RD51-WG7 Report

RD51 collaboration week

Kolymbari, June 2009

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Outline

- Report from test beam in Demokritos
- RD51 Test beam status report
  - Schedule
  - Experimental zone
  - Setup sketch and mechanics
  - Gas system & cables
  - Magnet
  - Safety instruction
  - Test beam in October and in the next year
  - Summary of the updated costs and proposal for common funds

Report from Test Beam in Demokritos

from E. Ntomari presentation

Test beam set up

- Micr
detect
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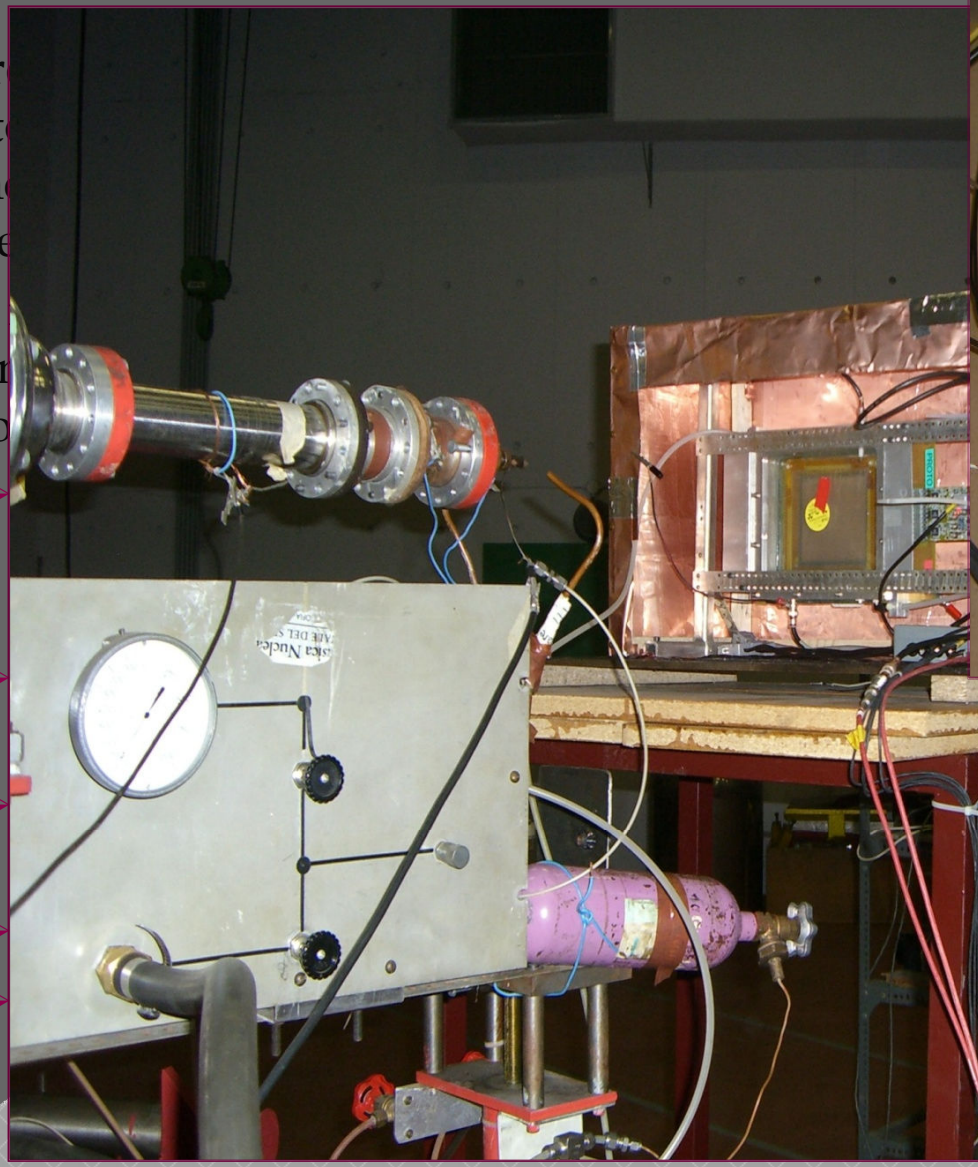
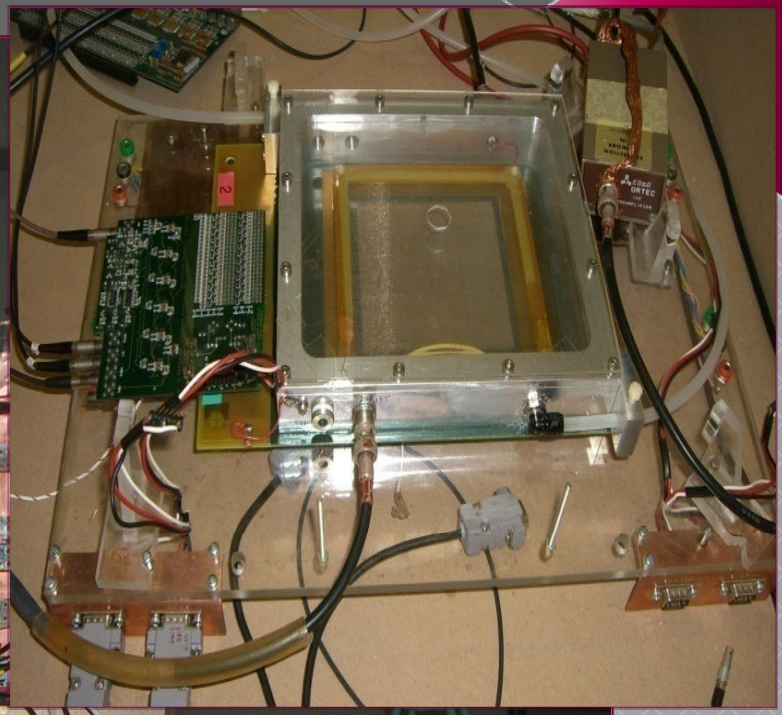
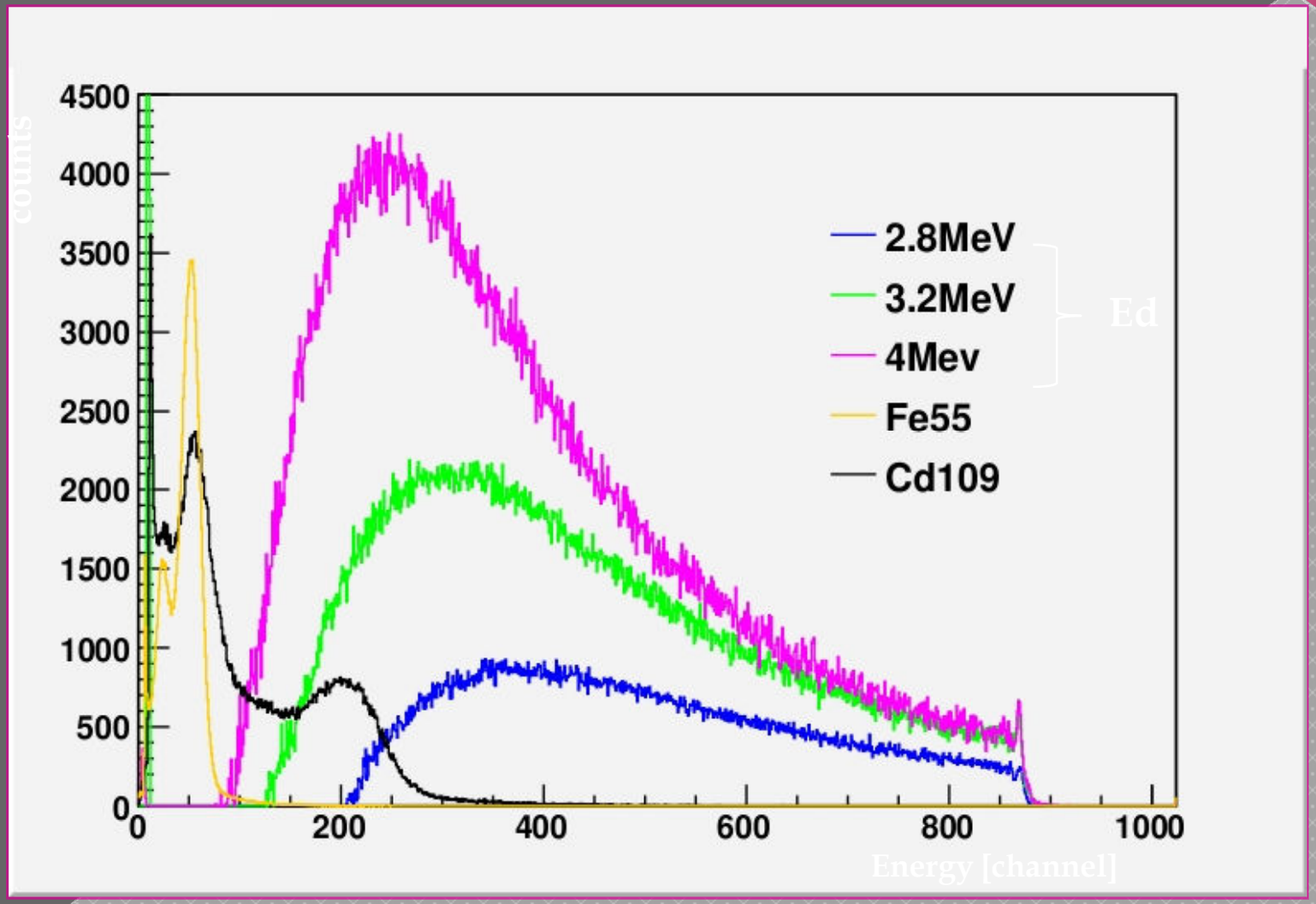
- R&D
trackin
enviro





