Proposal of FT5-6 layout change

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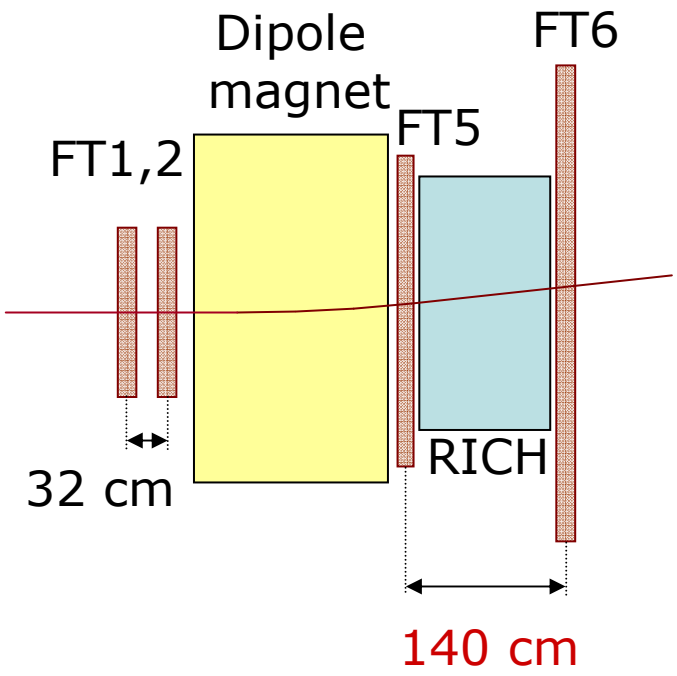
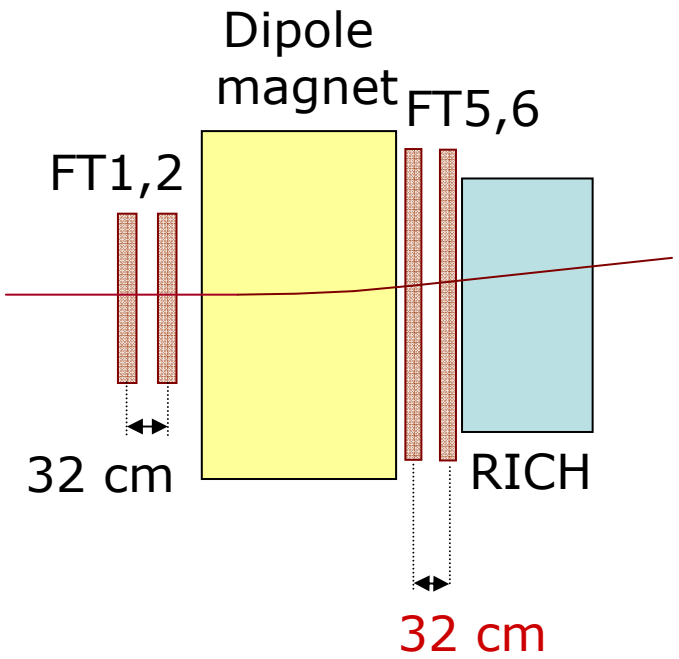
Long vs. short lever arm of FT5-FT6

(short lever-arm proposed as an alternative at TB-meeting, Paris, Sept. 2012)

