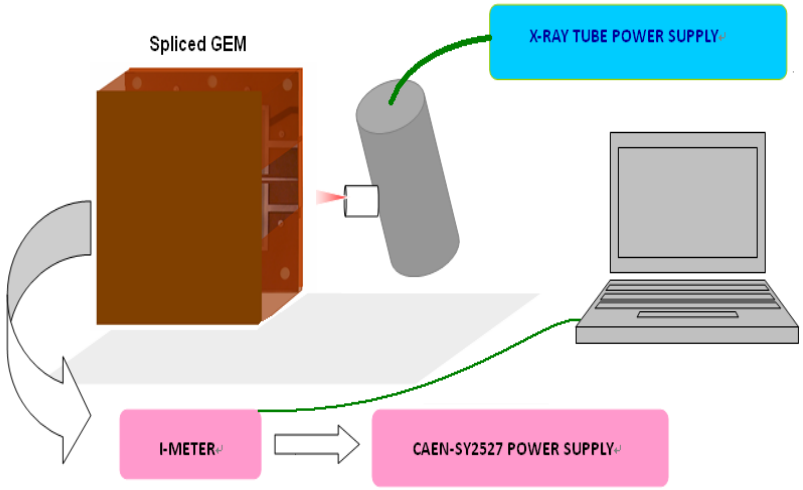
  Deliverables: Analysis of C-GEM beam test in Aug.2011 and Technology assessment report of C-GEM in Sep.2011.

Test of Spliced single-GEM(1)

- The study of the performance around gluing region of the GEM foil is dedicated to realize the possibility of large sensitive area detector without dead zone.
- A single-GEM(100*100mm^2) was constructed with a spliced GEM foil which gluing zone in the middle.



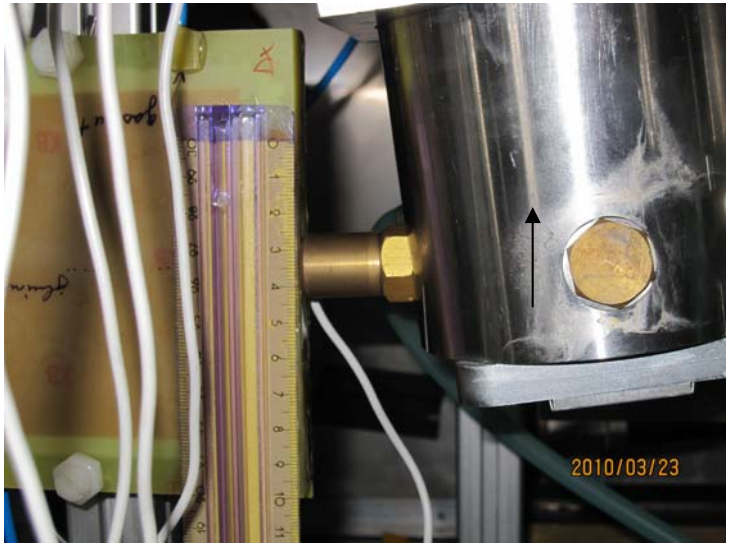
a spliced GEM foil

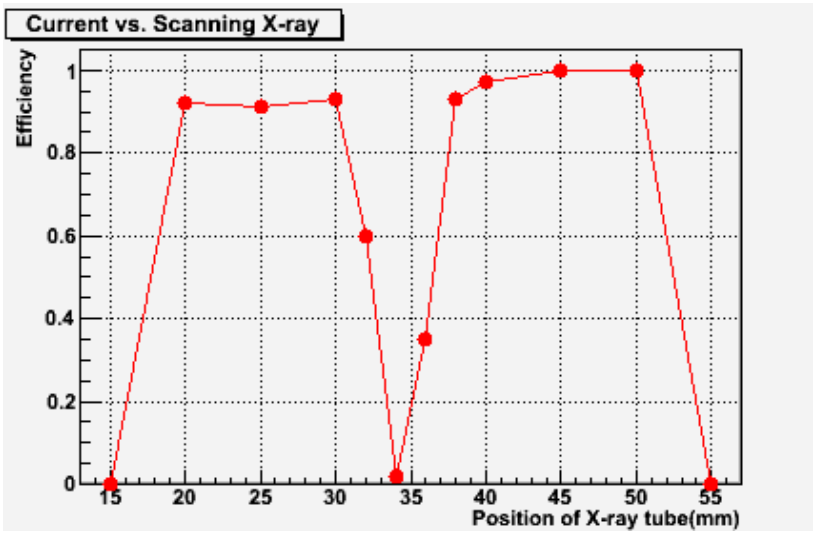


Scan the X-ray paralleled to gluing region

Test of Spliced single-GEM(2)

This measurement, performed with X-Ray (w/collimator of 1 mm diam.), is aiming to check the efficiency around the gluing region.

