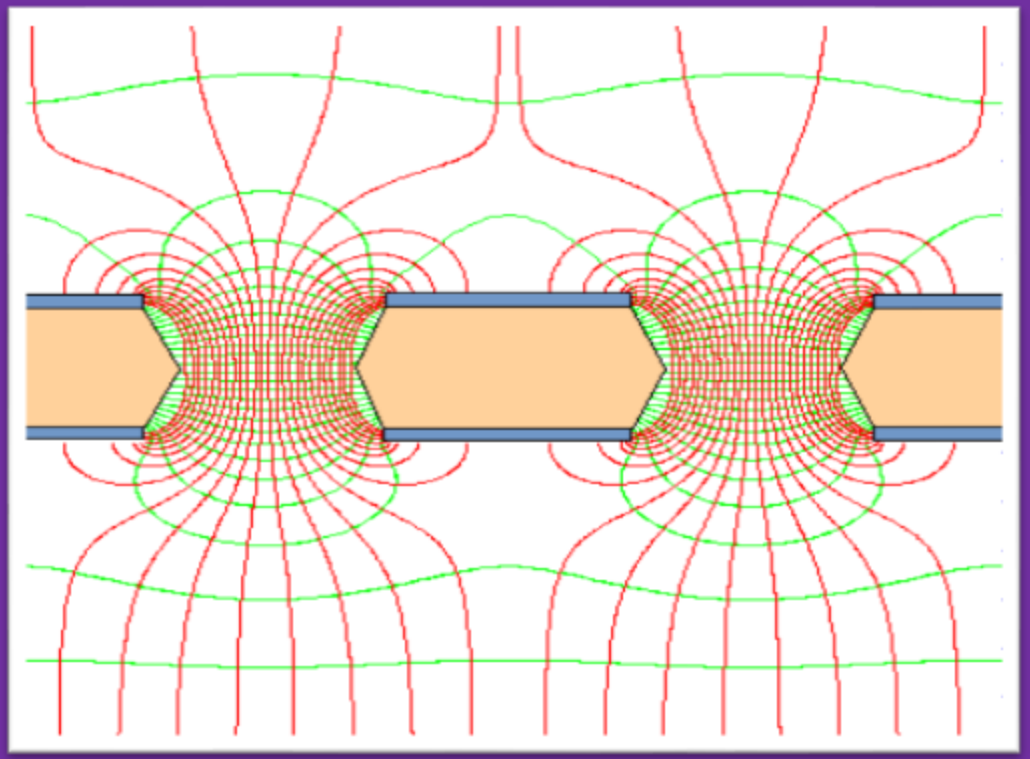
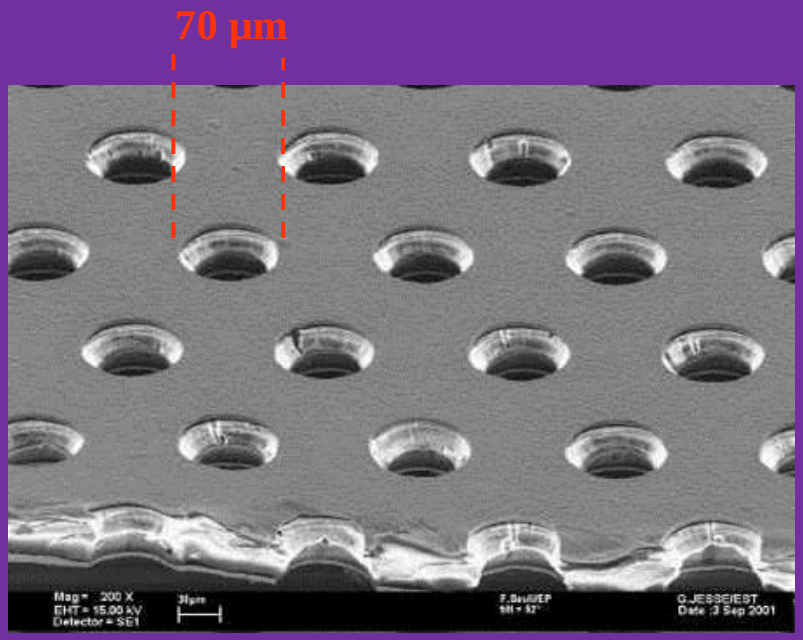
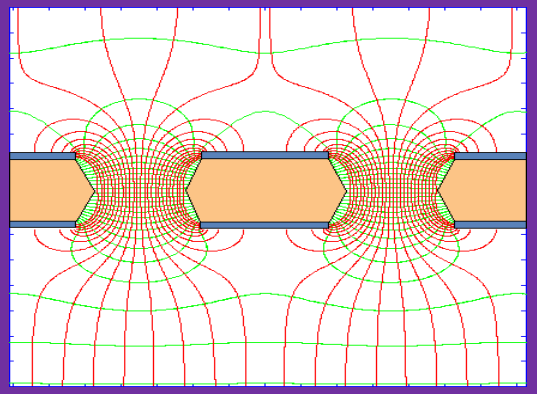
GEM Technology Transfer