Long lever arm



Short lever arm

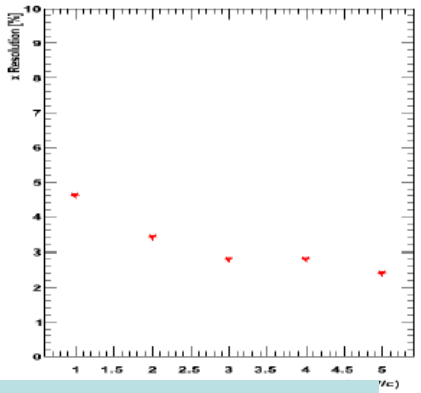


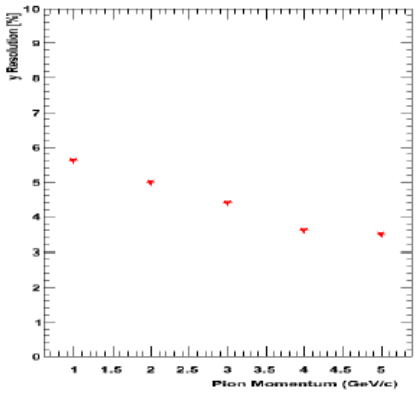
Momentum resolution

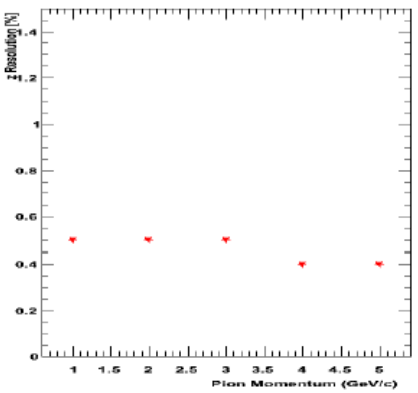
(Elisa Fioravanti, Computing session, PANDA meeting, GSI, June 2013)

Long lever arm

x axis: Pion Momentum Y axis: x,y,z Momentum Resolution (%)

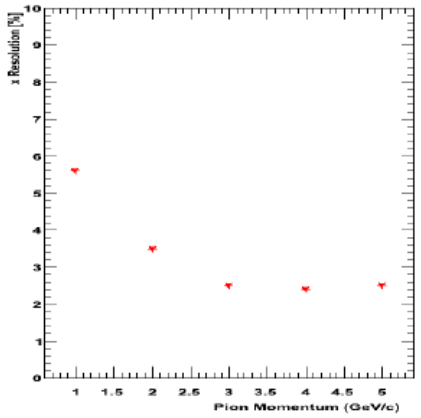


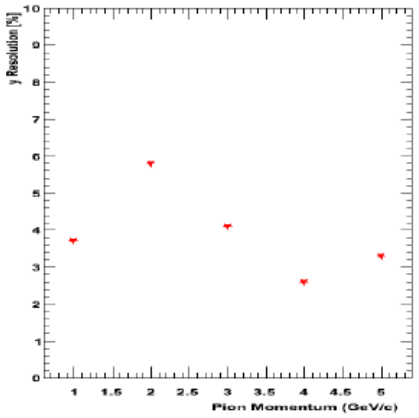


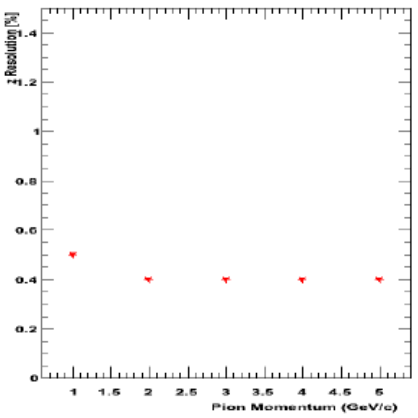


Short lever arm

x axis: Pion Momentum Y axis: x,y,z Momentum Resolution (%)



