

ATLAS: New Small Wheel ATLAS Micromegas plans in the magnetic field at SPS/H4

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European Social Fund

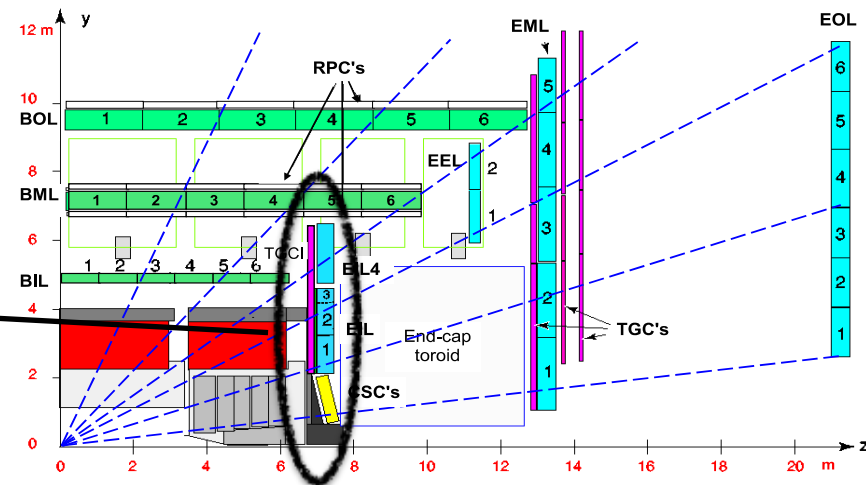
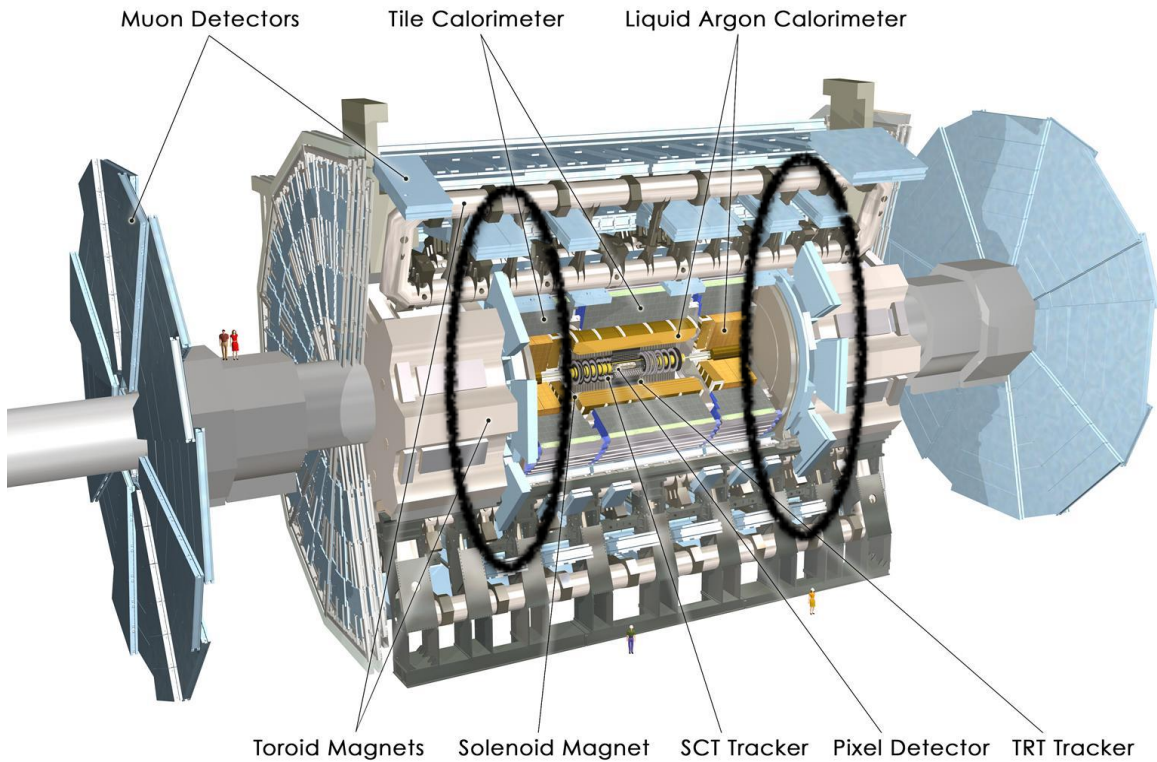