GEM - Gas Electron Multiplier

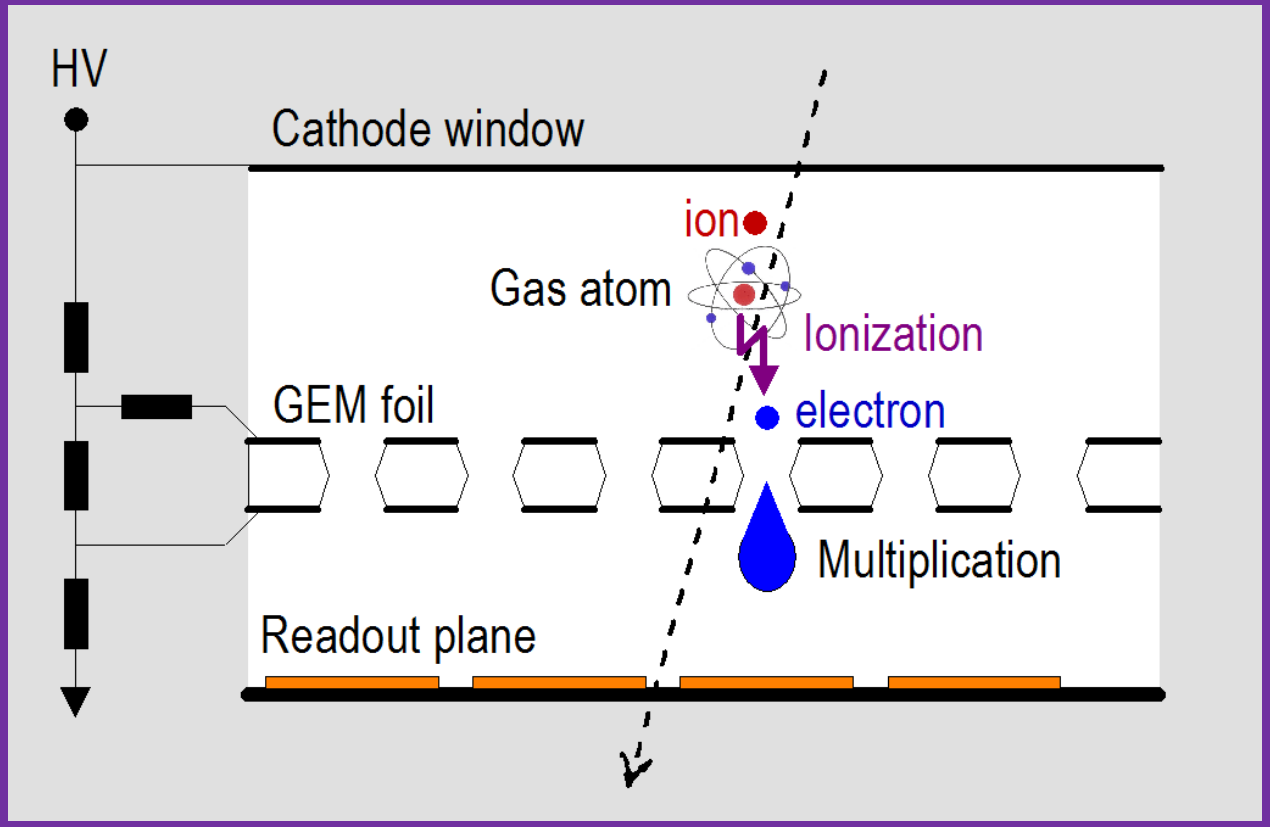
(historical background)