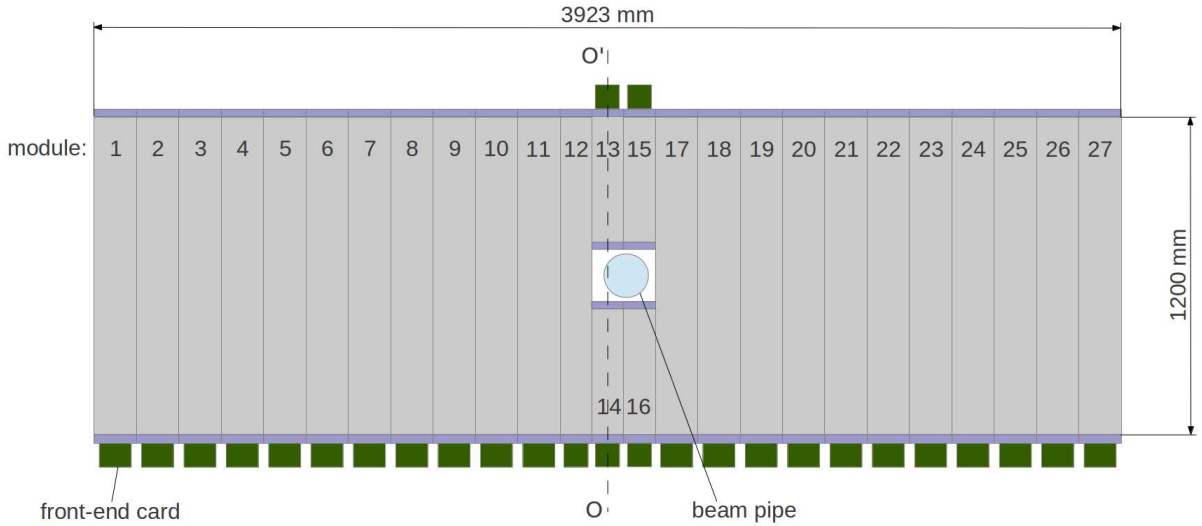




Advantages of the short lever arm option

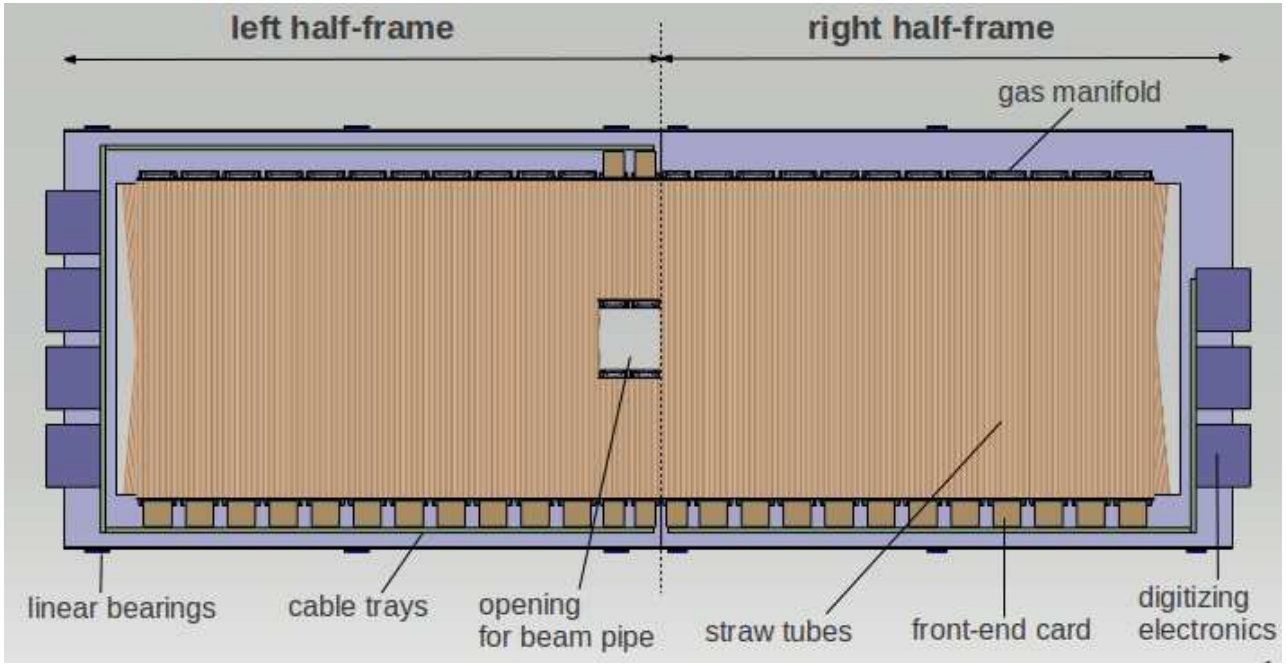
- Smaller active area of FT6: 3.9 m x 1.2 m
  instead of 6.0 m x 1.4 m;
  Number of straw tubes in FT6: 3200 instead of 4700
- Identical construction of FT5 and FT6
- Easy access to double layers in FT6 (as in FT5)
- Compact common support - relative-positioning of FT5-FT6 more precise

