TECHTRA
TECHNOLOGY TRANSFER AGENCY

Production of GEM foils & GEM detectors at Techtra

Piotr Bielowka

RD51, CERN, March 2016

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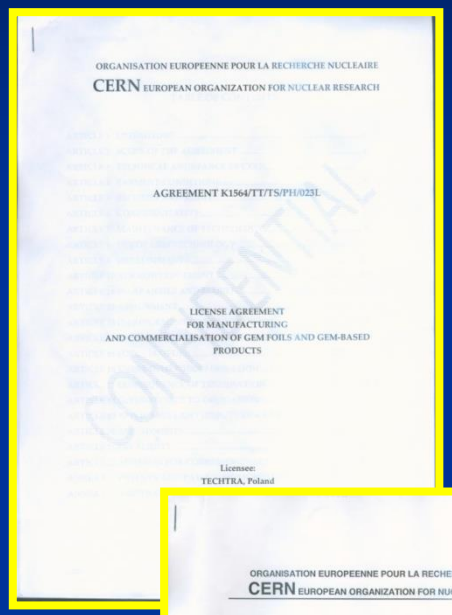
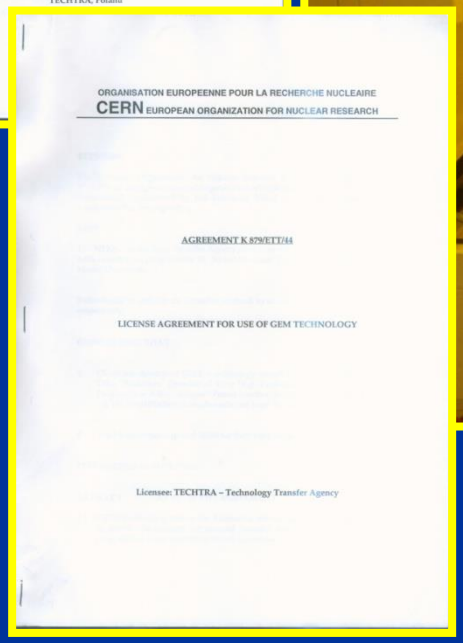
The begining: December 2002


ORGANISATION EUROPEENNE POUR LA RECHERCHE NUCLEAIRE
CERN EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH

AGREEMENT K1564/TT/TS/PH/023L

LICENSE AGREEMENT
FOR MANUFACTURING
AND COMMERCIALISATION OF GEM FOILS AND GEM-BASED
PRODUCTS

Licensee:
TECHTRA, Poland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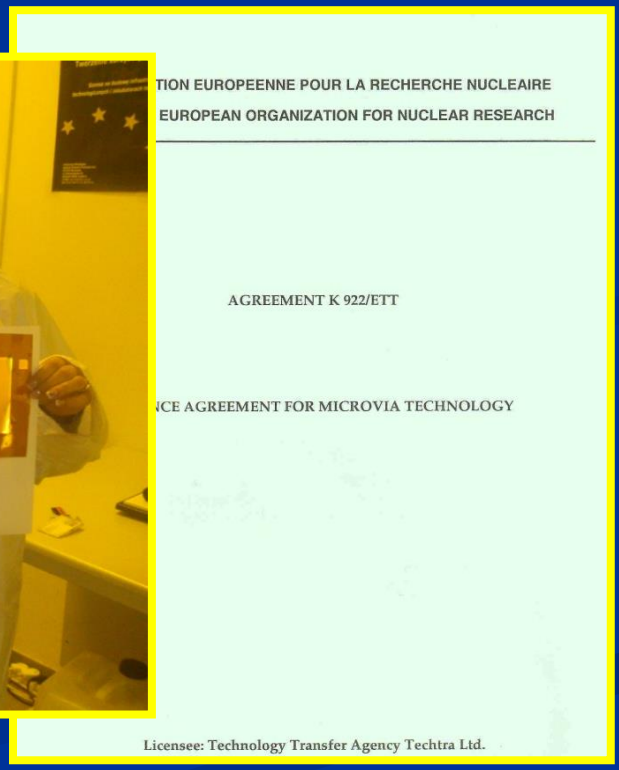
CERN EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH

AGREEMENT K 879/ETT/44

LICENSE AGREEMENT FOR USE OF GEM TECHNOLOGY

Licensee: TECHTRA – Technology Transfer Agency


TION EUROPEENNE POUR LA RECHERCHE NUCLEAIRE
EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH

AGREEMENT K 922/ETT

NCE AGREEMENT FOR MICROVIA TECHNOLOGY

Licensee: Technology Transfer Agency Techtra Ltd.

GEM manufacturing upon CERN licence

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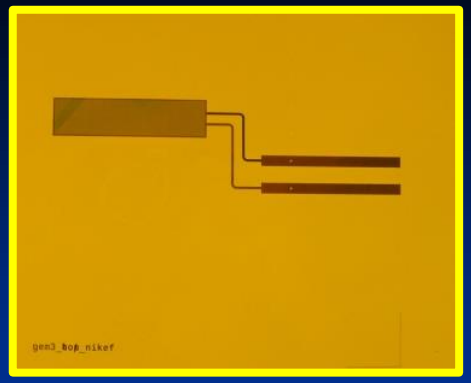
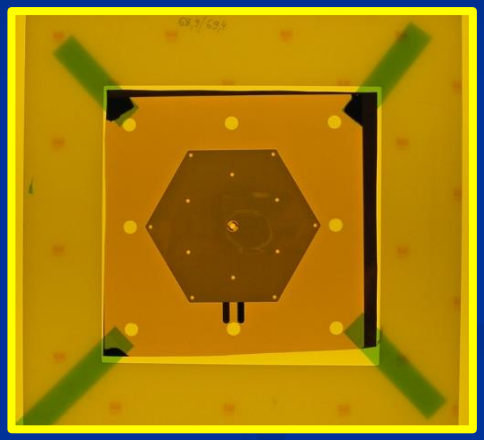
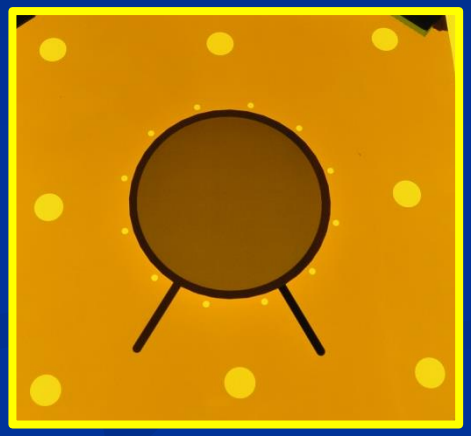