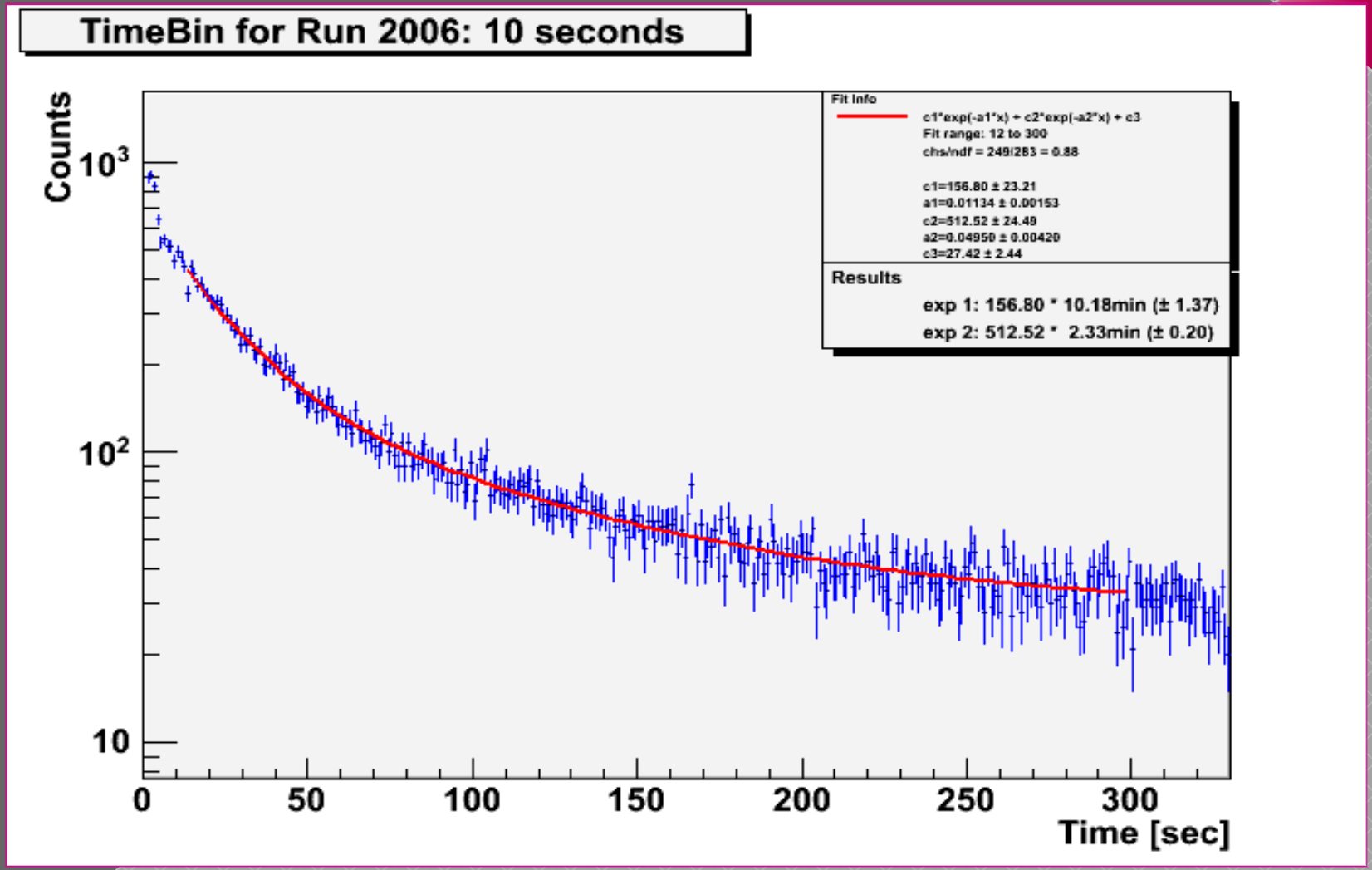
Strip length	1[illegible] cm
Strip pitch	[illegible] mm
Strip width	0.9 mm
Amplification gap	128 um
Conversion region	[illegible] mm