Basic features of FT5,6 design in the short lever arm scenario



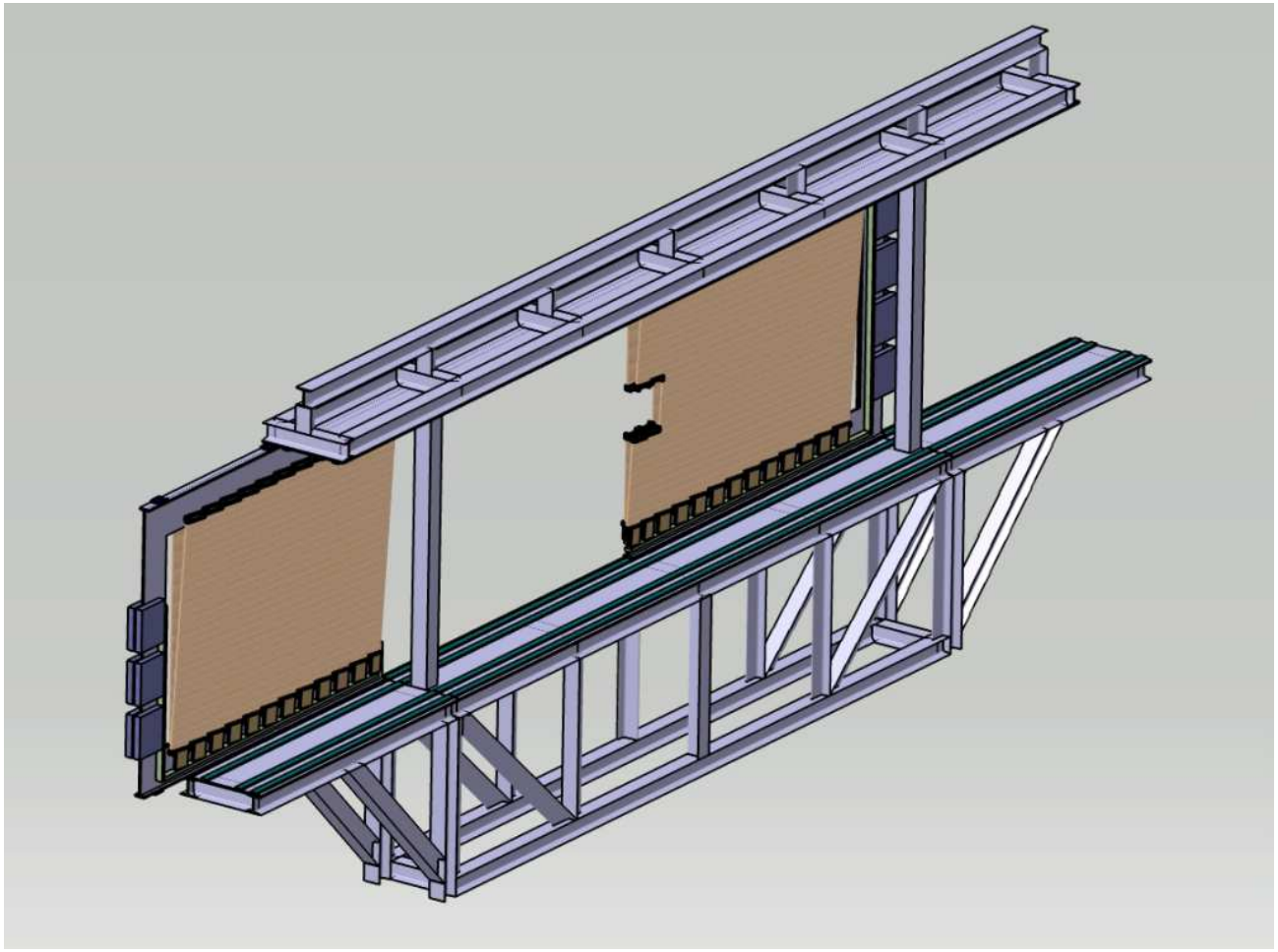
- FT5, FT6 – identical
- Active area: 3.9 m x 1.2 m
- One station - four double layers: 0°,+5°, -5°, 0°
- One double layer: 27 straw tube modules