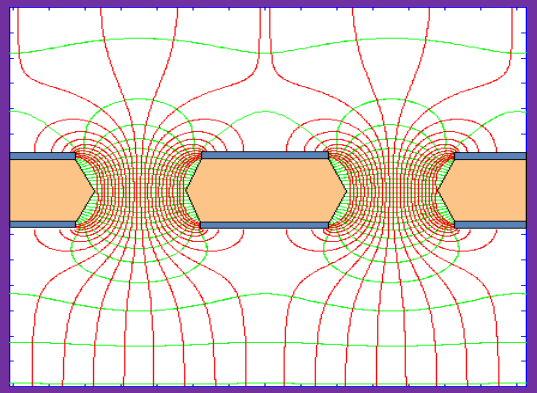


The micro pattern gaseous detector operating as a Gas Electron Multiplier (GEM) was introduced at CERN in 1996 by Fabio Sauli.

GEM - Gas Electron Multiplier



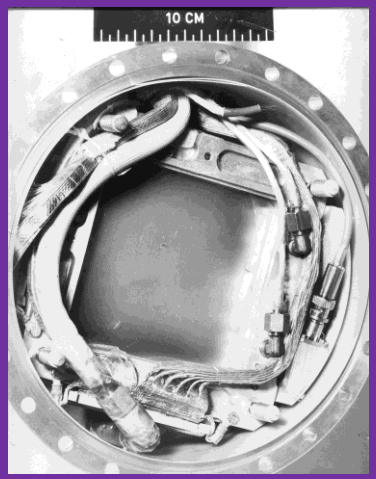
Gas Electron Multiplication working principle

