SMALL SIZE GEM DETECTOR ASSEMBLY

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Detector as described in
A. Bressan et al, Nucl. Instr. and Meth. A425(1999)262

The assembly consists of two parts: a main composite box including the readout printed circuit board and HV feedthrough ang the gas inlet (Figs. 1 and 2), and a roof (not shown) with the drift plane and gas outlet. GEM electrodes, mounted on individual frames, can be piled up over the readout plane using insulating pins and spacers.
Fig, 3 shows a raw GEM foil; the active area is 100x100 mm^2, with a 4 mm wide metal strip around edges and two contact leads on opposite sides; the kapton foil outer dimensions are about 150x150 mm^2. Holes in the foil can be used for positioning during framing.
Fig. 4 is the schematic of a thin (0.5 mm thick) fibreglass frame used to mount GEMs. To avoid warping, two frames are glued symmetricaly on each side of the GEM foil, pre-stretched and cut to size after gluing. A framed GEM ready for mounting within the box is shown in Fig. 5.
Fig. 6 is a close-up picture of a GEM, and Figs. 7 and 8 electron microscope pictures at an angle and in section. The standard model is made on 50 µm thick kapton with 5 µm copper on each side. Holes are 70 µm in diameter at the metal sides, 50 µm diameter in the center of the kapton, in a triangular pattern with 140 µm distance between centers.

NOTE:
GEM foils are HV tested before and after framing (requred less than 5 nA at 500 V in dry air). All tests and manipulations should be done in clean room conditions (class 1000 minimum). Any contact with the active area should be avoided, including loading with hard surfaces.

More data on operation and a full list of publications can be found on our web site
www.cern.ch/GDD
Instructions on framing a GEM can be found on the Carleton web site
http://www.physics.carleton.ca/~karlen/gem/assembly/index.html

