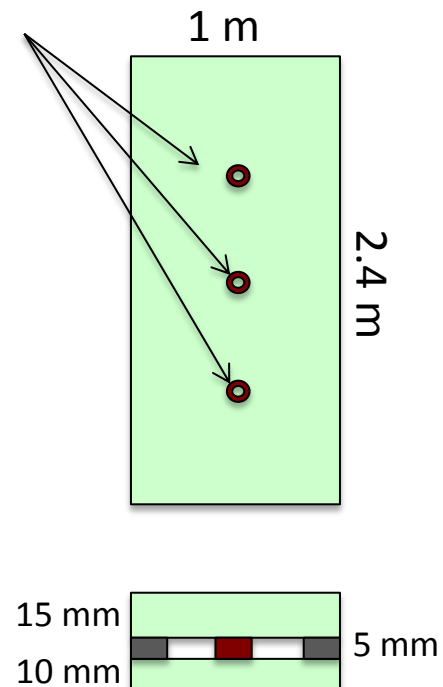


# Operational prototype work at CERN

Status report

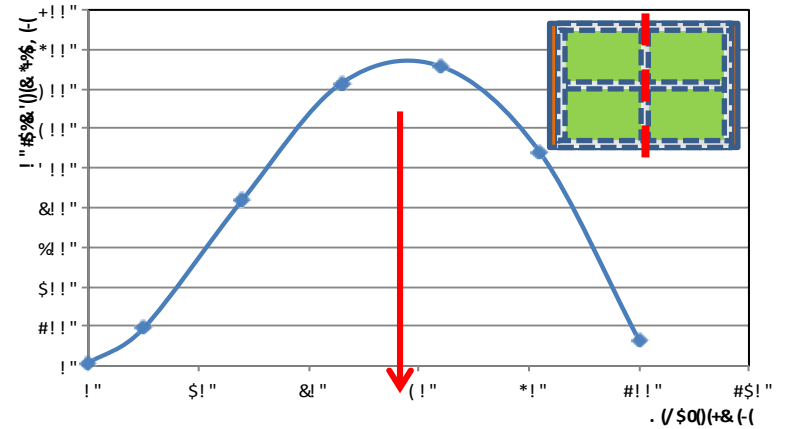
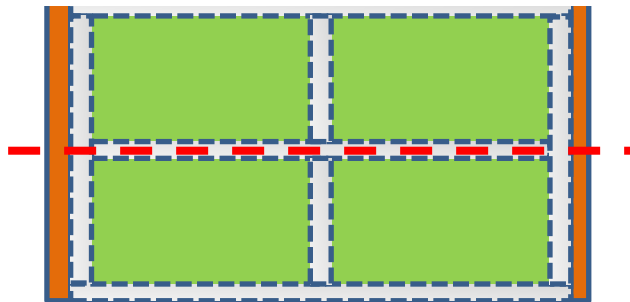
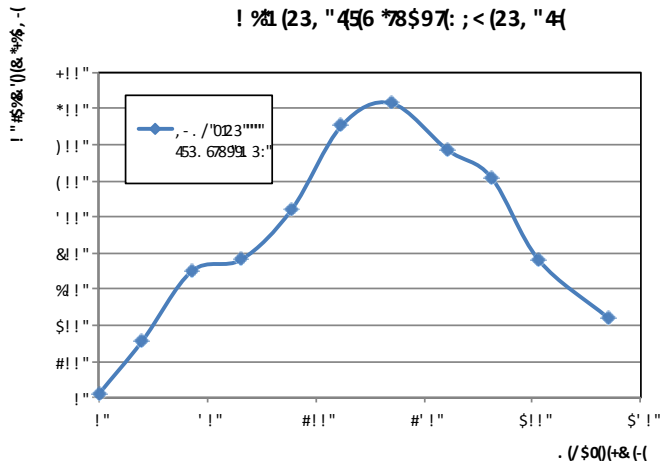
# Evaluation of L3 (2.4 x 1 m<sup>2</sup>)

- L3 is the second 2.4 x 1 m<sup>2</sup> prototype that had been built; it differed from L2 by adding three panel interconnections, spaced by 50 cm
- L3 suffered (like L2) from gas leaks in the drift panel
  - Suspect gas leaks through mesh frame screw holes; frames were not glued, screws not sealed (to be avoided in the future)
  - Gas penetrates into the drift panel
  - Fixed by sealing the drift panel skins with Araldite glue.
- Measurement of mechanical deformations
  - Effect of gas pressure
  - Test of panel interconnections