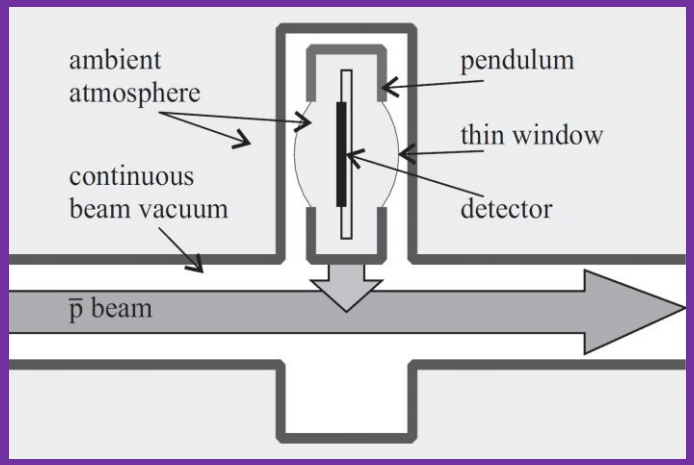


Field lines

Profile measurement at AD-EA

MWPC have been used the last 12 years, but…



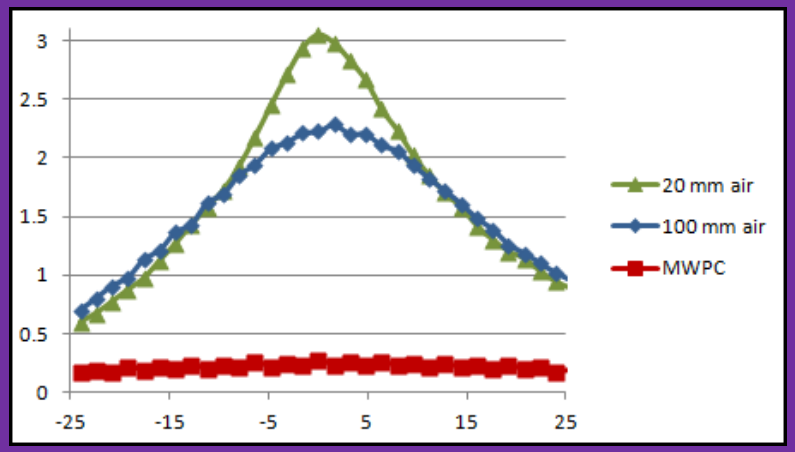


MWPCs were giving poorly representative profiles at low energy: 5.3 MeV (100MeV/c).

Pendulum transported by crane for installation in the experimental areas of the AD.

Beam steering at the AD-EA

Problem: non reliable profiles!



- Effect of material in front of a profile detector:
- Severely distorted profiles (blow-up) at 5.3 MeV.
- Especially in the second plane of the MWPC.

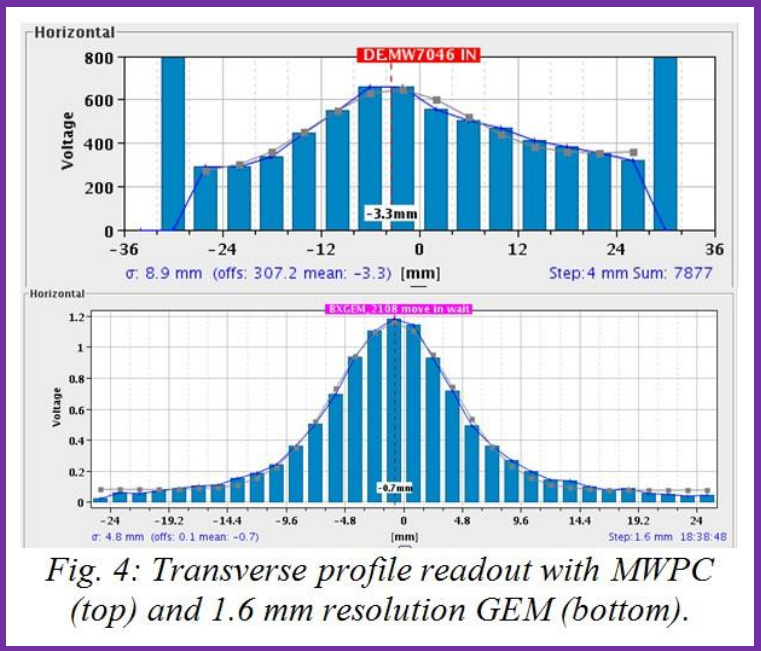
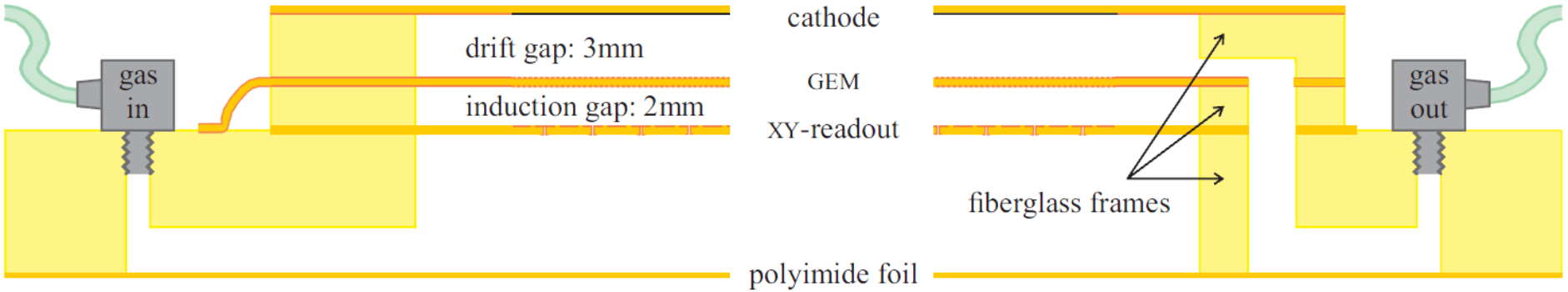