Support frames



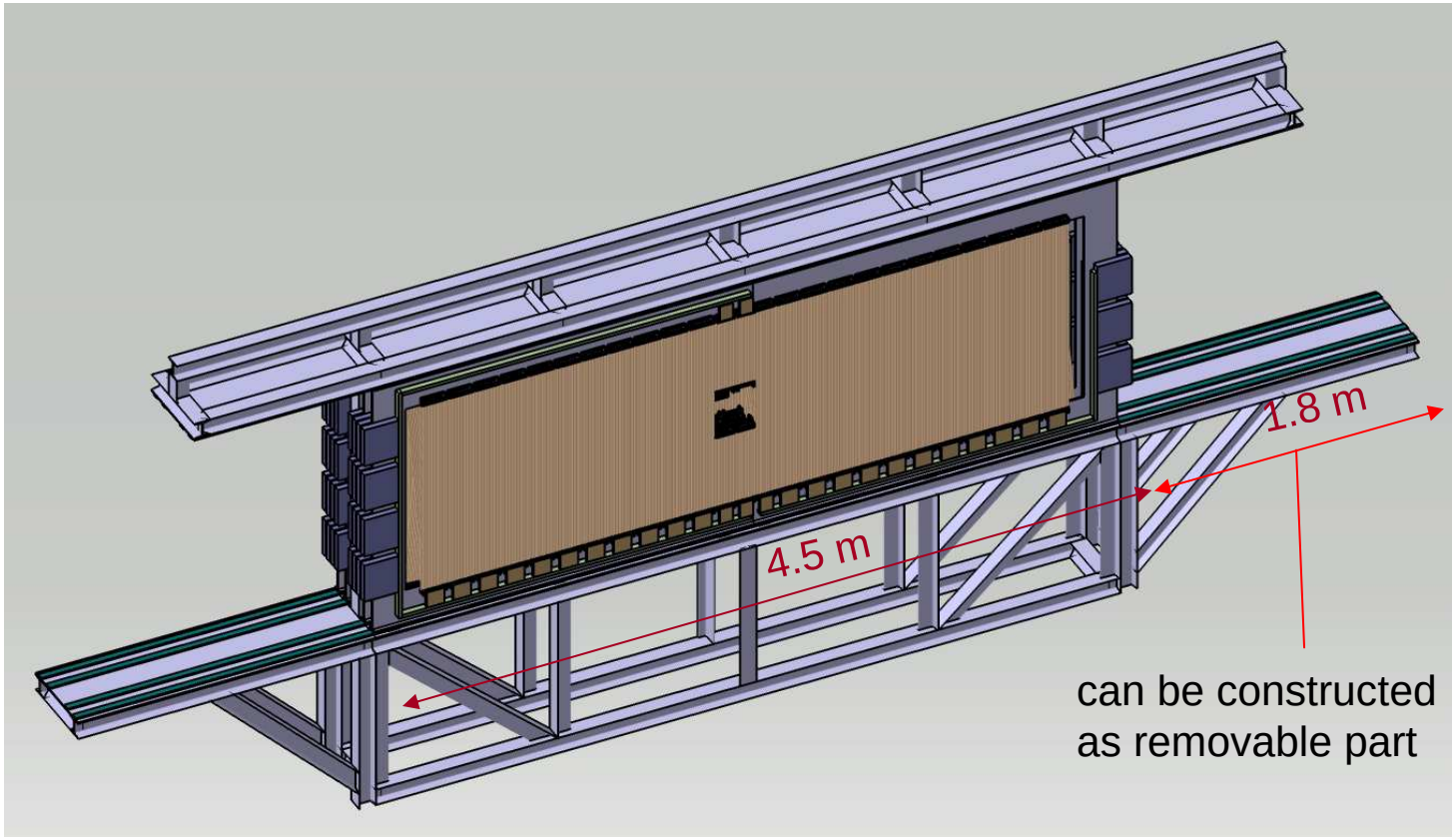
- One support frame is used for two double layers (0°,+5°), second for (-5°, 0°)
- Pairs (0°,+5°) and (-5°, 0°) are identical
  (*rotation by 180° around y-axis*)
- Each rectangular frame consists of two C-shaped half-frames