Customizing GEM layouts:

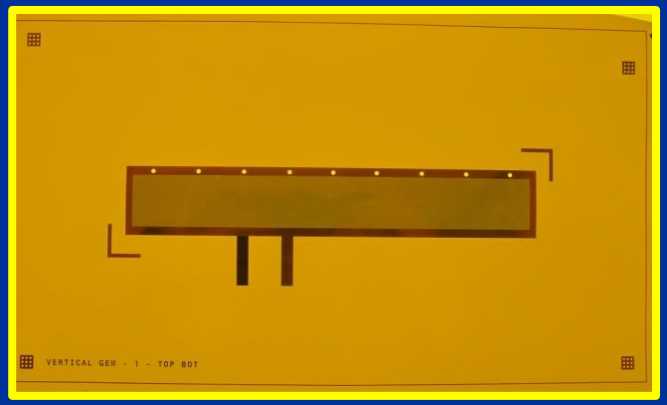
Over 1000 foils already delivered

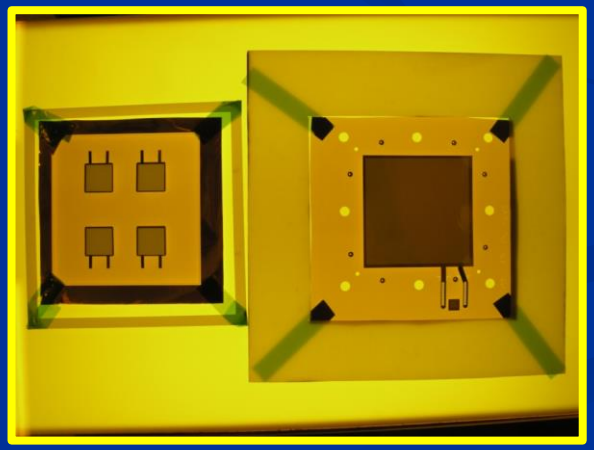




Possible changes:

- Different sizes, shapes,
- Different layouts, pitches
- Diffeent openings diameters





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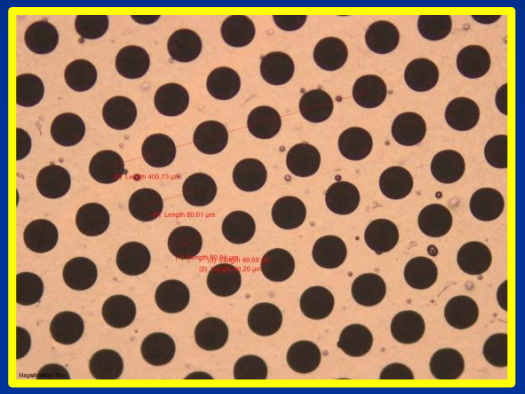
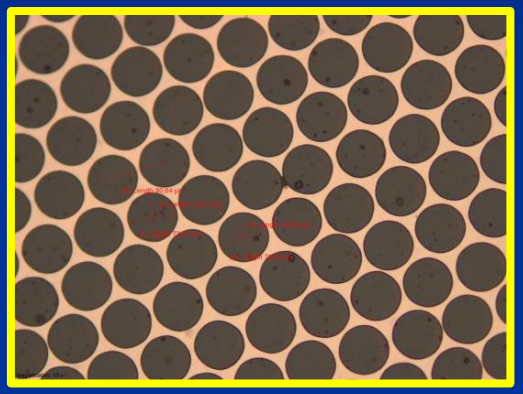
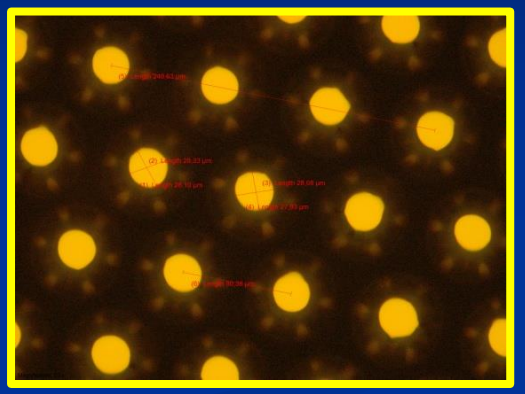
Customizing GEM layouts:



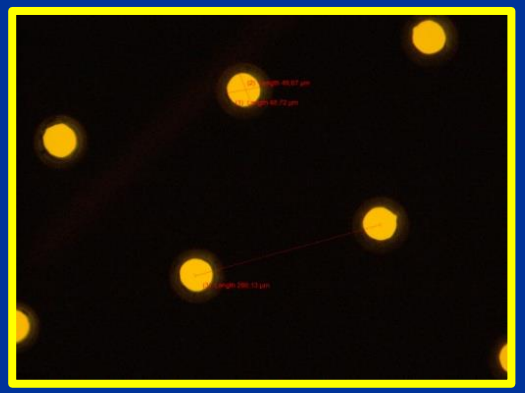
ø50μm, pitch: 80μm



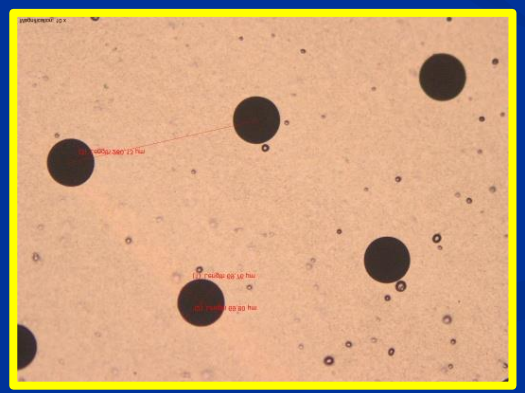
ø70μm, pitch: 80um



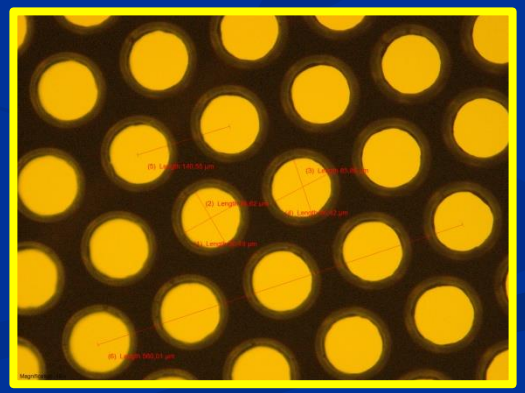
ø30μm, pitch: 80μm



ø50μm, pitch: 280μm



ø70μm, pitch: 280μm



ø90μm, pitch: 140μm

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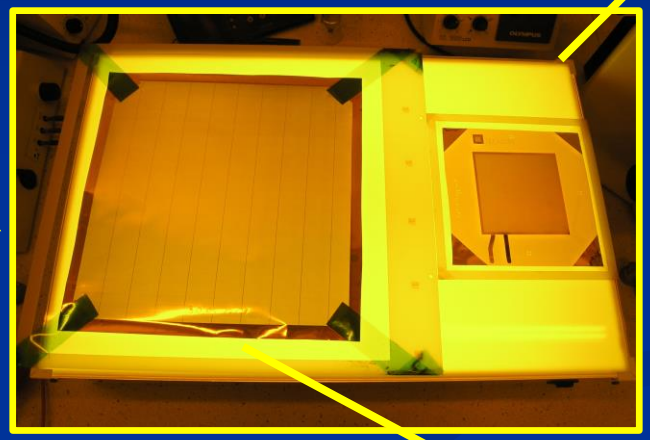
Towards *big* GEMs:

Prototype etching machine



10x10cm2 Double Mask

30x30cm2 Single Mask

Industrial etching machine

First fully operational boards till: **21.10.2015**

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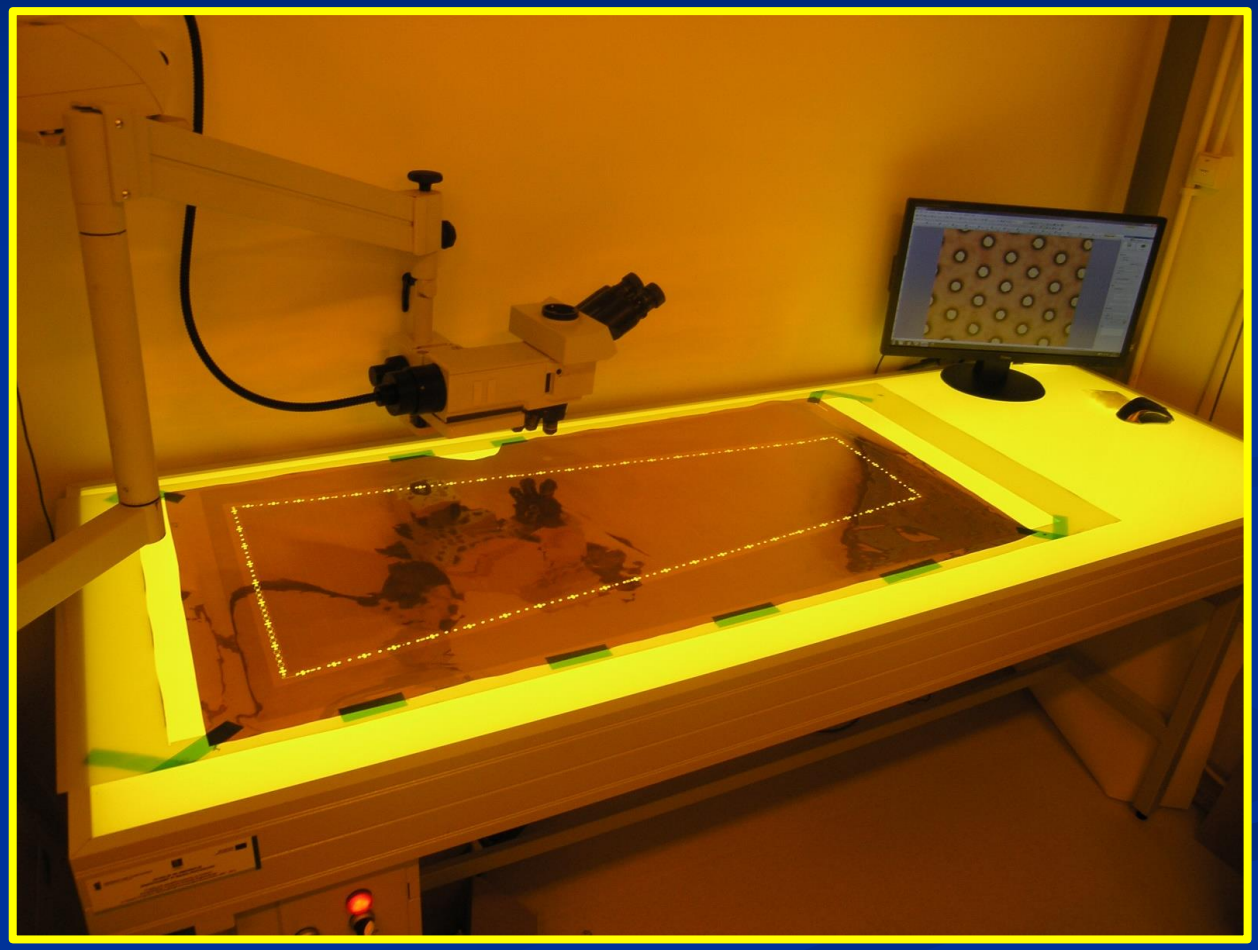
8th of March 2016: *big* GEM !