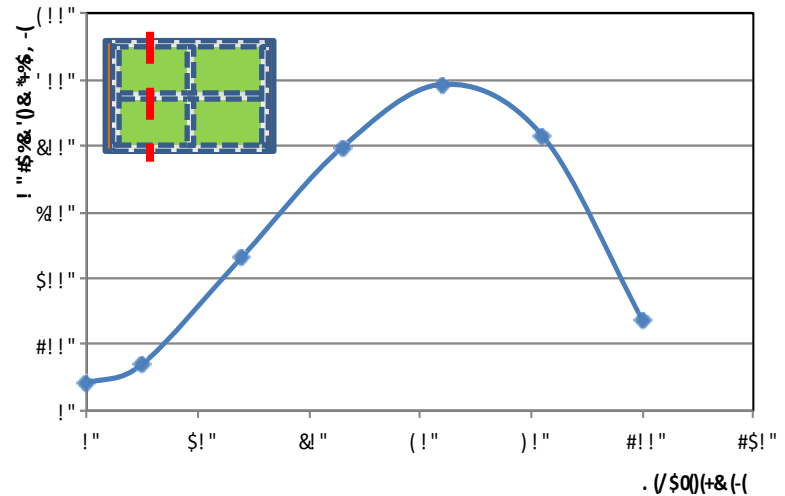


# Drift panel (without R/O panel)

- Mesh tension ( $\approx 10 \text{ N/cm}$ ) produces banana effect
  - Deformation is  $\approx 1 \text{ mm}$  in the centre
  - Requires  $W \approx 8/11/8 \text{ kg}$  to flatten drift panel ( $th=15 \text{ mm}$ )



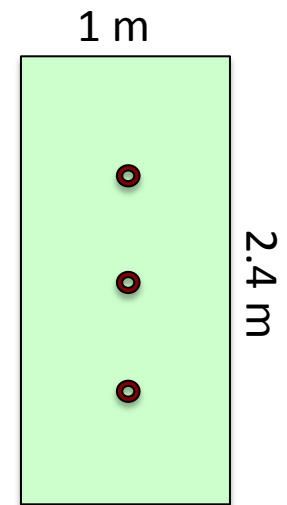
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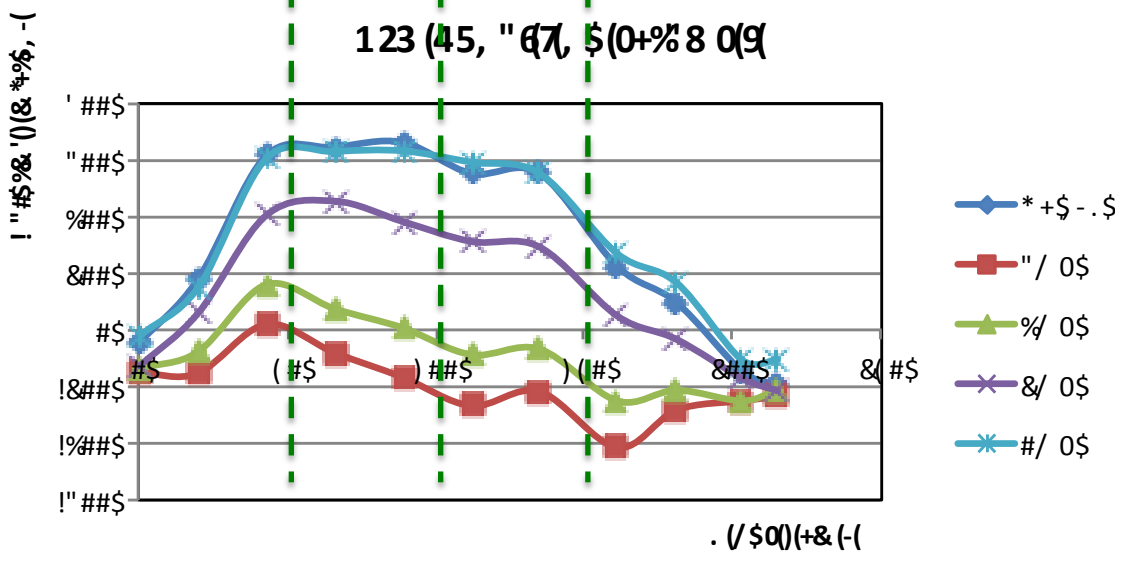
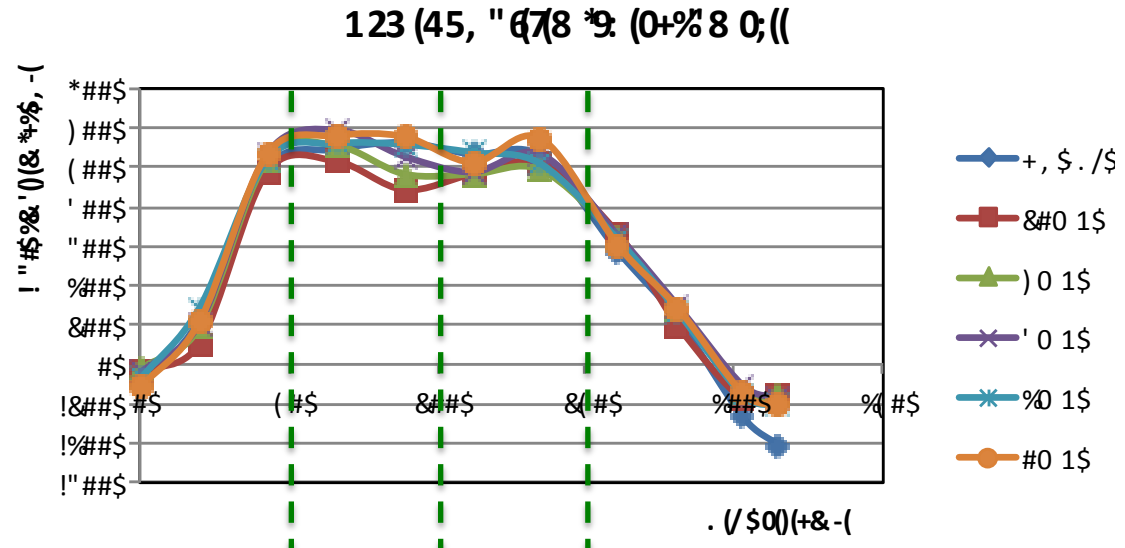
# Evaluation of L3 (cont'd)