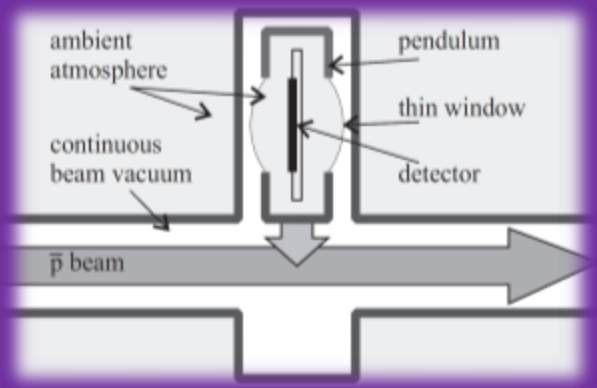
Fig. 4: Transverse profile readout with MWPC (top) and 1.6 mm resolution GEM (bottom).

Profiles before 2012 (top) and profiles now (bottom).

BI developed GEM for AD-EA

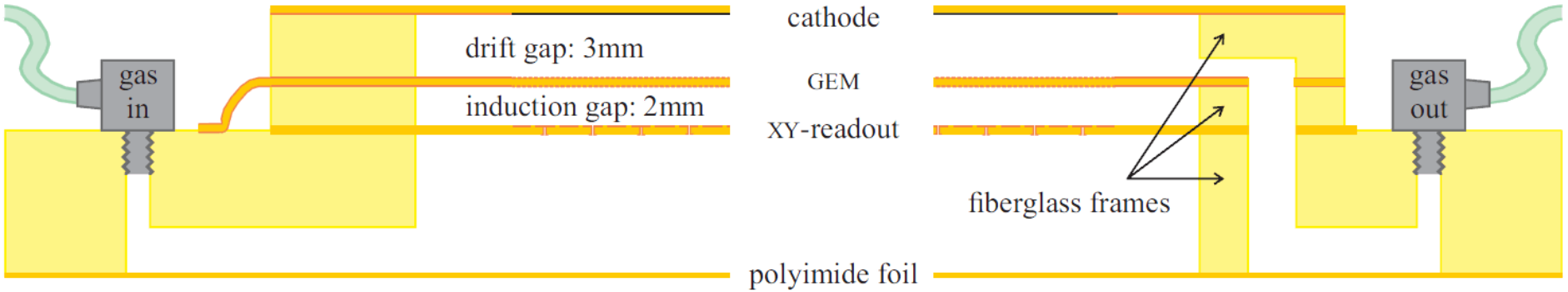
(20 detectors installed for 2012)