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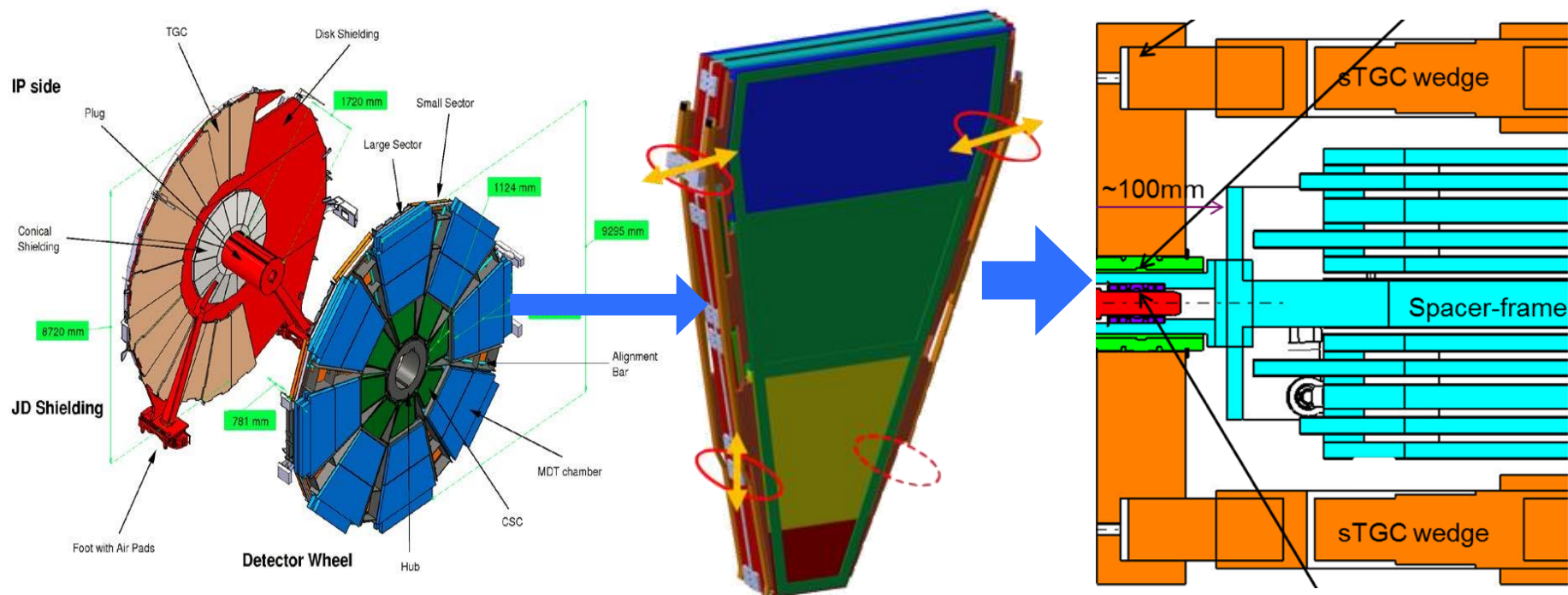
NSW Upgrade Project

NSW will replace the innermost end cap station of the Muon Spectrometer
 Located between end-cap calorimeter and end-cap toroid
 Is not so small; 10 m in diameter