Trestle for movable half-frames



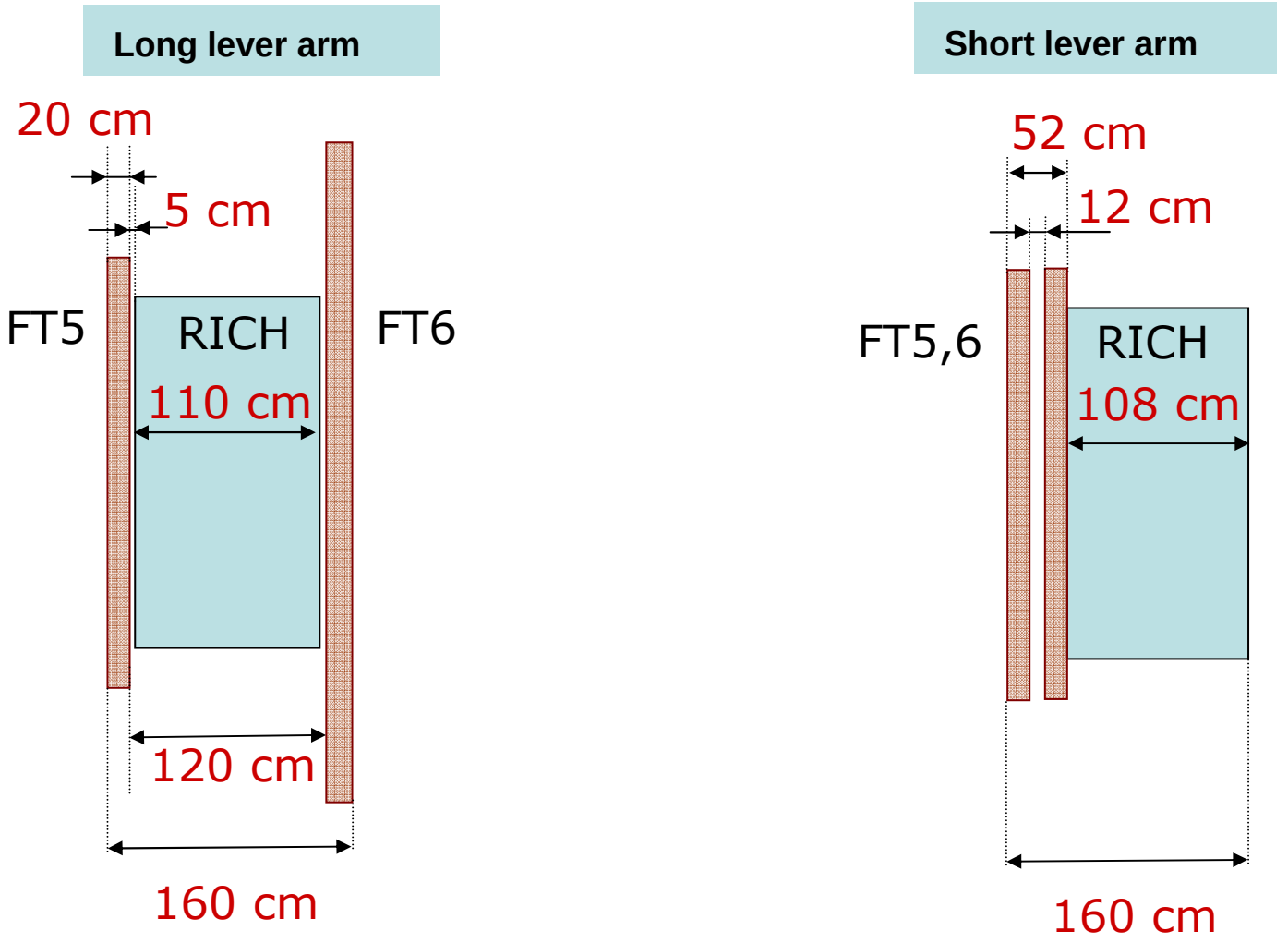
- Each half-frame is guided by a pairs of rails –upper and lower one
- Easy access to straw tube modules (also in experimental hall)
- Access to the beam pipe connection between the dipole magnet and FT5

FT5-6



- Trestle with FT5-6 is placed on the forward platform
- The lower rail with length of 8.1 m can be split into 4.5 m central fragment and two removable 1.8 m long side pieces

Allocation of space in z-direction



- Space in the z direction foreseen for the RICH is slightly smaller in the short lever arm scenario