Micro-Chemical-Vias technology !



Prototype of 120x60cm2 CMS-like GEM foil @ Techtra

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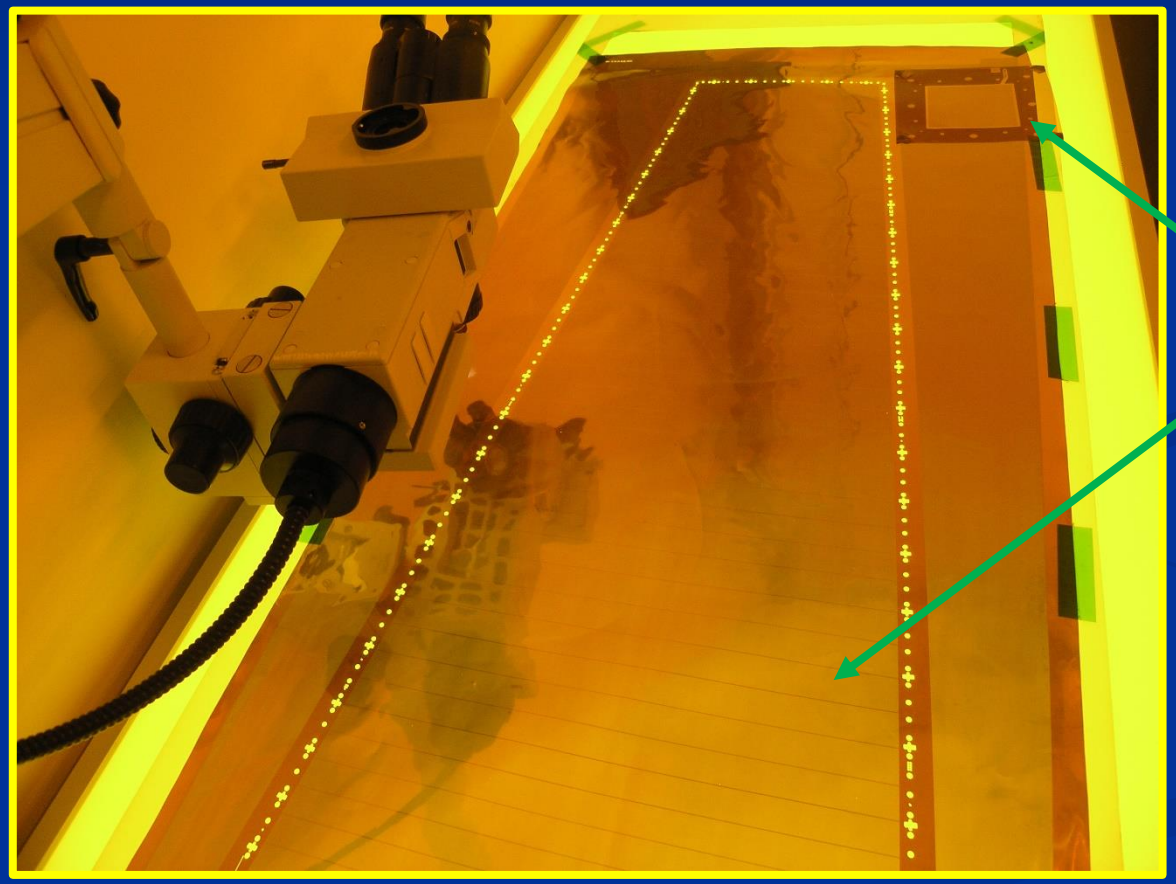
8th of March 2016: *big* GEM !



Prototype of 120x60cm2 CMS-like GEM foil @ Techtra

Cleanroom, Techtra

2002 – 2016:
from 100cm2
to 7000cm2 GEM.