- Measurement of mechanical deformations of assembled detector
- Observe similar 'banana' effect as for drift panel alone
- Gas pressure leads to deformation of 500 and 800  $\mu\text{m}$  for 6 mbar overpressure (operating pressure is  $\leq 2$  mbar) for drift (15 mm) and r/o panels (10 mm)
- Panel interconnects (every  $\approx 50$  cm)
  - Reduces banana effect
  - Eliminates the gas pressure effect

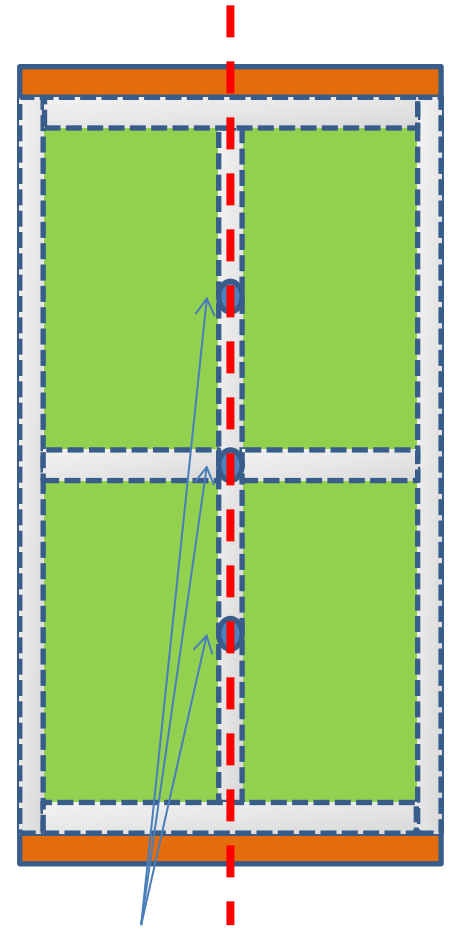




# L3 assembled – readout panel surface



Central line



Interconnections

# Conclusions from L3 measurements

- Mesh tension creates panel deformation, needs attention
- Concept of internal spacers works
  - Eliminates deformation of panels caused by the gas pressure
  - Distances between spacers to be optimized
- More precise measurements using the laser interferometer will follow shortly
- Will try to compensate 'banana' effect during the assembly
- More results ... in the January meeting

# The MMSW project

- Install a MM detector as similar as possible to the NSW detectors on the present Small Wheel next summer, before ATLAS closes
  - Detector dimensions: 1.2 x 0.5 m<sup>2</sup> (to fit upper half of large CSC)
  - Four layers (quadruplet), 2 eta and 2 stereo
  - Strip pitch 0.425 mm, 1024 strips/layer
- PCB production as close as possible to final production
- Panel construction and assembly serve as prototype for Module 0
- Readout electronics
  - ATCA SRS as DAQ system
  - Front-end boards (SRS compatible) with 8 VMM2 chips/board (back-up: APV25)
- Collaborative effort
  - CERN, Japan, Mainz, Lecce, Napoli, ... for detector construction
  - Bucharest, BNL, Arizona, ... for electronics