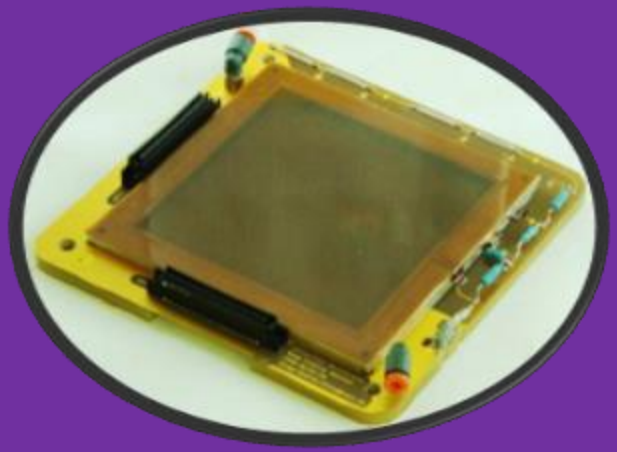


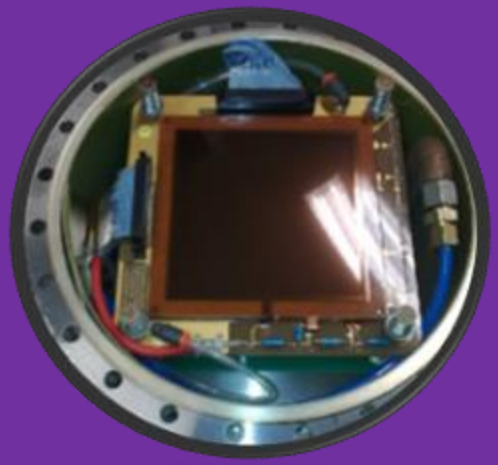


BI developed GEM for AD-EA

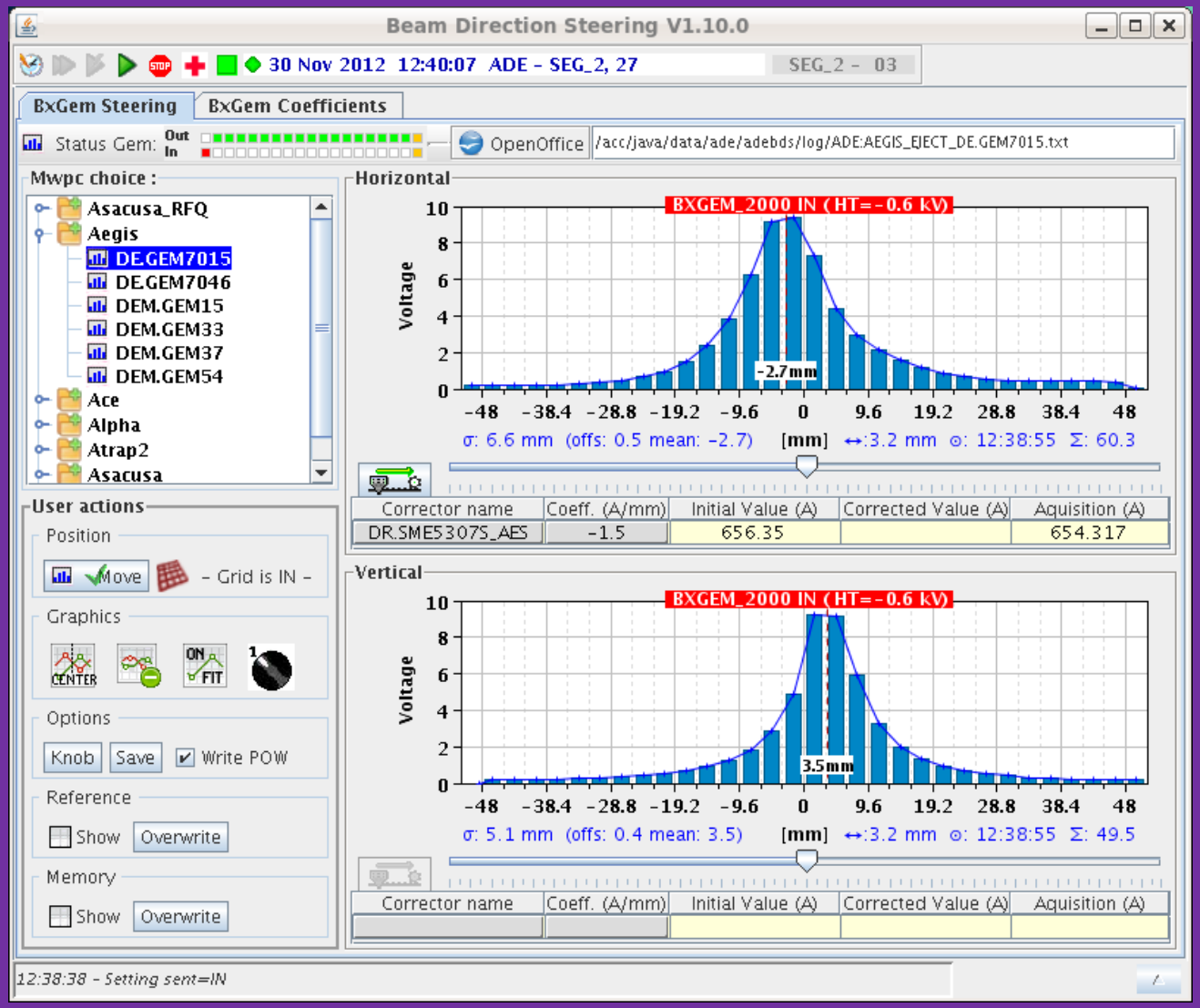
(20 detectors installed for 2012)