Chemical tretment baths, Techtra

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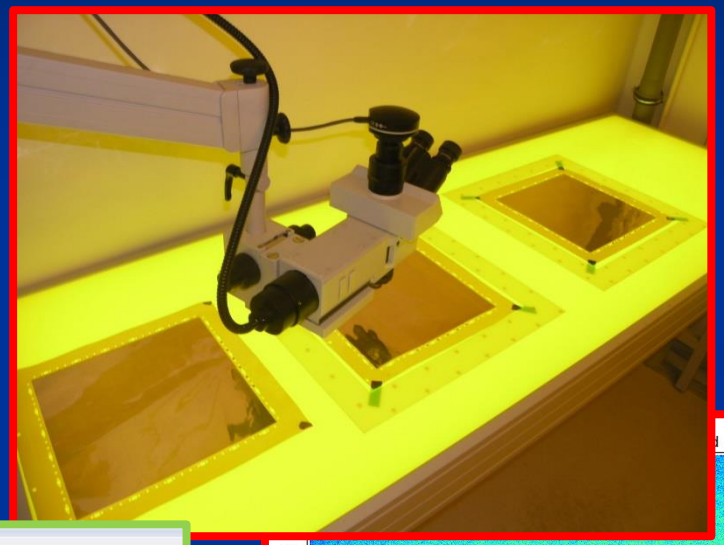
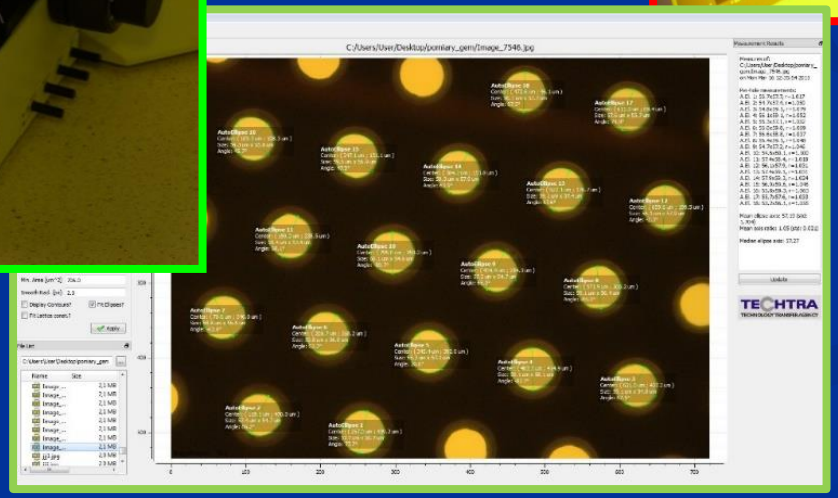
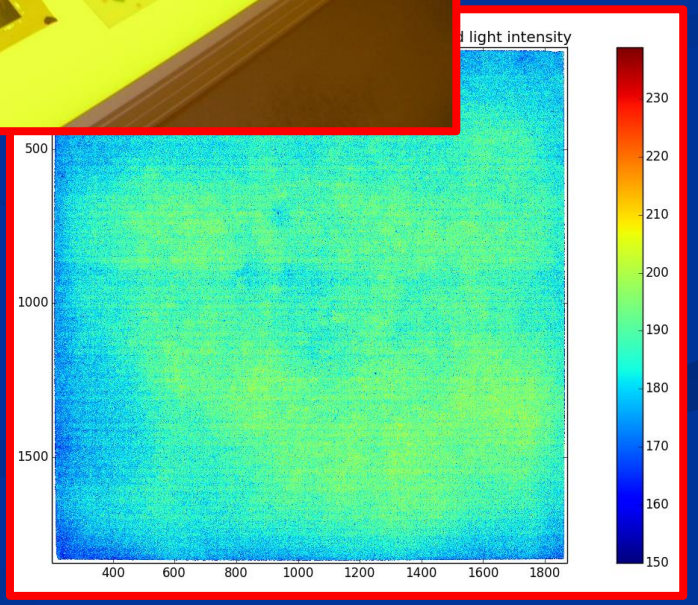
Quality assurance:

Global uniformity test







Local uniformity test

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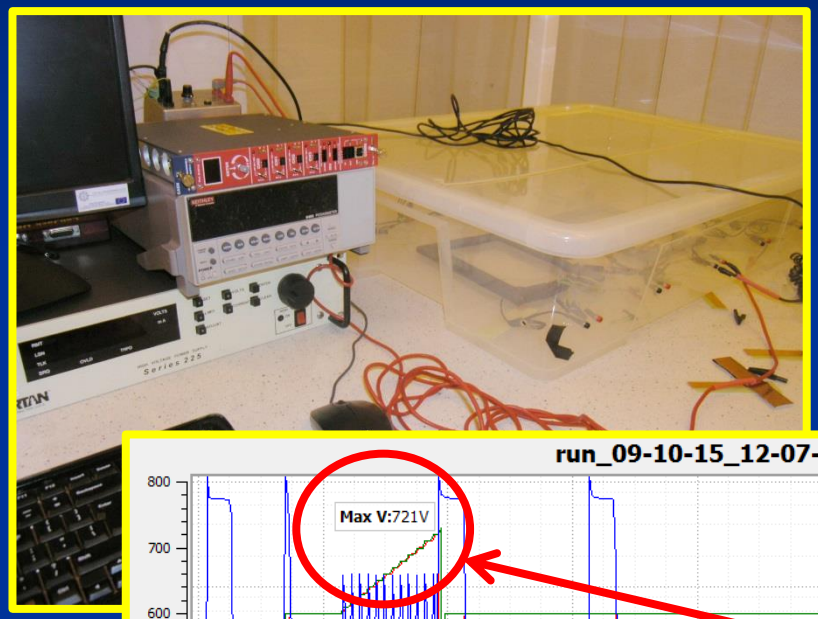
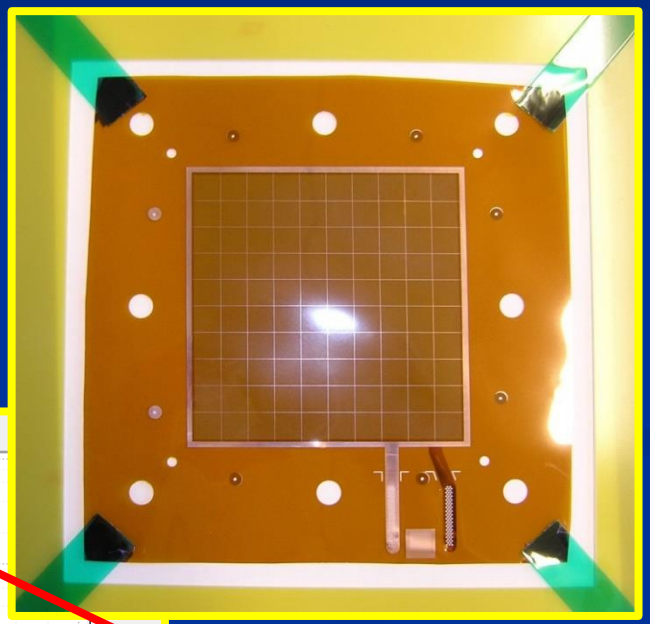
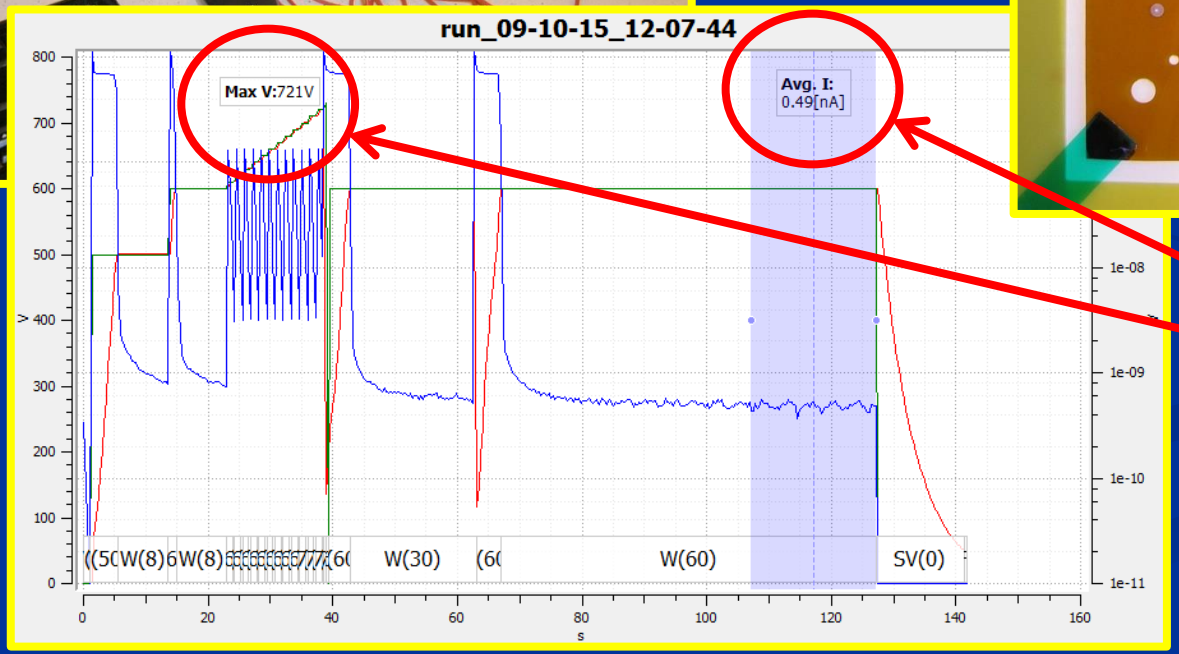
Leakage current measurement stand.