Energy spectrum



The blue, green and violet histograms correspond to the net neutron contribution and the other histograms correspond to calibration with ^{55}Fe and ^{109}Cd

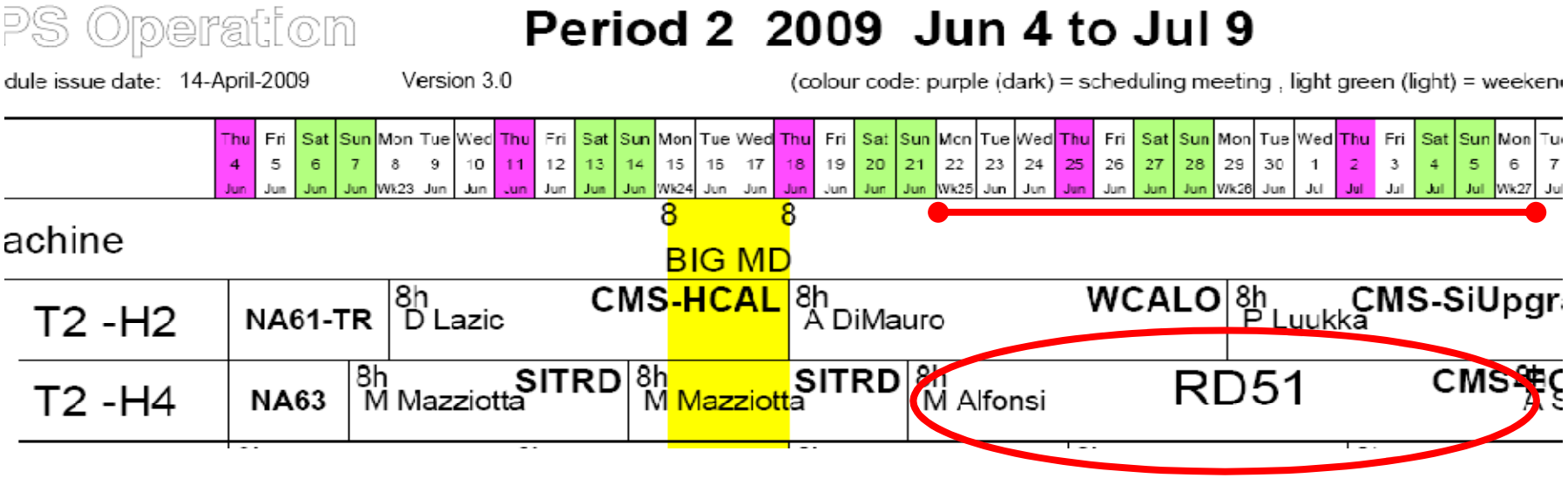
Lifetime measurement

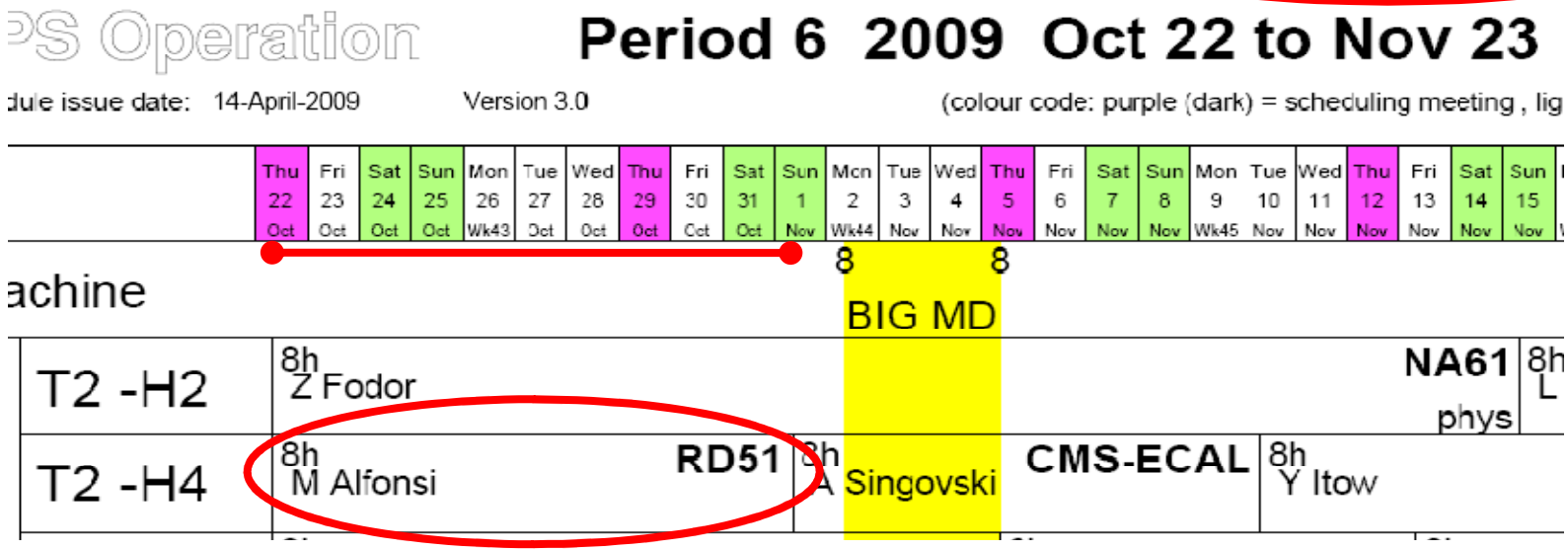


- Lifetimes of :
  - ^{28}Al (2.24 min)
  - ^{27}Al(n,p)^{27}Mg (9.46 min)