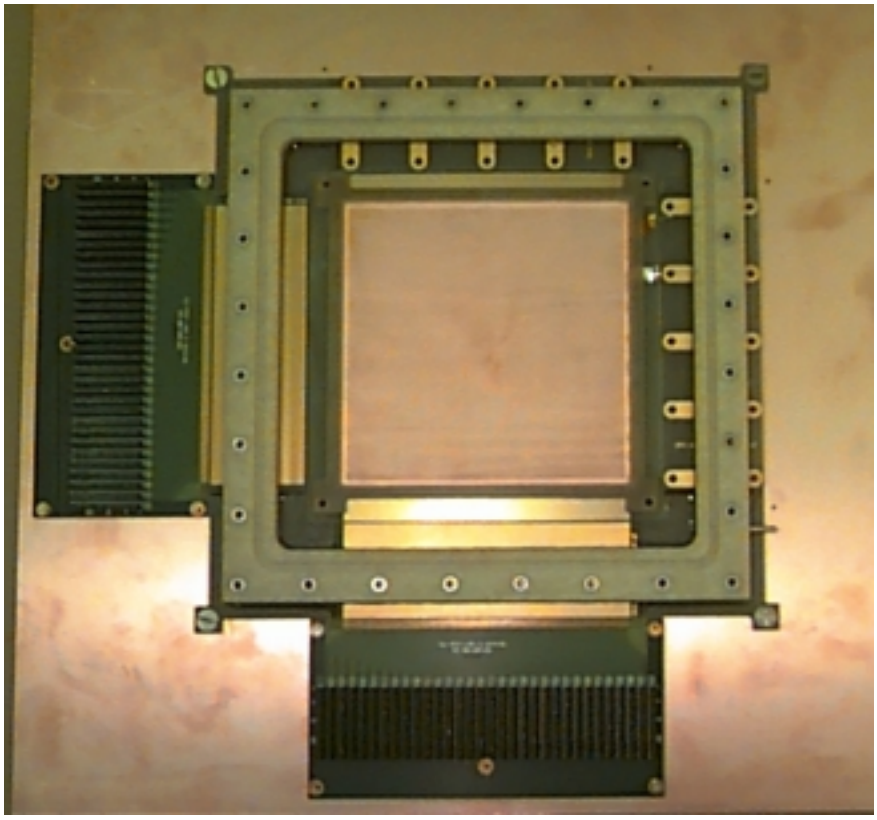


Fig. 1

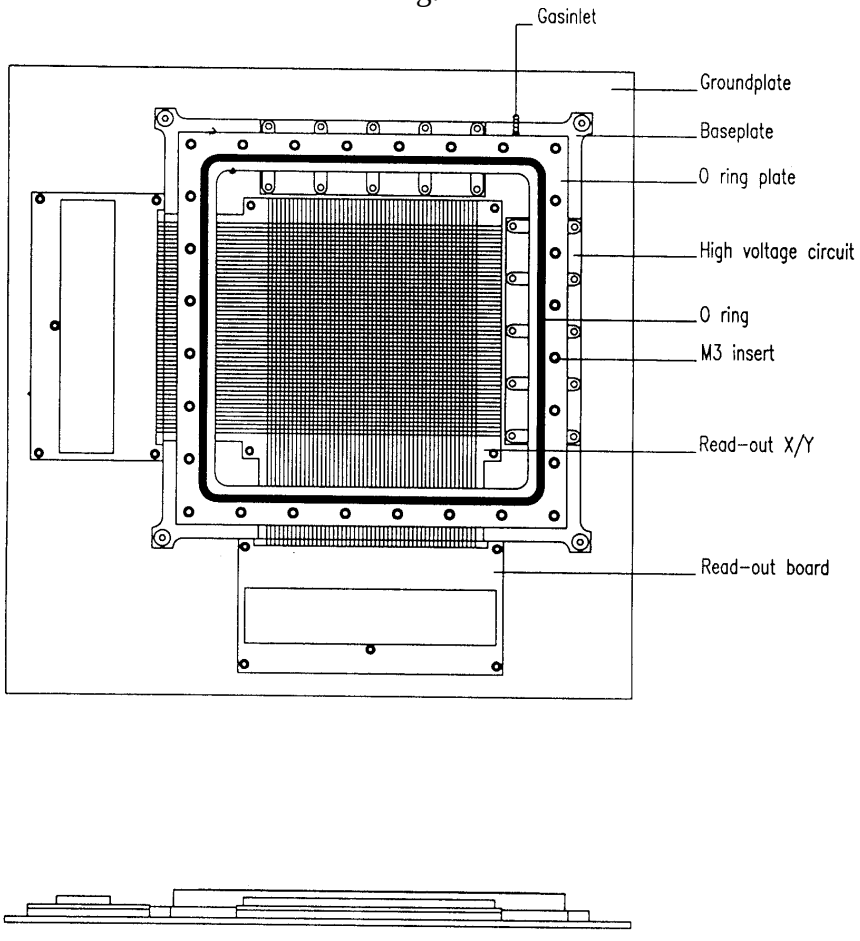

Gasinlet
Groundplate
Baseplate
O ring plate
High voltage circuit
O ring
M3 insert
Read-out X/Y
Read-out board