Leakage current below 1nA
@100cm2 @600V @30%HR

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Commercial GEM based detection systems for industry and science

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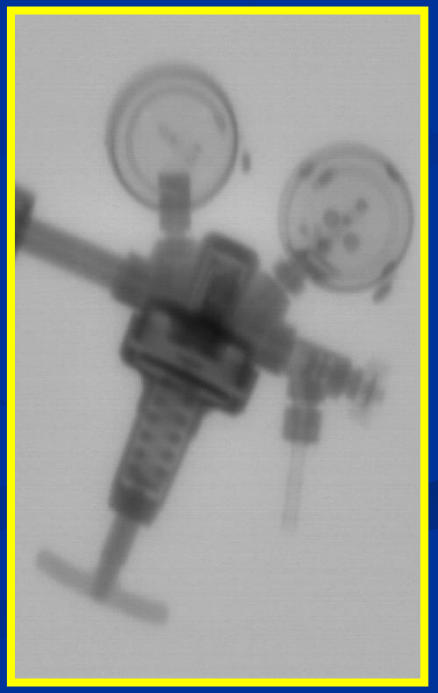
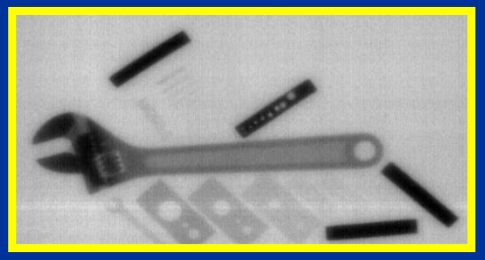
GEM detectors for industry (NDT)

GEM-VIEW detector, Techtra.





Radiographs made with GEM-VIEW, Techtra.