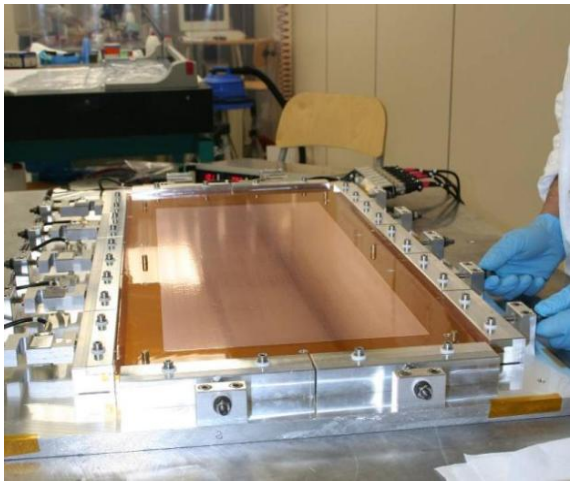


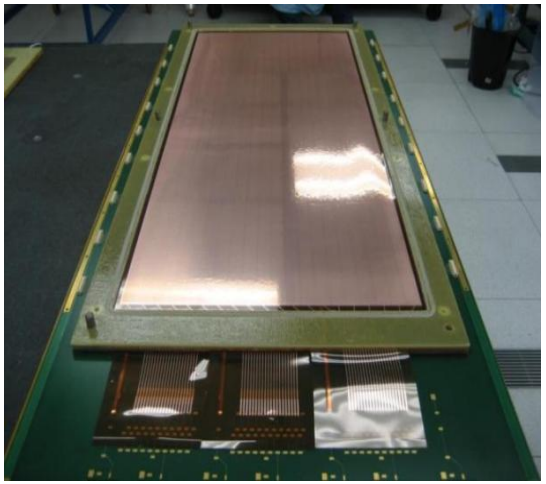


Of course with ionization tracks the efficiency will be higher.

Large area planar GEMs(1)

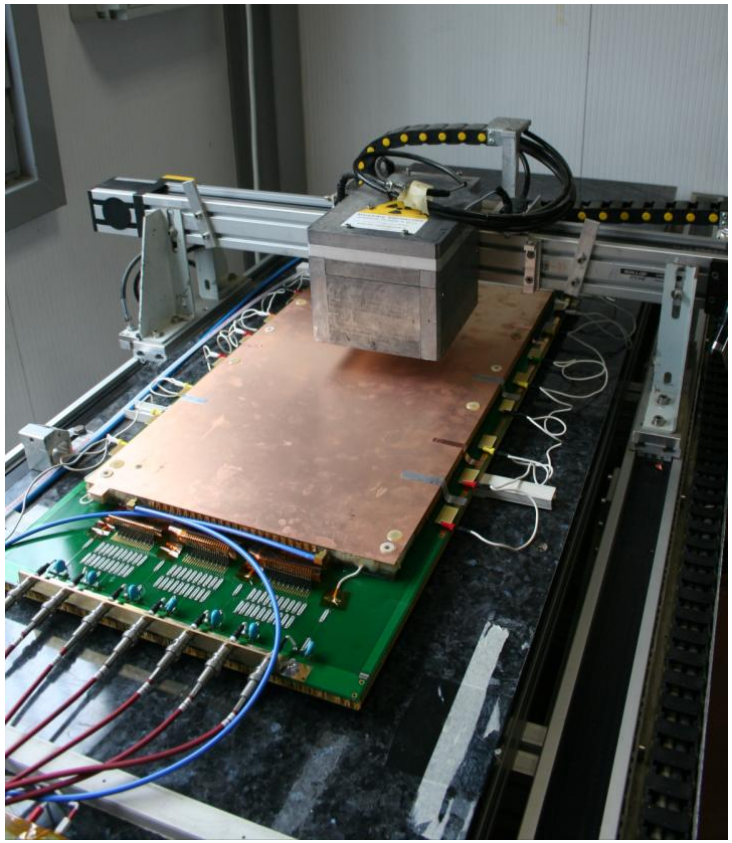
- Same dimensions for the cylindrical Inner Tracker
- Two prototypes with large area GEMs (300×700mm^2)
- One is assembled with the final XV readout, equipped with the 64 channels FEE and will be tested on the cern PS beam in October,2010 ;
- The other was tested in current mode showing good stability, uniformity and a gain ~25% lower than double-mask GEM.