Fig. 2

Fig. 3

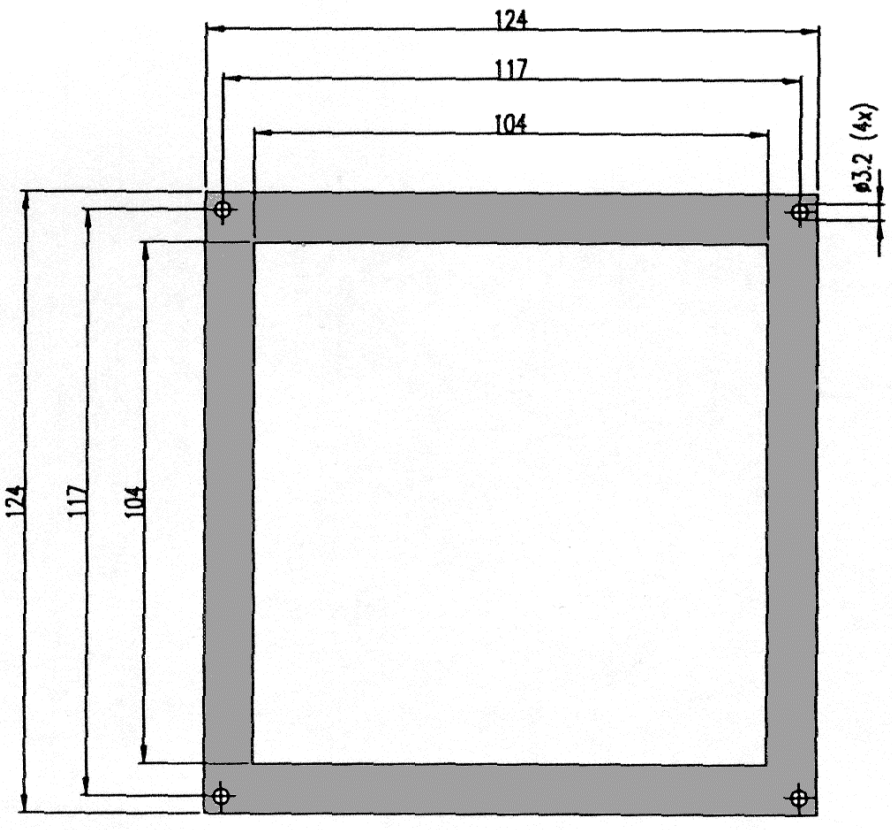


Fig. 4

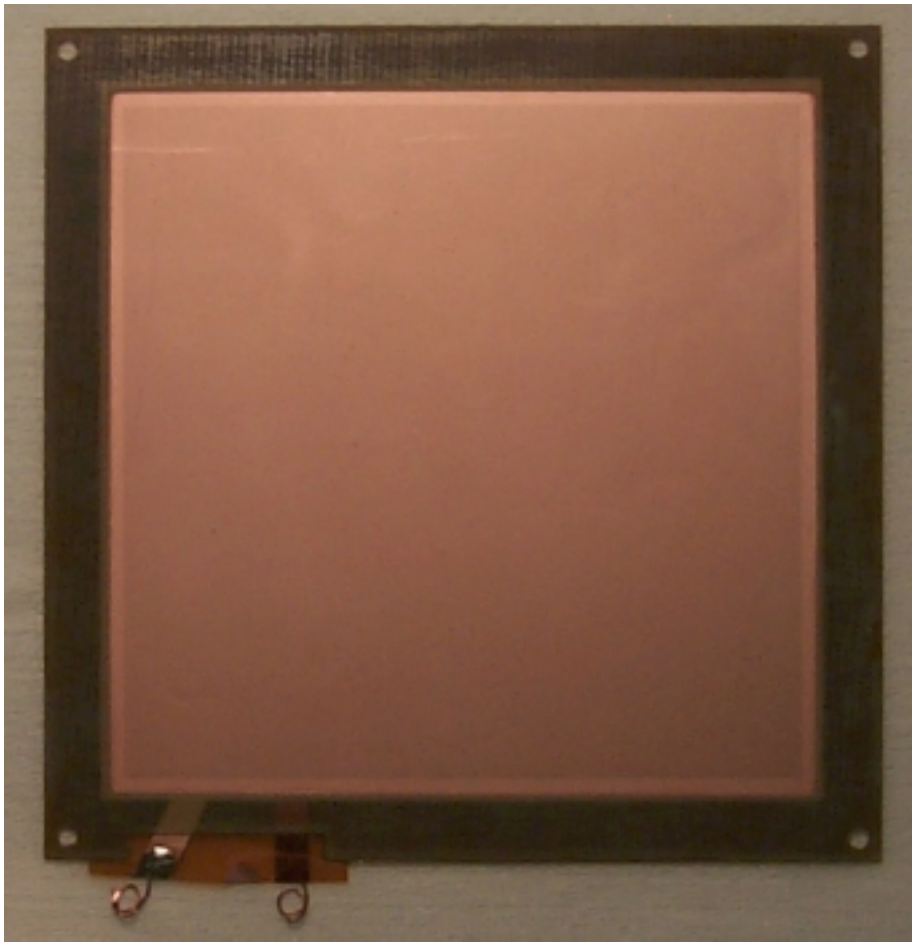


Fig. 5

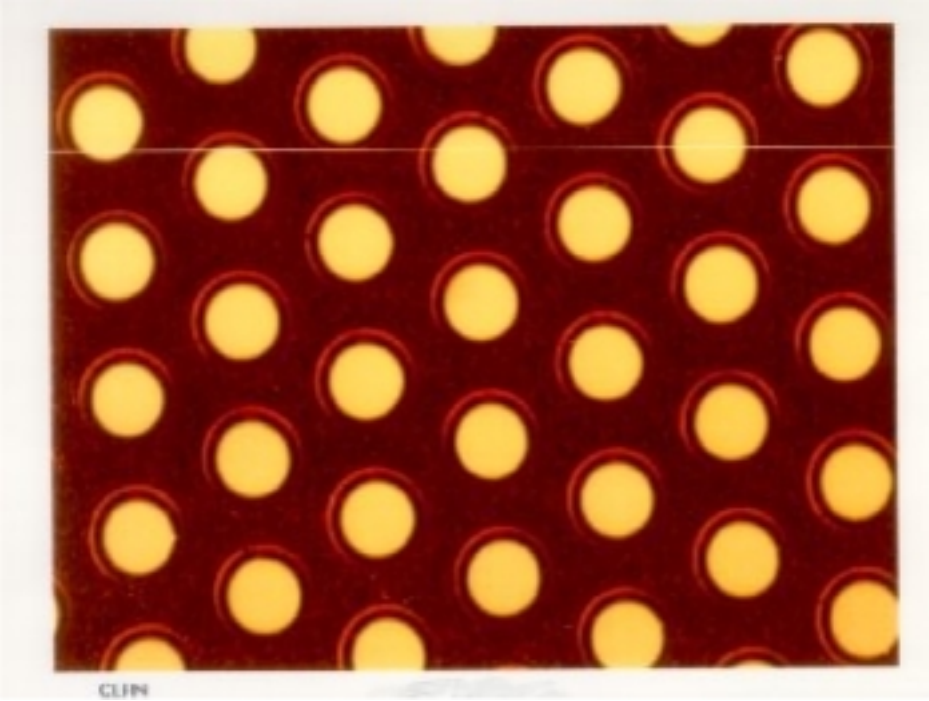