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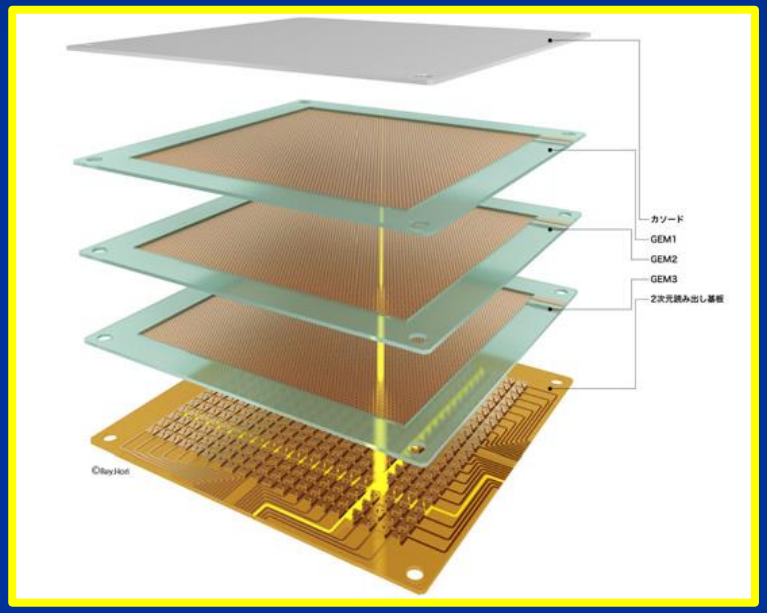
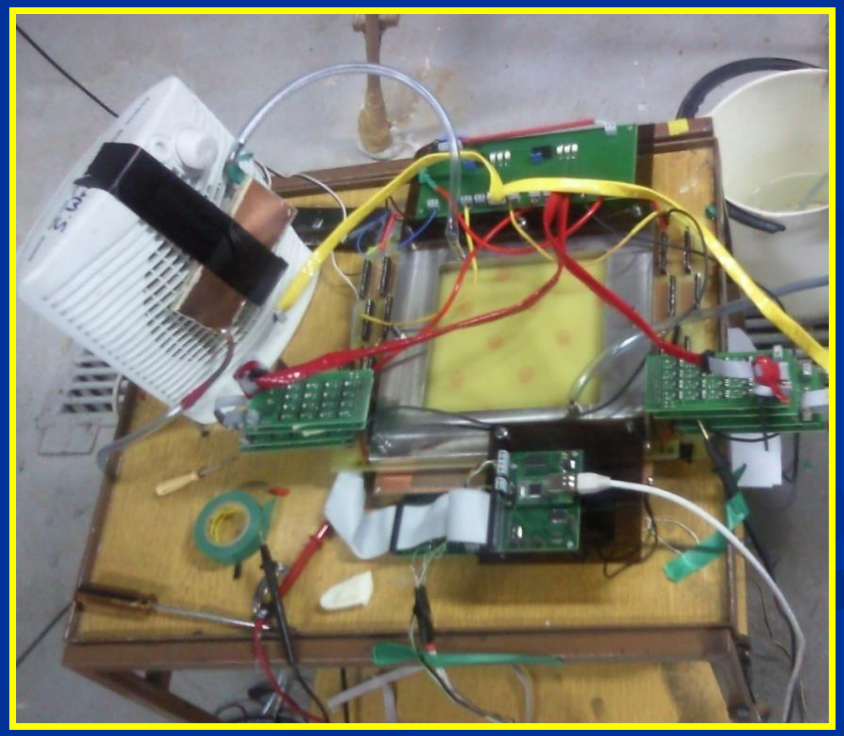
GEM detectors for science



Step 1: Scheme of GEM detector: drift plate + 3 GEMs + stripes readout

Step 2: „proof of concept"



GEM detectors for science

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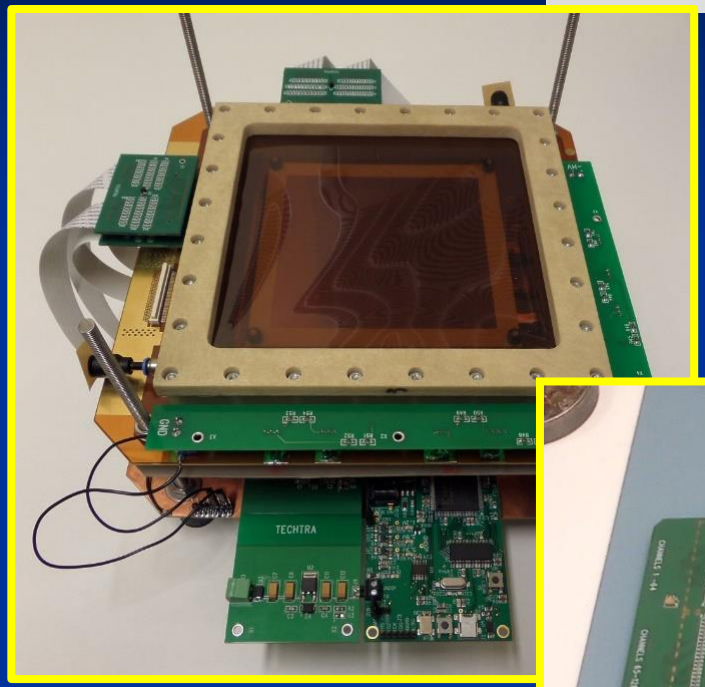
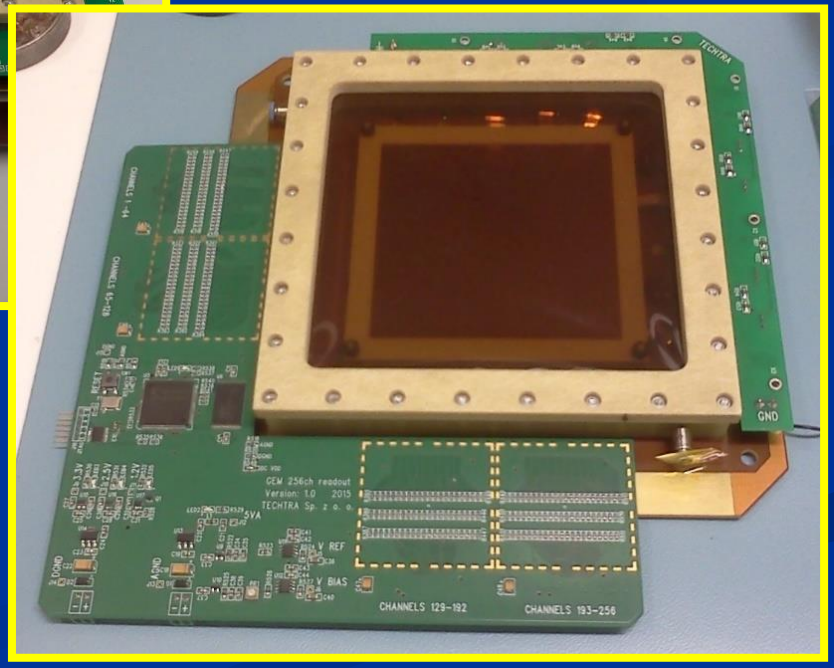
Step 3:
Operational detector



Plug & Play with
GEM technology !