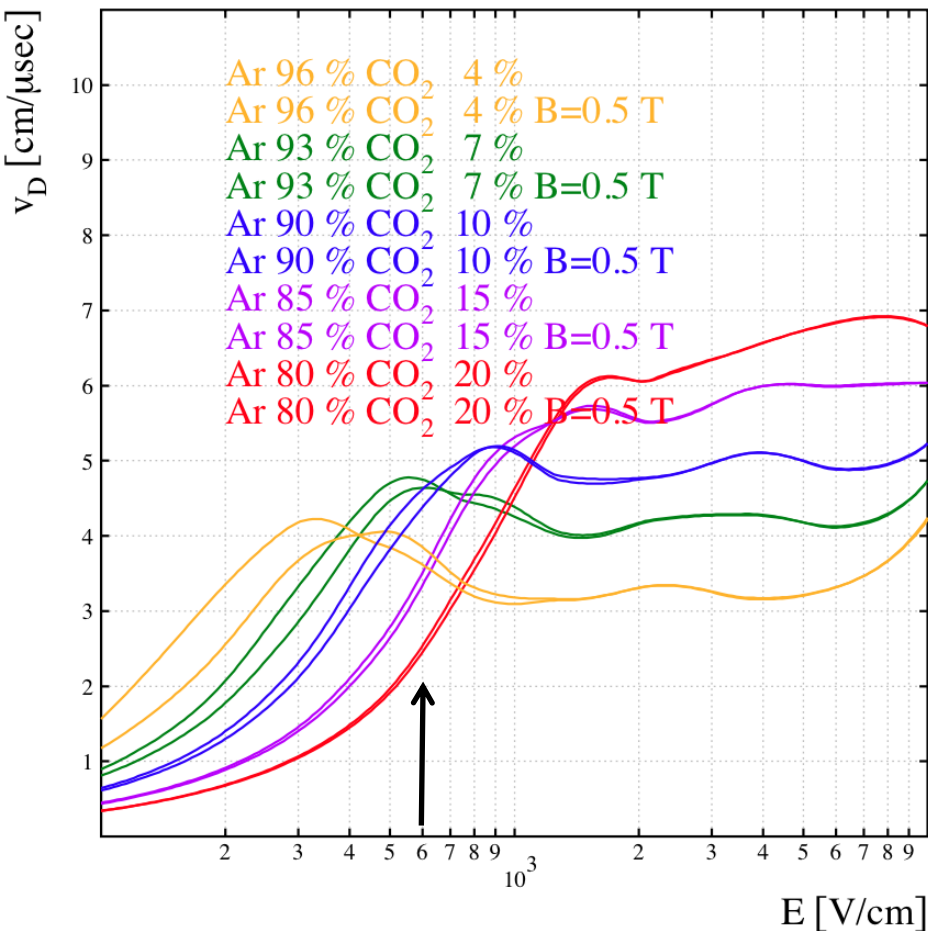
New Small Wheel (NSW) Layout

- Two technologies: Both Micromegas & sTGC detectors will provide tracking and trigger data
- 16 Sectors per Wheel (8 large, 8 small)
- 2 Multilayers per Sector for Micromegas & 3 Multilayers per Sector for sTGC
- 8 Micromegas Layers & 8 sTGC Layers per Multilayer