z-coordinates

Long lever-arm

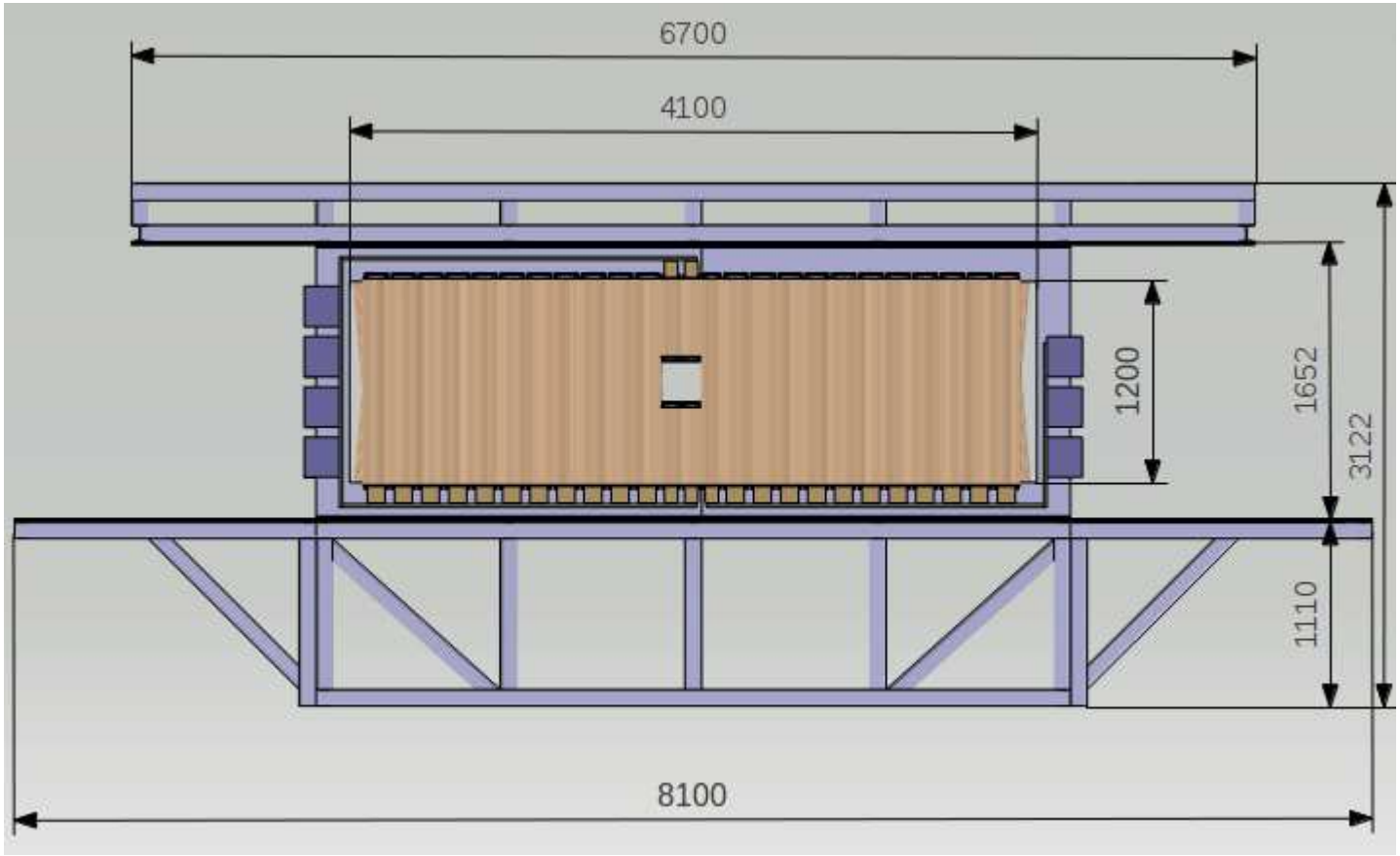
	z [mm]	Δz [mm]
FT5	6050-6250	200
RICH	6300-7400	1100
FT6	7450-7650	200

Short lever-arm

	z [mm]	Δz [mm]
FT5	6050-6250	200
gap for support	6250-6370	120
FT6	6370-6570	200
RICH	6570-7650	1080

Backup slides

Overall dimensions



Uncertainty of track inclination measured with FT5-6

p **[GeV]**	θ_{defl} **[mrad]** Bl = 2Tm	θ_{mult} **[mrad]** RICH (HERMES type, NIM A479 (2002)511) X/X_0=0.12	θ_{mult} **[mrad]** FT5 X/X_0=0.0038	θ_{det} **[mrad]** =0.1mm / 320mm
1	600	5.9	0.91	0.3
3	200	1.5	0.23	0.3
5	120	0.9	0.13	0.3

For the long FT5-6 lever arm the multiple scattering on RICH dominates the uncertainty of track inclination

For the short FT5-6 lever arm the multiple scattering on tracking stations and the detector angular resolution dominates the uncertainty of track inclination