Detector parameters :

Active area: 100 x 100 mm2
Readout: X-Y stripes (from CERN)
Based on Texas Instructions DDC 264
Number of channels: 512
ADC resolution: 16 or 20 bits
Noise amplitude: below 1 fC peak-to-peak
Sampling rate (per-channel): 6 kSPS
Communication protocol: Ethernet
Measurement: continuous without trigering



Step 4: Commercially available

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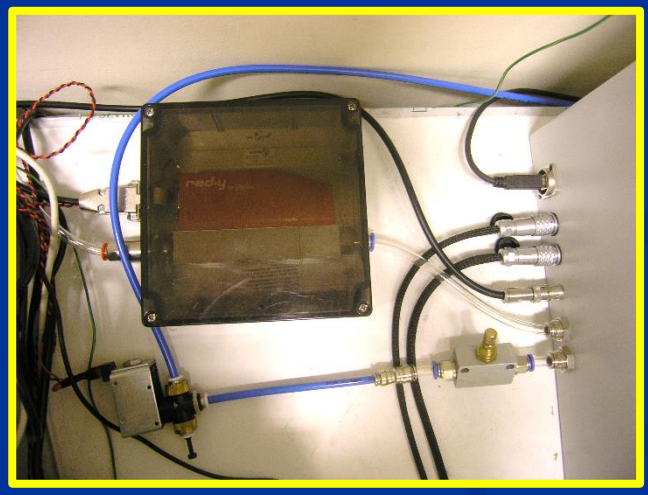
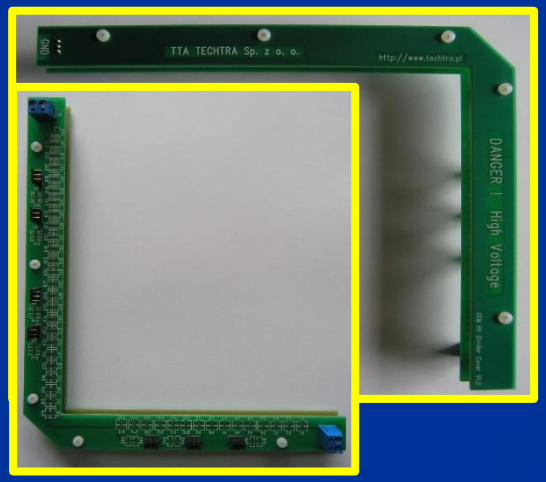
GEM detectors for science

GEM foils are connected using snap-on connectors for easy foil exchange

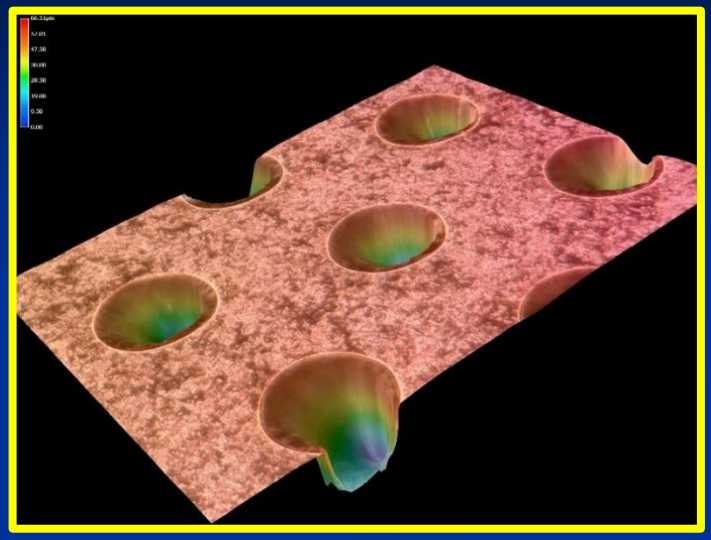


Gas flowmeter and output valve.

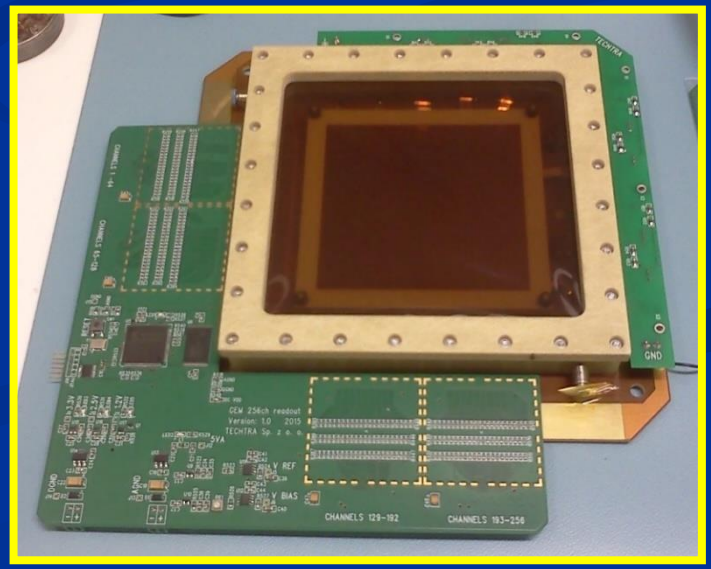


Voltage divider plugs onto the pad plane and polarizes all GEM foils and the drift electrode

Our Core GEM-team



GEM & GEM based detector, Techtra



INNOVATIVE ECONOMY
NATIONAL COHESION STRATEGY

EUROPEAN UNION
EUROPEAN REGIONAL
DEVELOPMENT FUND

„Dotacje na innowacje"

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