Common Test beam @ SPS/H4: status report

2009 test beam schedule





2009 Specific test beam requirements

Requirements 2009:

- Dimension: around 60x60 cm^2 planar devices; weight: few kg devices
- *CF_4 and flammable gas mixtures*
- High resolution (better than 70μm) external tracker
- *Low or high rate beam, typically MIPS (pions preferred)*
- Mechanical Support allowing X-Y position and rotation
- *High Magnetic field, sometimes together with low energy beam*

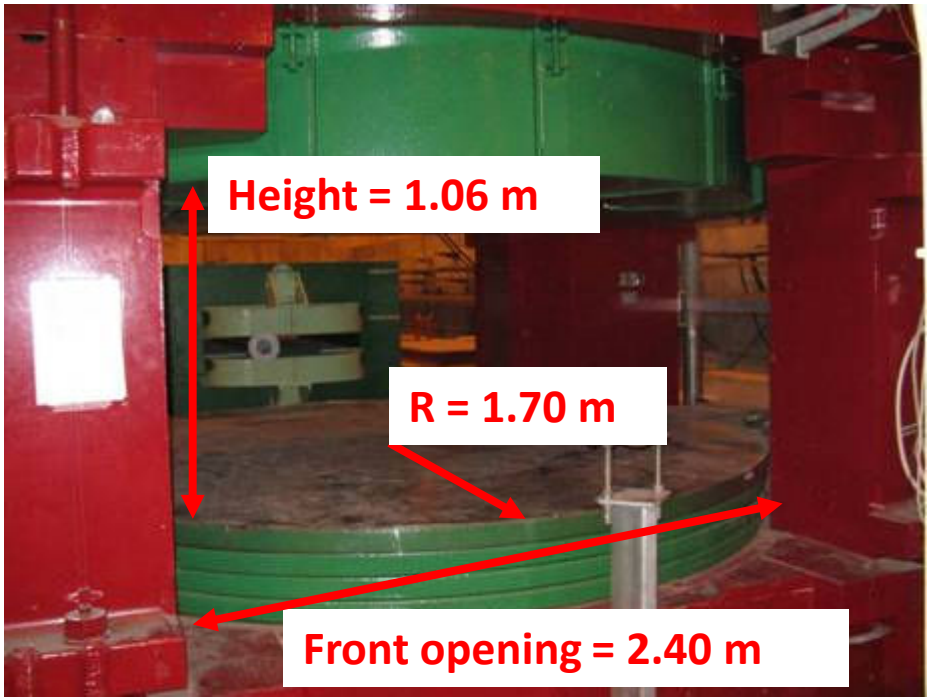
Groups involved in summer time slot:

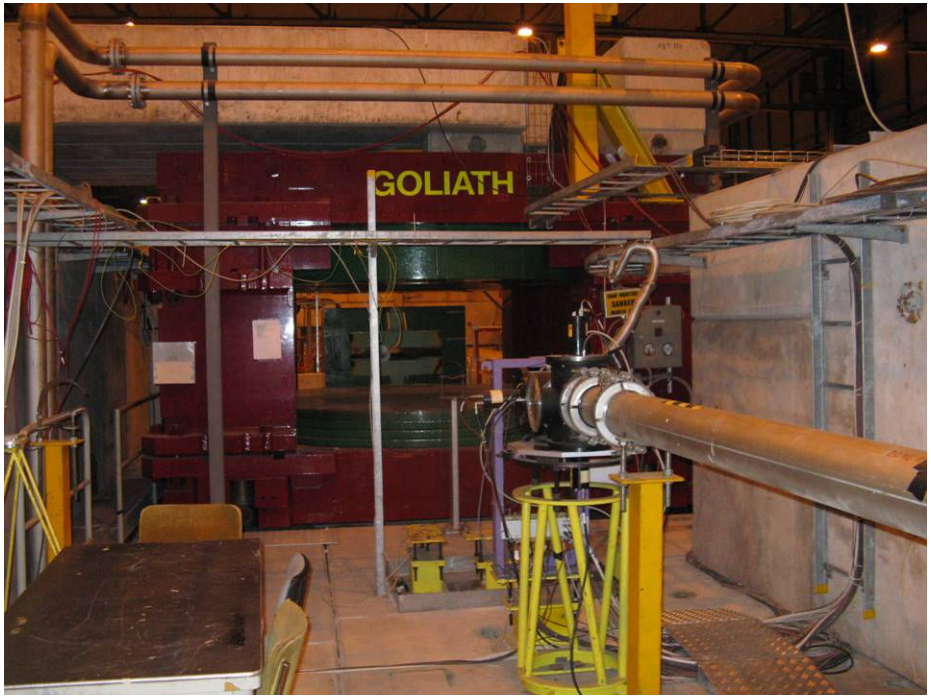
- CERN GDD Large Area GEM detector *(large support)*
- Frascati KLOE-2 GEM prototypes *(magnet, flammable gases)*

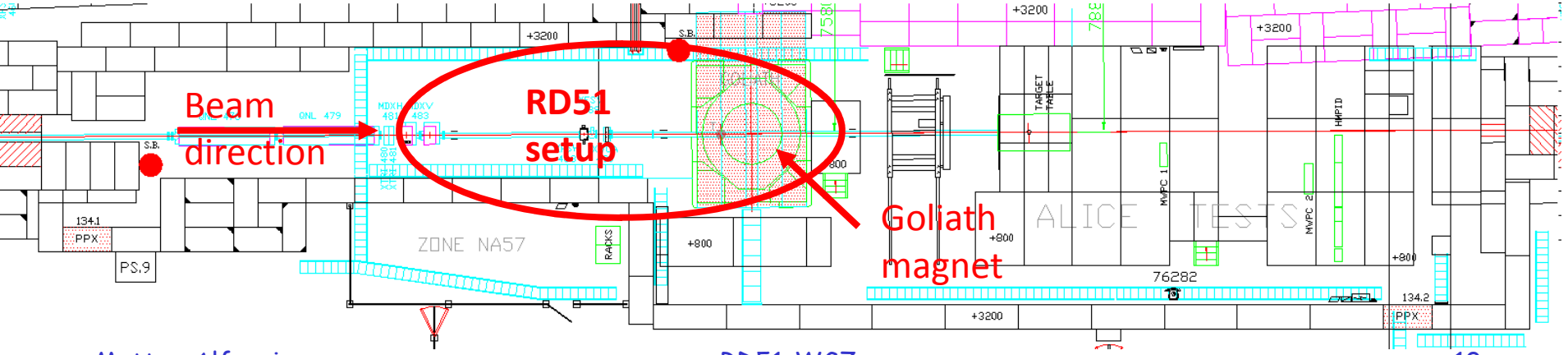
Groups involved in autumn time slot:

- CERN GDD Large Area GEM detector
- Paul Colas' Saclay group MicroMegas TPC *(magnet, low energy beam)*
- Stephane Aune's Saclay group MicroMegas *(magnet?, flammable gases?)*
- Bonn TPC *(high energy beam, magnet?)*

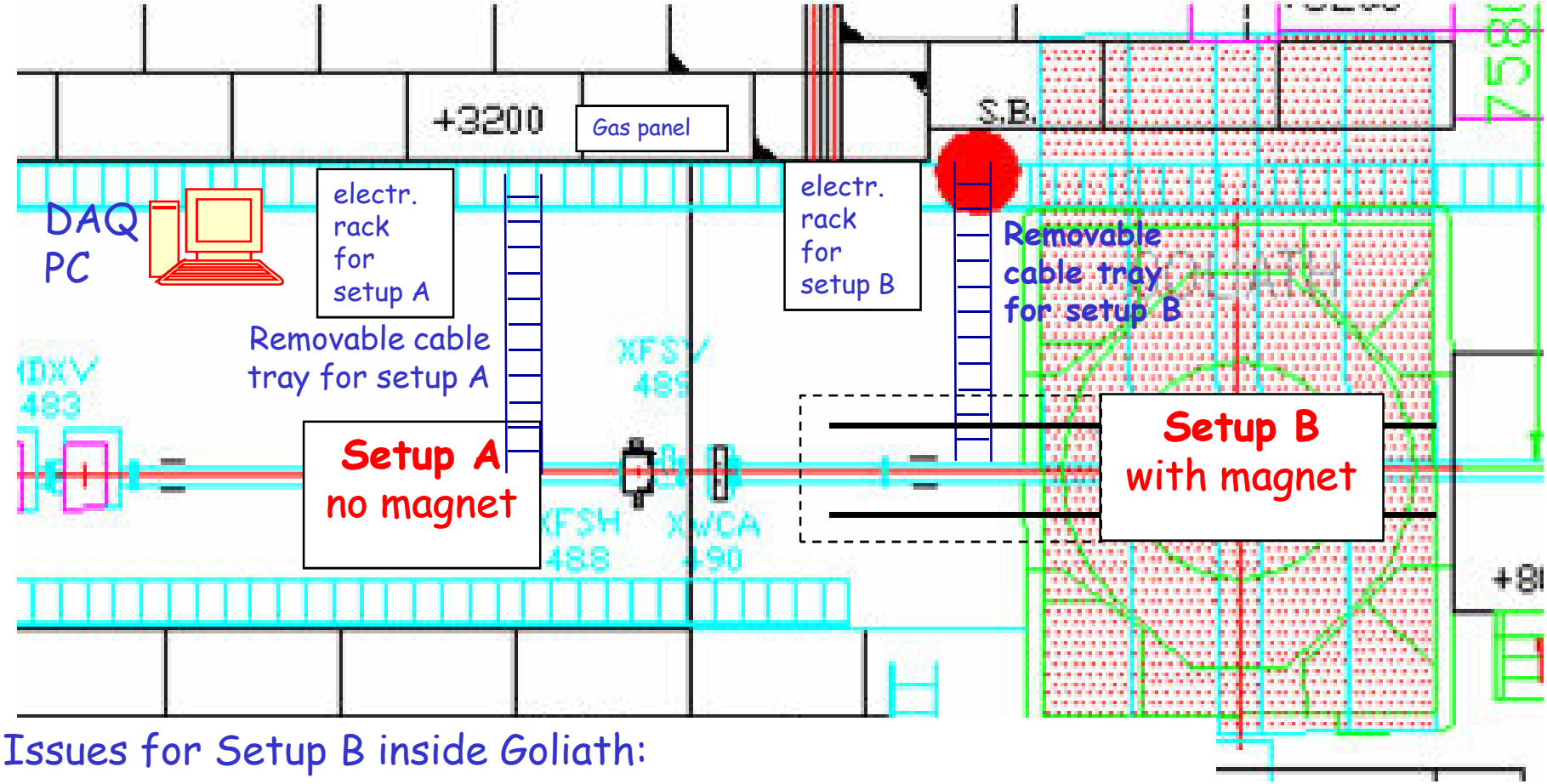
SPS/H4 line at Prevessin North Area







The RD51 installation @ SPS/H4

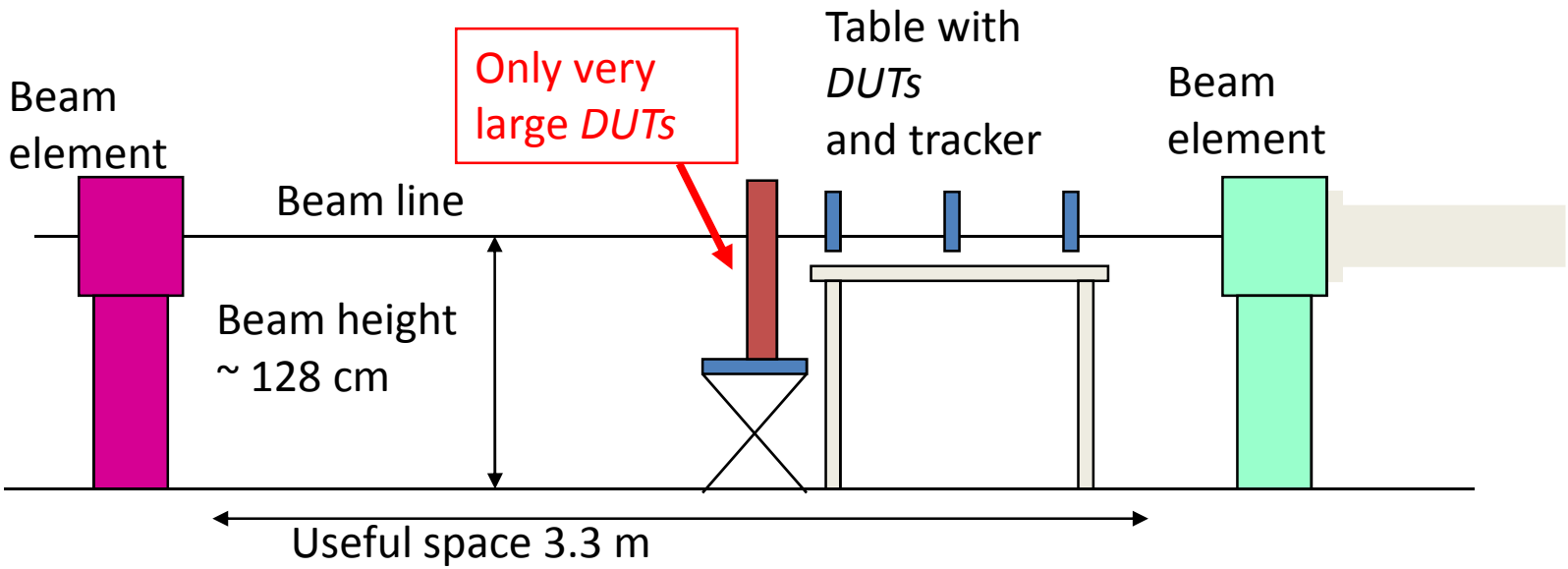


Issues for Setup B inside Goliath:

- Electronics rack is in a region with a 5-10mT fringe field
- Cables lenght can arrive up to more than 8 m

Setup "A" outside the magnet