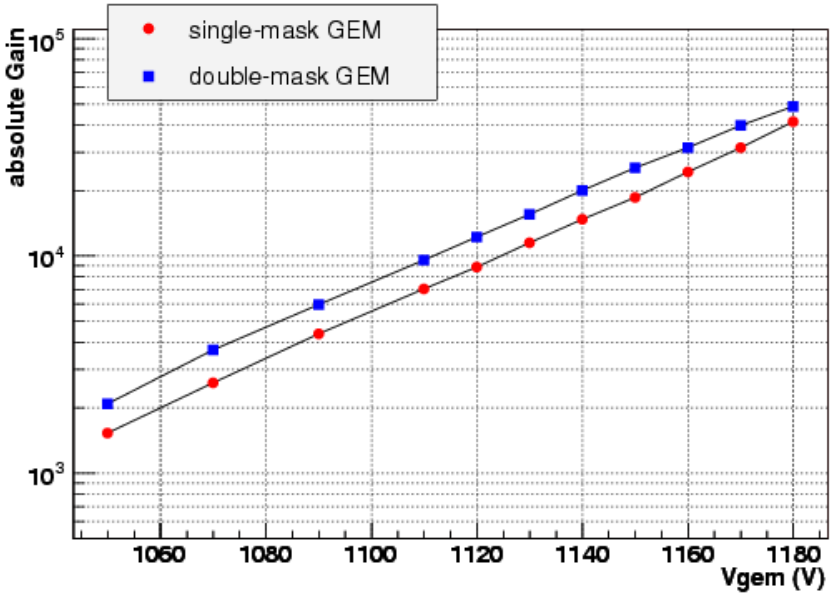
Large area planar GEMs(2)

Test with 137Cs gamma source



•Only ~20 V increase in the operating voltage of a Triple-GEM to reach same gain

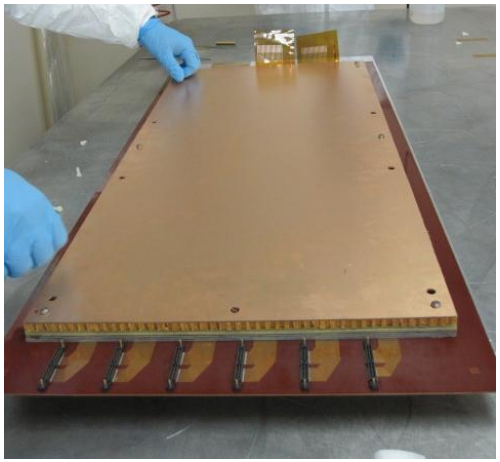
• NO discharge observed up to 40000 gain



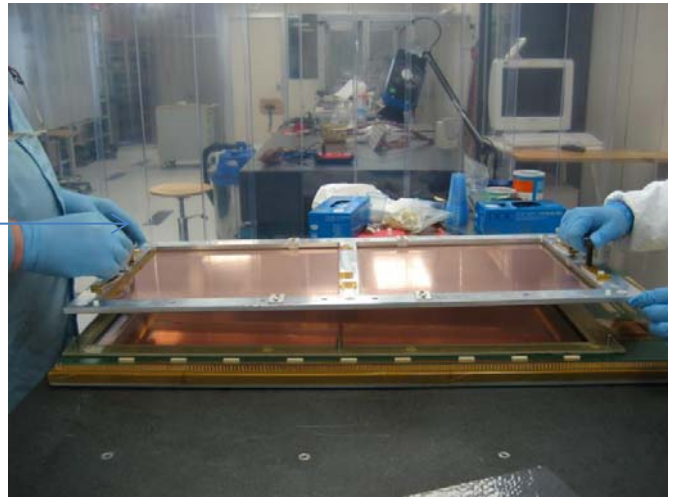
Very stable operation

Large area planar GEMs(3)

- During this work, the expertise in large area GEM was complemented.



Assembling of the triple-GEM chamber (GEM foils are mounted on removable stiffener to keep tension)



Overview - Training

- 30/11-04/12/2009:The National Seminar on Innovative Detectors , INFN-LNF,Italy (before start of contract)
- 30/01-02/02/2010:2nd MC-PAD Network Training Event, DESY, Germany
- 07-10/06/2010:12th Topical Seminar on Innovative Particle and Radiation detectors, Siena, Italy
- 01-07/07/2010:Marie Curie event, ESOF 2010 Euro Science Open Forum, Turin, Italy
- regularly attend KLOE-2 collaboration meetings (typically one meeting every two weeks)
- Use of Garfield code to simulate basic GEM cell.
- Root (self-study)

Overview - Results

- Poster presented at the Marie Curie Satellite Event
- Abstract accepted for a talk to be presented in IEEE NPSS Science Symposium 2010, Knoxville, USA (30/10-6/11/2010)
- Aiming for a peer-reviewed publication once some physics results are available

Conclusion and next steps

- KLOE-2 and the Cylindrical-GEM project are approaching steadily the finalization.
- Participation to the construction and test of the first layer of the inner tracker.
- Two planar prototypes with 300x700 mm2 foils have been built which showed in current mode good stability, uniformity and a gain ~25% lower than double-mask GEM.
- The study of the final XV strip readout configuration will be performed at the T9-PS beam CERN facility with a telescope composed by small, 10x10cm^2, planar GEMs and one large area planar GEM equipped with the 64 channels ASIC FEE.