# PCB production

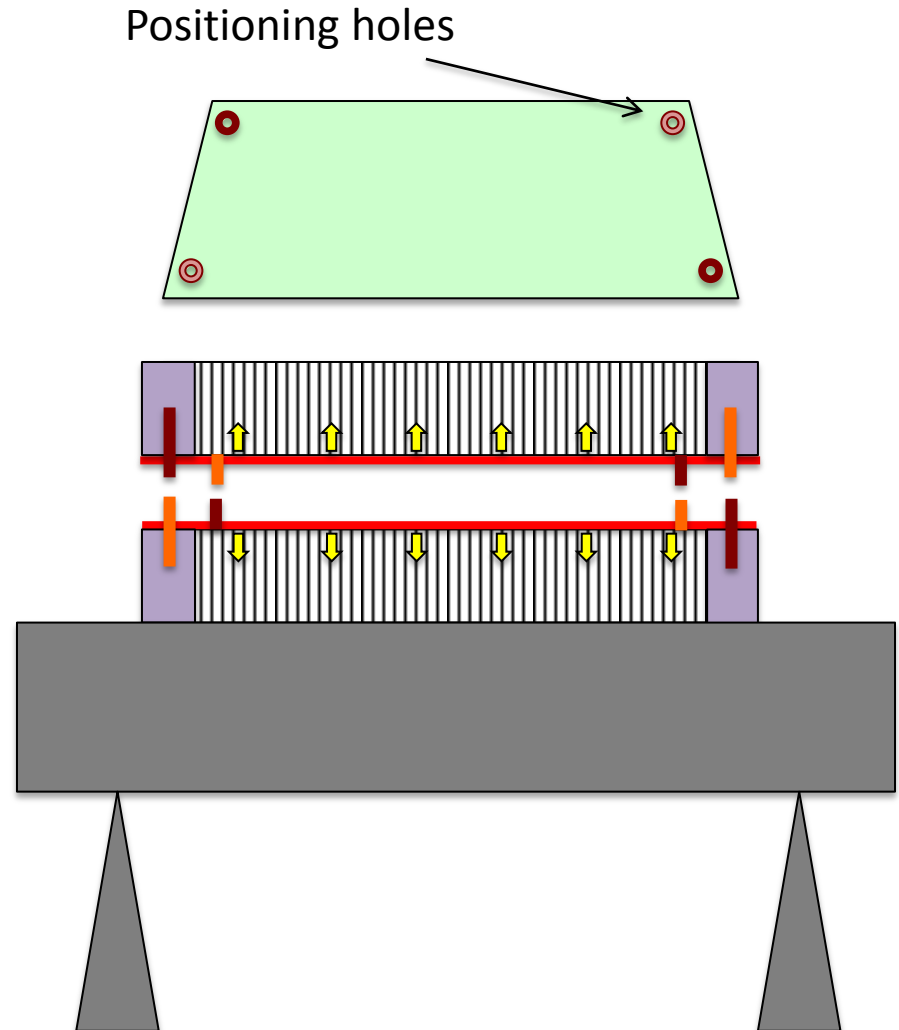
- PCB production method as in final production, however, PCBs are smaller in size
  1. Etching of readout pattern on PCB (Eltos, Italy); expect boards to arrive next week
  2. Production of Kapton foils with resistive strips (Japan); done
  3. Glueing of resistive strip foils at CERN
  4. Making of pillars at CERN
  5. Cutting and drilling at CERN