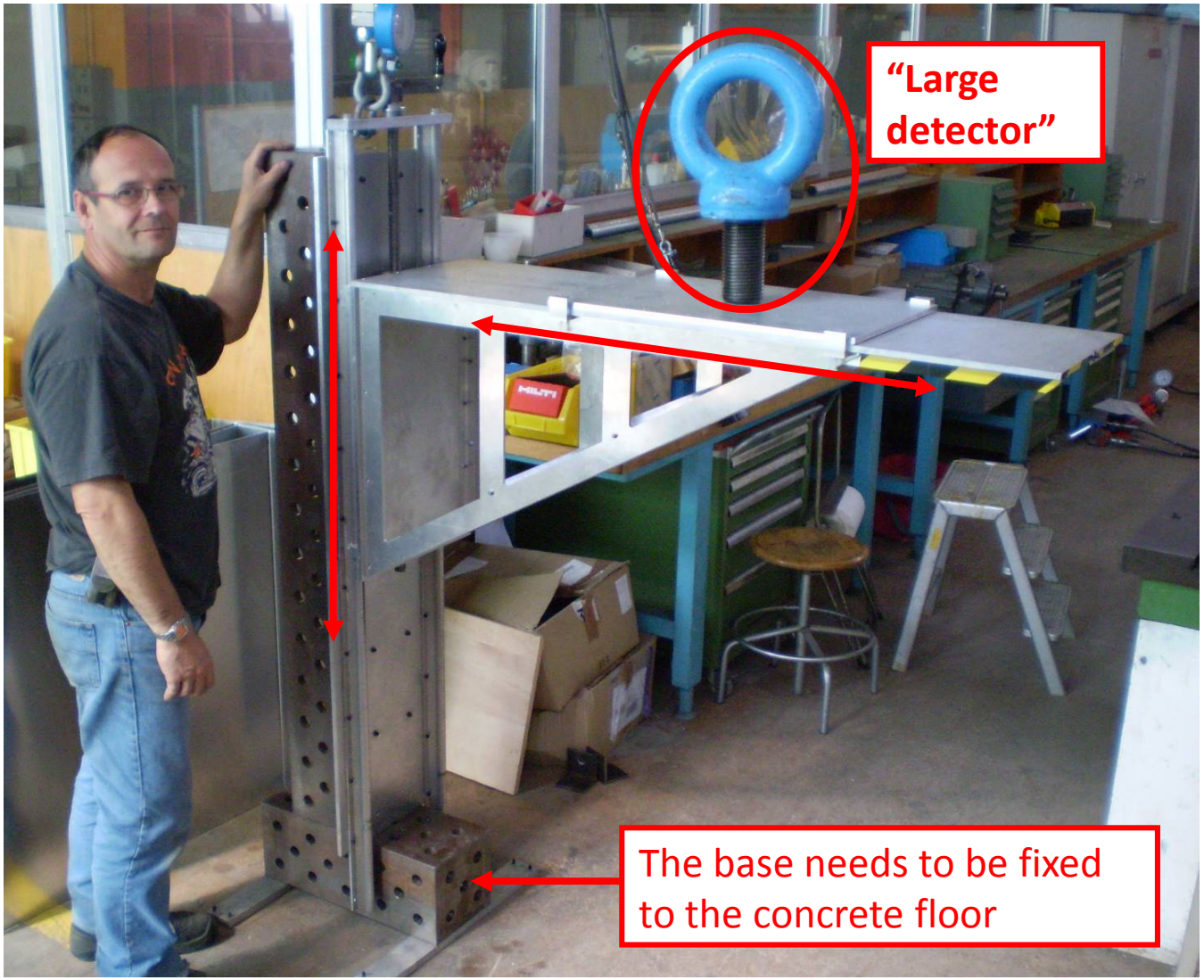
Placed upstream Goliath, composed by a table with precisely-positioned tracking elements and an external support for the case of very large *Detectors Under Test (DUTs)*



Setup "A" table

- height ~ 70 cm
- Surface 85x120 cm^2 with a grid of holes
- Suitable for small (20x20 cm^2), light (5 kg) tracking elements and *DUTs*
- In case of flammable gas, retention buckets can be added on the table (closing the fixation holes)
- Moved out of beam on the side when not used, without dismounting the tracker