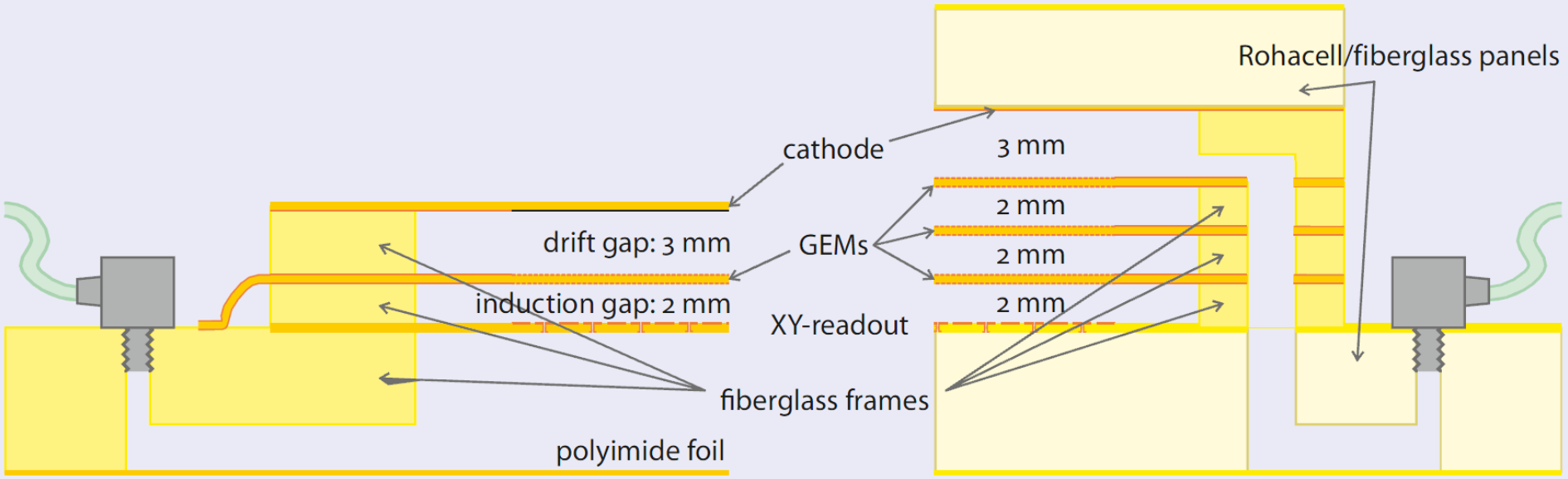


Beam steering at the AD now



BI developed GEM for SPS-EA

(Prototypes installed on H4 and M2)