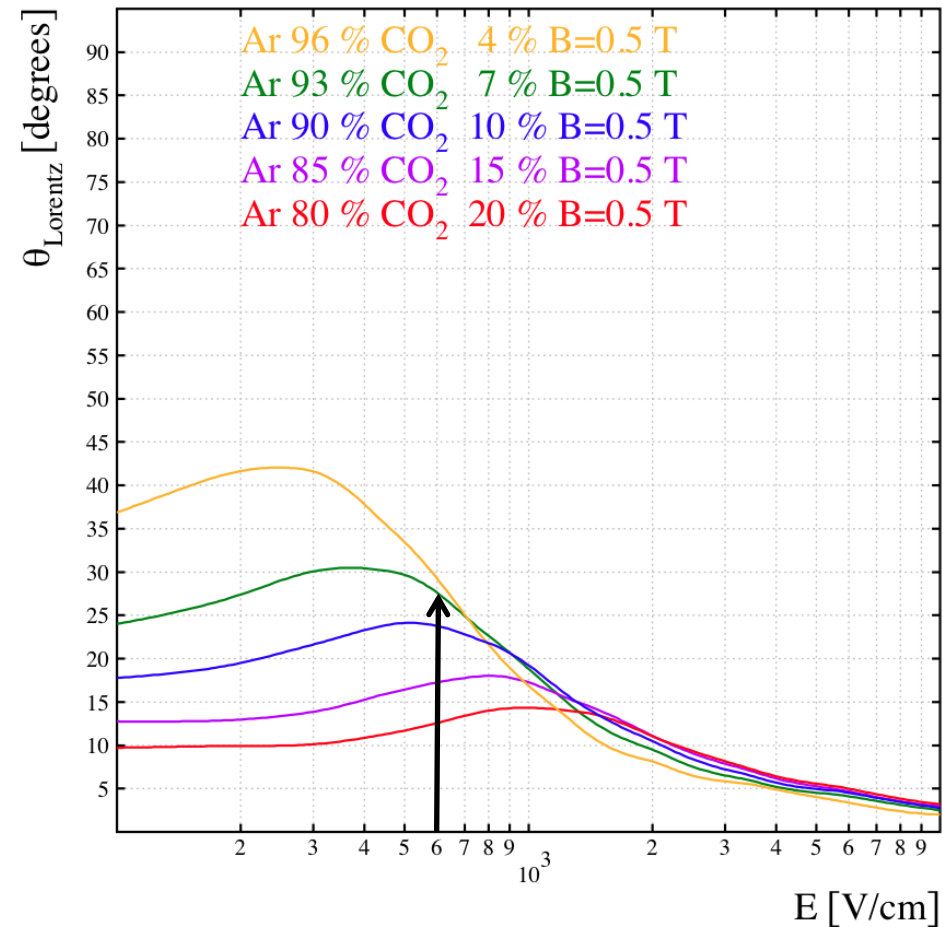


Need to optimize the gas mixture;
Baseline gas: Ar+7%CO₂

Drift velocity

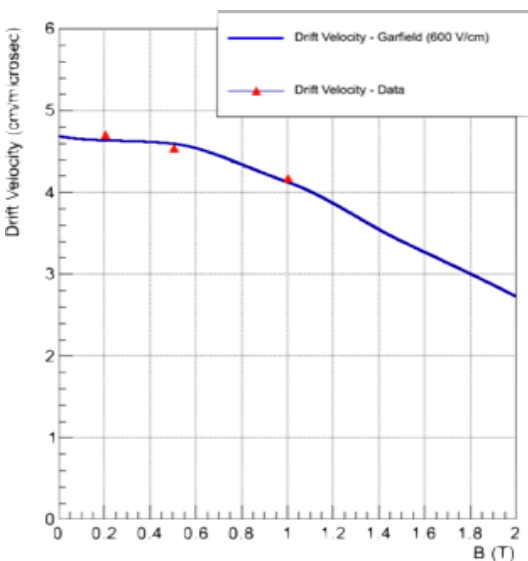
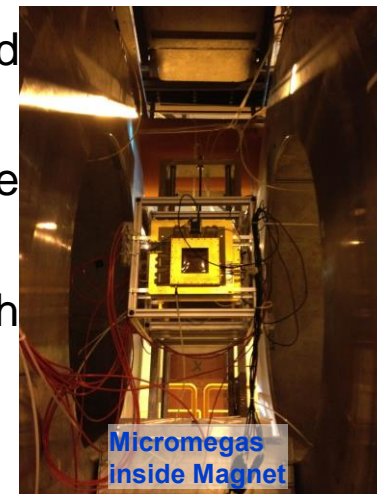


Lorentz-angle

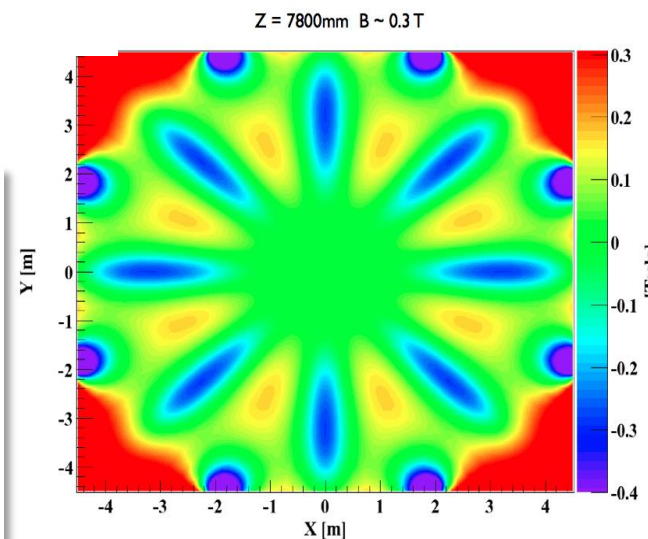
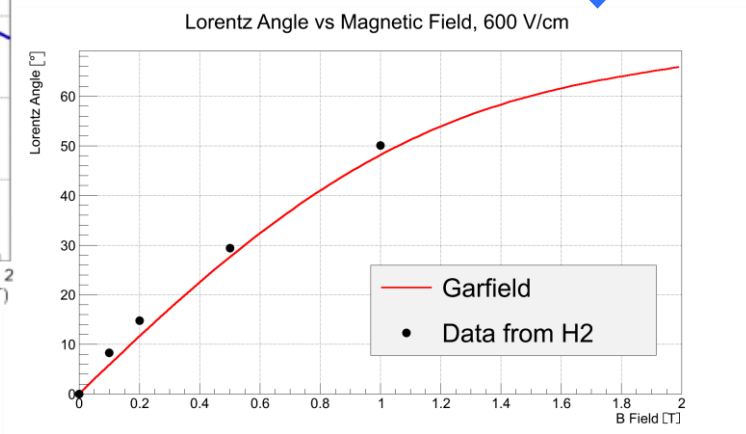