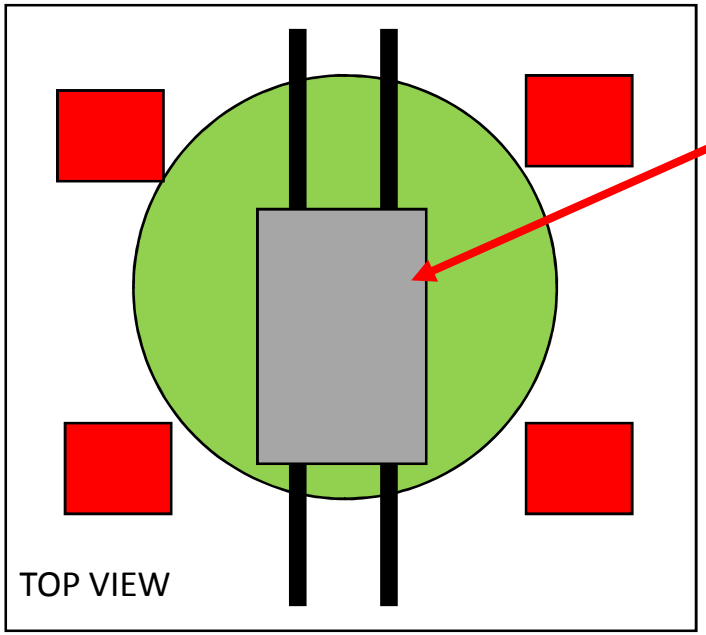
Large detector support



Tracker & DAQ

- A new micromegas tracker, 3 x-y detectors, are ready and will be at CERN next Monday (Demokritos & NTU Athens groups)
- The DAQ system is already at CERN and working
- There is a problem with the block transfer that limits the R/O but will be fixed.

Setup "B" inside the magnet

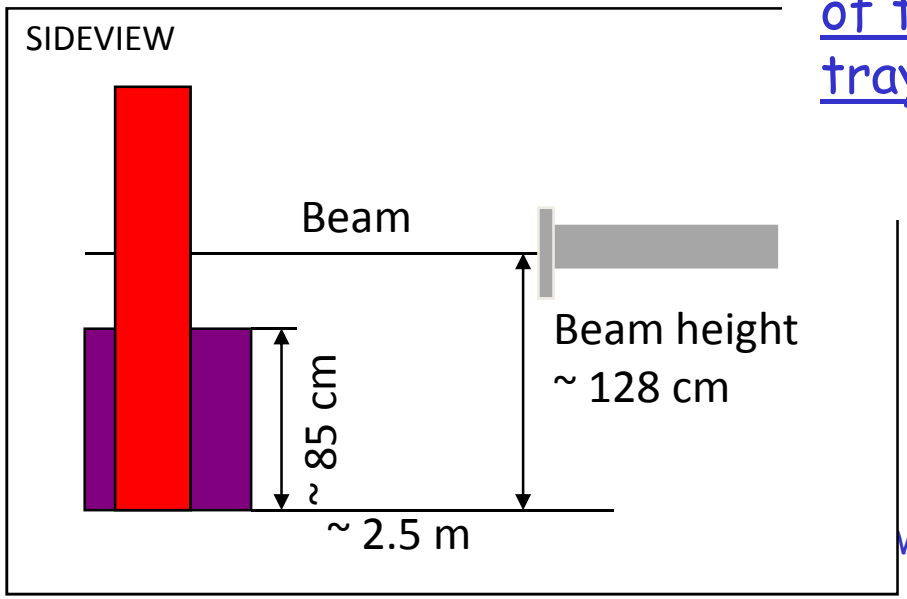


Similar table mounted over rails

Rails will extend out of the magnet for about 1m, with two legs for support

Table will be moved out of the beam when not used. Rails will stay, if possible

More than 8m lenght for cable, to arrive from rack to the farthest part of the magnet, properly using cable trays

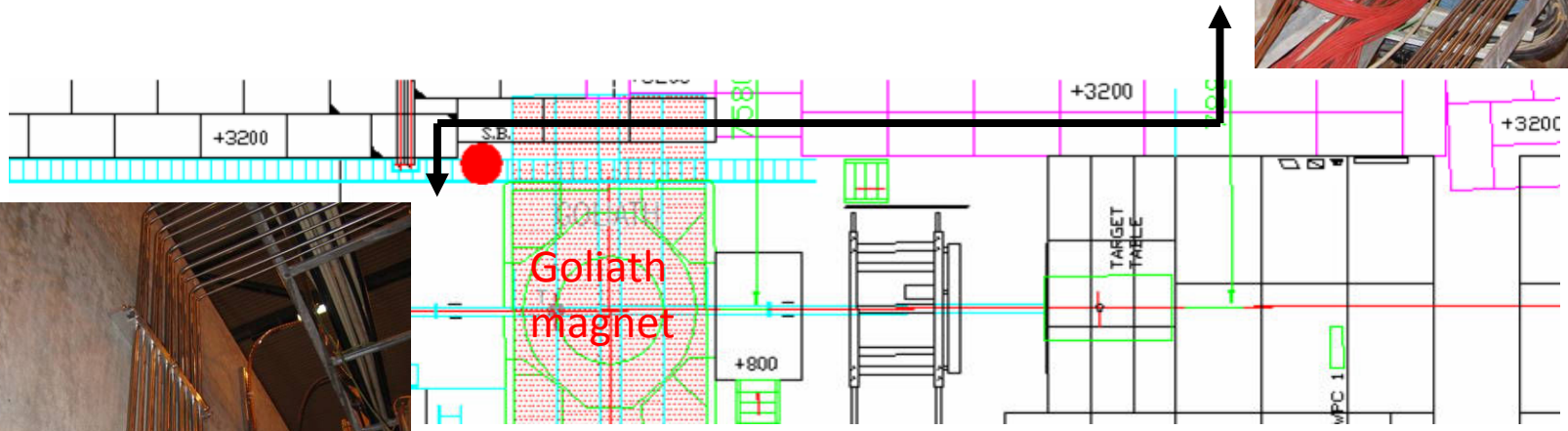


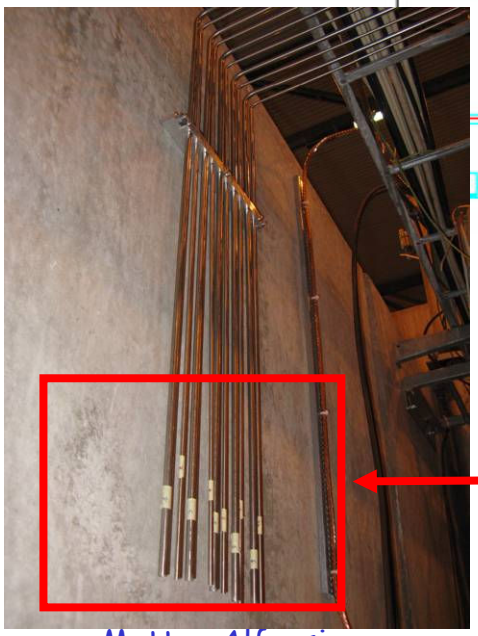
RAIL SYSTEM:

Setup "B" inside the magnet

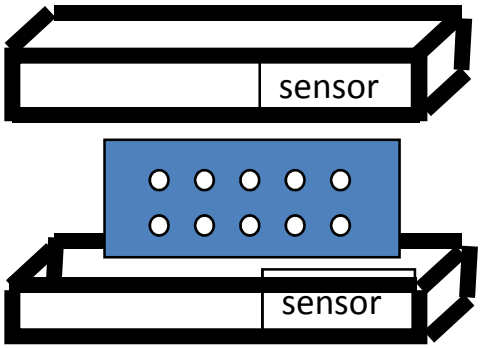
Gas Pipes

- **Stainless steel** from gas zone to a patch panel in the experimental area
- **5 lines**, each with 6mm diam. pipes for inlet and 10mm diam. pipes as exhaust





Gas panel includes also **retention buckets** for **flammable gas sensors.**



Cables list (barrack → area)

Lines installed from the experimental area to the barracks

- Fiber line x2
- Ethernet lines x3 + 2 small switches at both sides
- SHV lines x4
- 16 LEMO coaxial cables

Still missing:

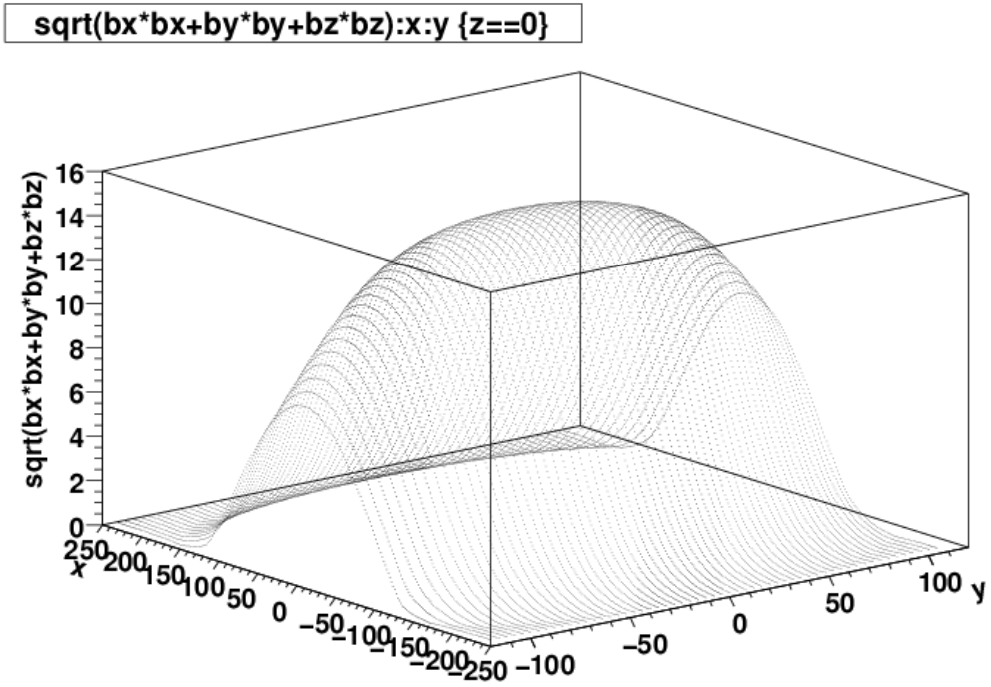
- Other fiber lines for October
- More coaxial cables

Cables inside the experimental area must be provided by the users!!!

Specification and field map from NA57

Power: about 2MW
Maximum field: 1.4T
Gap volume: around 8 m^3
Max. water pressure: 10 bar

- Looking at the map realized during NA57 experiment, the field seems to drop fast when approaching the border.



Field map realized during NA57 experiment, file decoded by Frascati group

experimental area hazards and operational procedures

- Goliath magnet safe operation
  - Goliath magnet specifications and hazards
  - Procedures for people joining the test beam
  - Goliath operative procedures
- Flammable gases safe operation
  - RD51 gas system specifications
  - Detector installation and commissioning
  - Initial and final purging procedures

Additional information about October

Irfu cea saclay

Test beam planning on resistive Micromegas by Clas12 + Compass Saclay groups

Characterization of Micromegas prototypes with resistive layer at high hadron flux

- pion test beam on SPS from 22/10 to 1/11/2009
- study of resistive prototypes performances in high discharge rate environment
- discharge rate, gain and efficiency measurements on ~5 prototypes (3 in the same time)
- spatial resolution measurements if tracker available (σ_x ~ 100µm)
- combined scans foreseen: mesh HV (~10 points), drift HV (~5 points), drift space (~3 points)
- 128 channels / prototype to read with Gassiplex and/or T2K readout
- custom DAQ, read-out of external detectors to be investigated
- flammable gas mixture (Ar-95%, iC_4H_{10}-5%)
- dimension of each detector: 150x100mm² (active area 100x100mm²), longitudinal size 50mm

Additional information about October

Irfu cea saclay

Test beam planning on resistive Micromegas by Clas12 + Compass Saclay groups

All the October participants (Bonn, CERN and 2 Saclay groups) must join in a meeting to discuss the organization of the test beam. Proposal: an EVO meeting (at least half day) in the week 13-17th of July

- flammable gas mixture (Ar-95%, iC_4H_{10}-5%)
- dimension of each detector: 150x100mm² (active area 100x100mm²), longitudinal size 50mm

First 2010 request

- Requested by Gossip/GridPix group at Nikhef
  - Harry van der Graaf, Fred Hartjes

1. Low flow gassystem
   - 5 - 20 ml/min
   - using pipes with low volume => thin (2 mm ID)
2. Stable X-Z tafel
   - remote control
3. DAQ hut
   - Cupboards that can be locked
4. Common trigger
   - Event counter with RS485 bus
   - R.O. by more than one DAQ PCs
5. Magnet (2T?)

Proposals for common funds?

- Gas system in priority order:
  - Flexible stainless steel pipes for final connection to the detector (very important for flammable gas).
    Rough estimated cost: 1000-1500 CHF per detector gas line
  - Gas mixing system for 4 components, including flammable gas compatibility.
    Very expensive! Up to 25kCHF per mixing system

- Common electronics rental at e-pool.
  A full year rental costs around 7kCHF