# Panel construction (PH-DT)

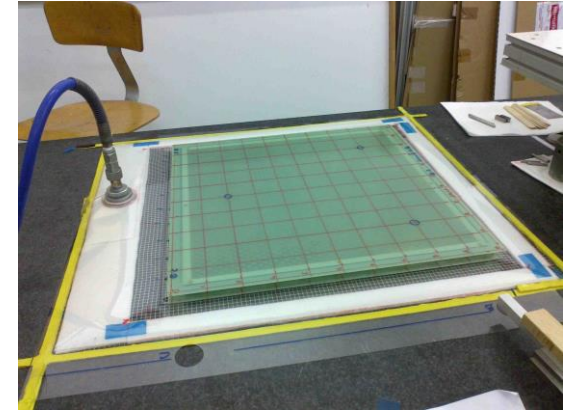
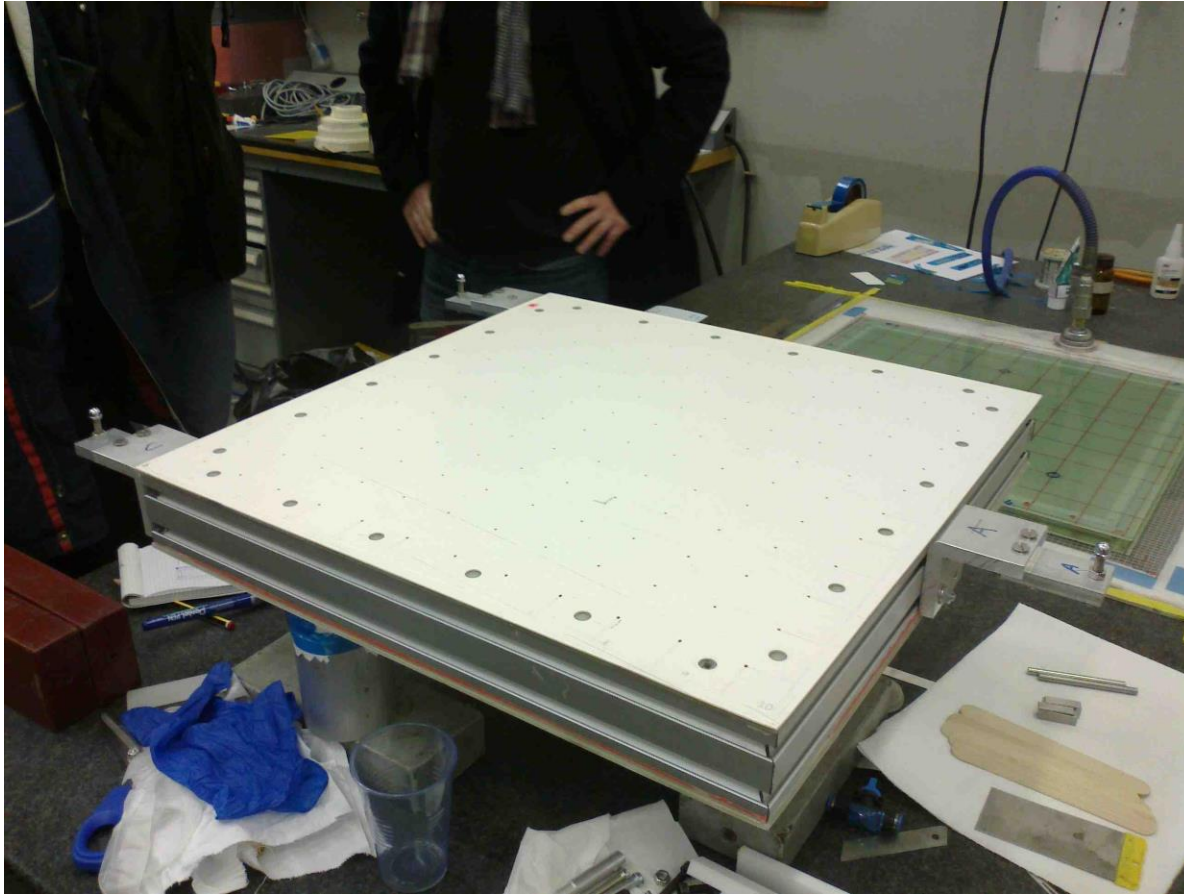
- Method follows the very successful 50 x 50 cm<sup>2</sup> prototype panel construction (flatness  $\leq 20 \mu\text{m}$ )
- Vacuum table & stiffback
  - Flat surfaces are produced on a marble table
  - Stiffness is achieved by 60 mm high Al honey-comb core
  - Vacuum pumping through flat surface
- Stiffback of 50 x 50 cm<sup>2</sup> has been produced and tested
- Vacuum table follows same principle
- Stiffback and vacuum table incorporate positioning pins for PCB alignment

# Panel construction tool

- Vacuum table + vacuum stiff-back
- Positioning pins for PCB alignment incorporated in frames
- Flat surfaces produced on marble table; does not require machining of flat surface
- Stiffness by thick honeycomb core
- Light, but stiff, structure, cheap
- Replaces marble



# The 50 x 50 cm<sup>2</sup> prototype



Work by Francisco Perez  
& Jordan Degrange (PH-  
DT)

# Status of MMSW

- Readout PCBs in production, expected to be delivered by mid November
- Vacuum table & stiff-back
  - Parts ordered, construction to start next week
  - Expected to be completed by 22 November
- Panel glueing
  - Design of mechanical parts and drawings done
  - Material ordered
  - Expect glueing to start in last week of November