Low energy antiprotons High energy hadrons

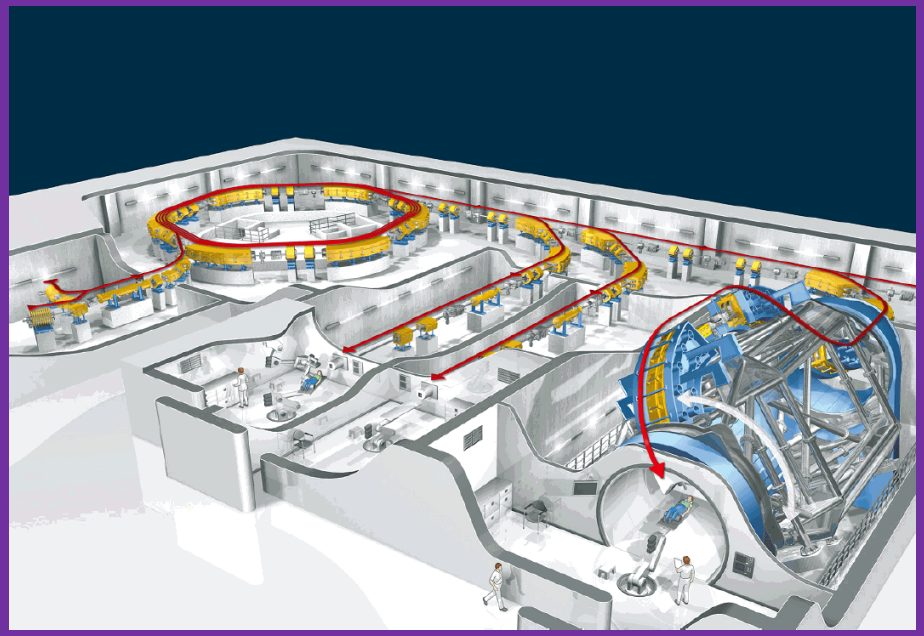
GEM applications in BE-BI

GEM versus MWPC

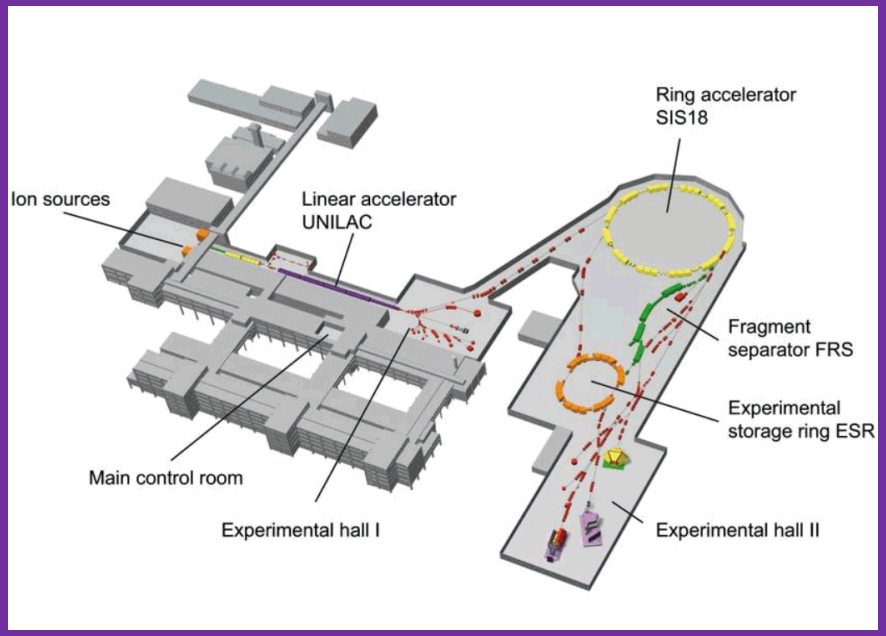
- Gas Electron Multipliers (GEM) are finding more and more applications in beam instrumentation. Gas Electron Multiplication is a very similar physical phenomenon to that which occurs in Multi Wire Proportional Chambers (MWPC), but for small profile monitors GEMs are much more cost effective to produce and maintain.
- We have demonstrated that GEM technology can be used to replace Multi Wire Proportional Chambers in most applications for transversal profile measurement. At low energies at the AD, our new GEM devices allow more precise beam profile measurement than a conventional MWPC.
- Looking for candidates to replace the MWPC at high energy it was possible to give more priority to the robustness of the new detector and prioritising an industrial design enabling low cost and low maintenance need.

Potential GEM Technology Transfer

(Dans le sillage du IPAC'13)



Heidelberg Ion Beam Therapy Centre (HIT)



GSI Helmholtz Centre for Heavy Ion Research

A visit to HIT, with a view to GEM technology transfer, is being planned this month.

Affaire a suivre…

Potential GEM Technology Transfer

(Dans le sillage du IPAC'13)

Thank you for your attention