Micromegas Performance in B at SPS/H2

- ATLAS New Small Wheels will be operated in a mixed directional B field up to 0.4 T.
- Micromegas chambers tested in a magnetic field at SPS/H2 in June 2012 using Ar+7%CO₂.
- Lorentz angle & drift velocity measurements are in agreement with simulation.



Lorentz angle from perpendicular tracks;
 $E_{\text{drift}} = 600\text{V/cm}$

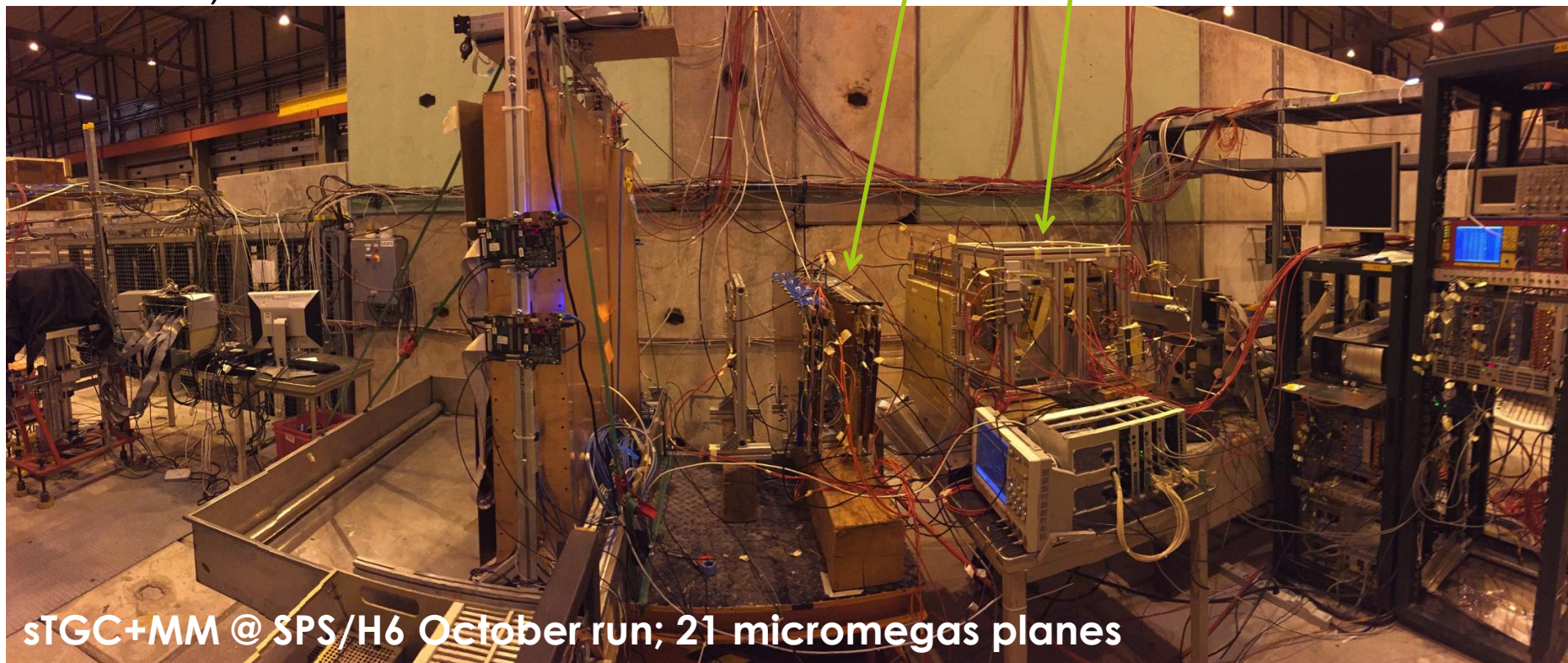


ATLAS End-Cap Toroid field

Micromegas Performance in *B* at SPS/H4

Set-up:

- Rectangular frame hosting up to 8 micromegas small prototypes
- Dimensions of the frame: 80 (in the beam direction)x50x50 cm³
- The frame should go in the region of uniform field
- In addition we're planning to install the MMSW chamber: 8x120x50 cm³. It could be installed just after the rectangular frame even in a region where the field is not perfectly known (the chamber will be equipped with **B**-field sensors)



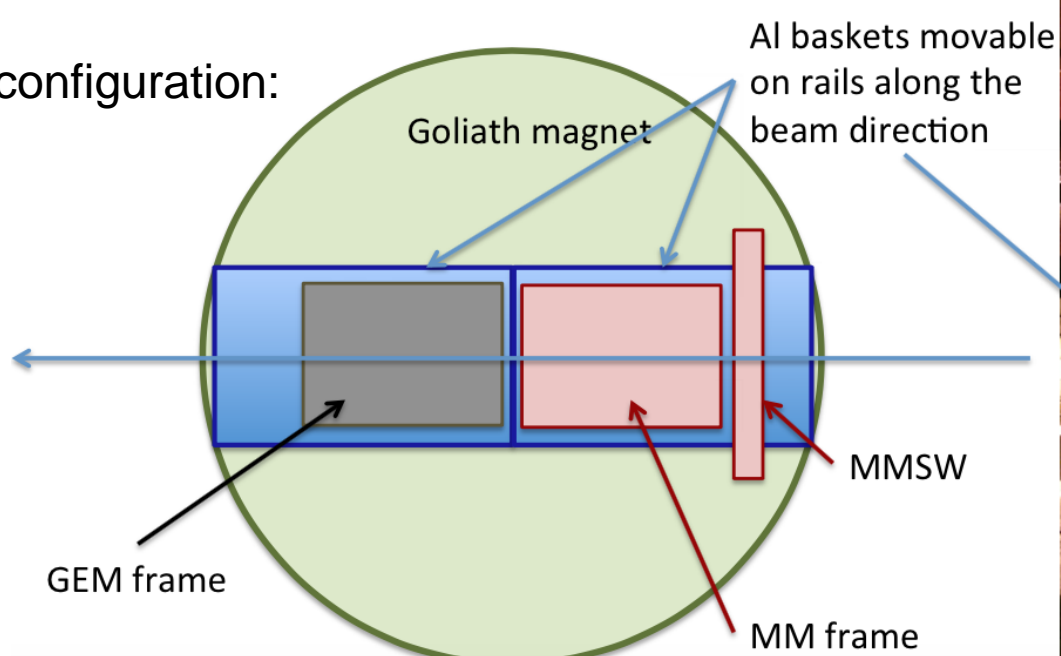
Aim of the test at RD51 SPS/H4:

Additional studies in magnetic field on small chamber and MMSW. Possibly test MM equipped with new electronics VMM2; baseline electronics: APV25

Improve tracking with respect to the previous TB @ H2 in magnetic field;
Track particles inside the magnet;
Reference chambers with reduced drift gap and (possibly) gas with smaller Lorentz angle

MMSW quadruplets will allow to study the resolution of back2back configuration in a detector with design final to the MM NSW modules

Proposed configuration:



Infrastructure

Two gas lines from the gas rack to the area (Ar:CO₂ 93:7 and 85:15)

- We'd like to use two Tmm chambers from RD51 if possible
- Trigger scintillator with NIM logic (we'll provide them)
- ELX: APV25 baseline, VMM2 back-up solution
- From counting room to the area: 2 Ethernet cables, 1 or 2 fibers, some lemo cables
- With the proposed configuration we can run simultaneously with GEM Frascati group