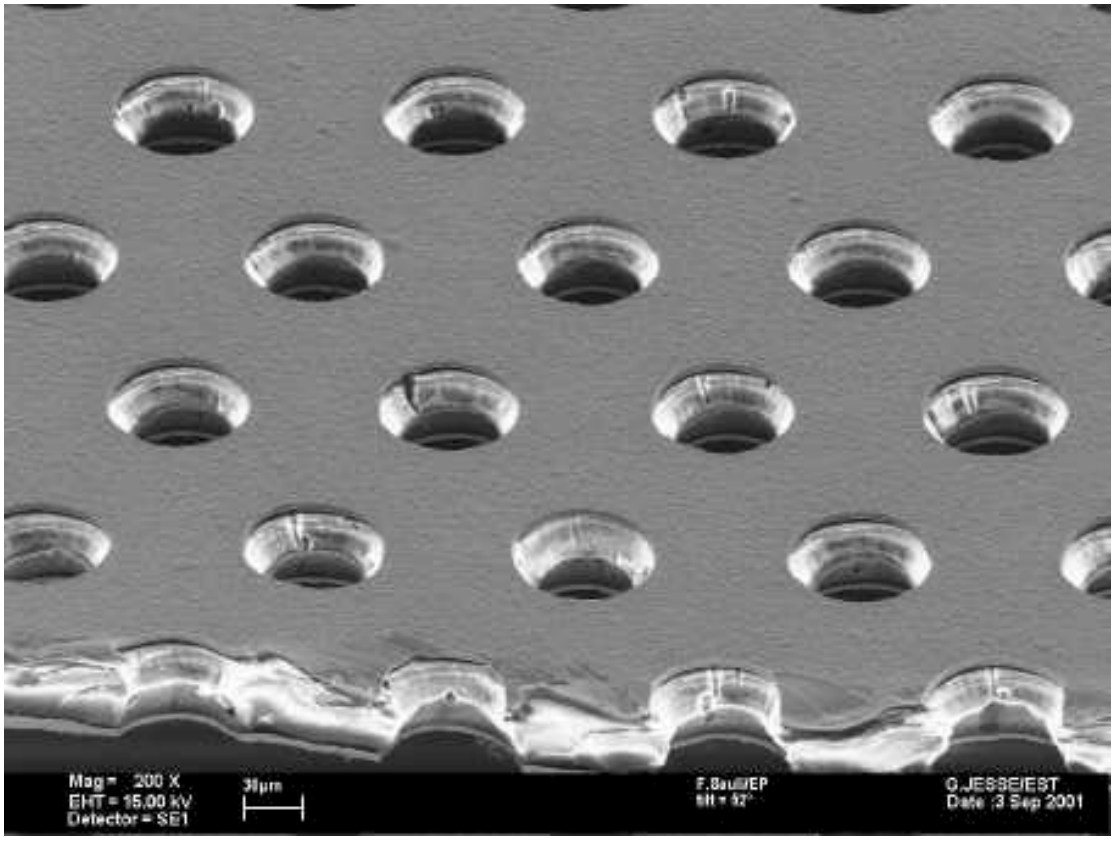
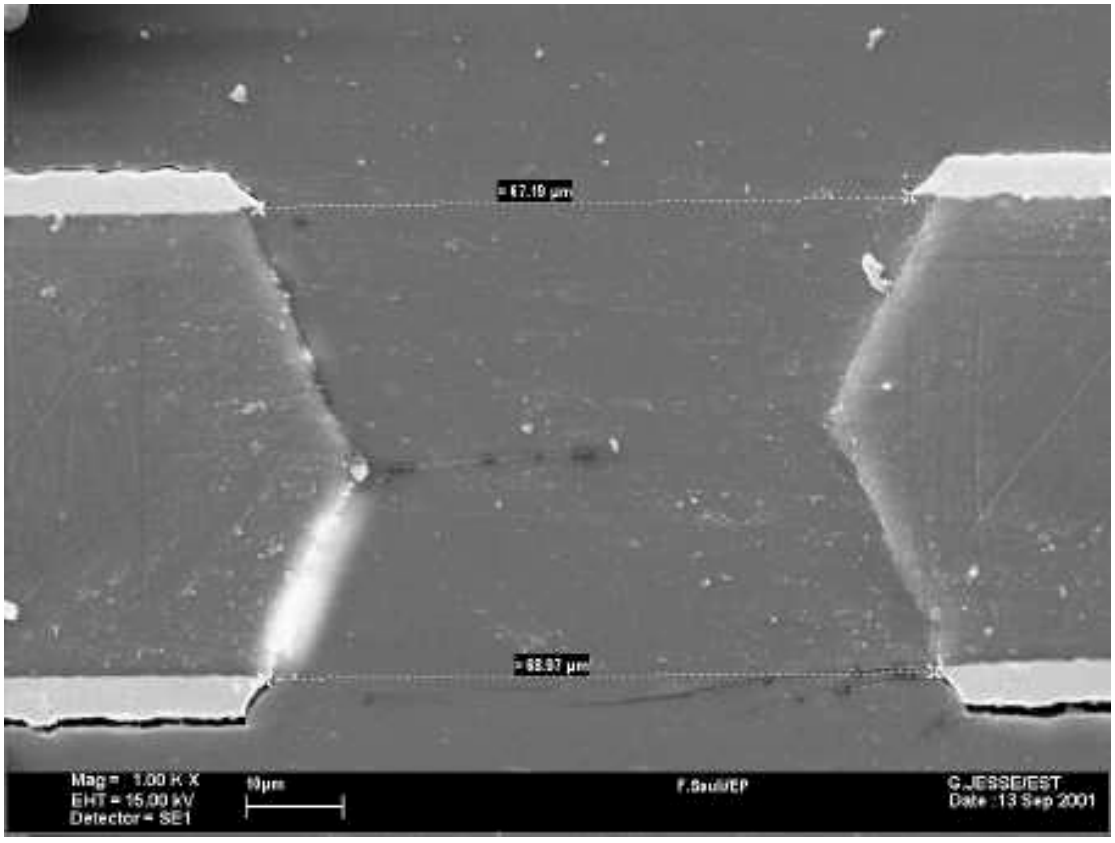


Fig. 6


Mag = 200 X
EHT = 15.00 kV
Detector = SE1
30µm
F.Saul/EP
tilt = 52°
G.JESSE/EST
Date :3 Sep 2001
Fig. 7


= 67.19 µm
= 68.97 µm
Mag = 1.00 K X
EHT = 15.00 kV
Detector = SE1
10µm
F.Saul/EP
G.JESSE/EST
Date :13 Sep 2001
Fig. 8