Forward Tracking Stations Simulations

Elisa Fioravanti
Isabella Garzia

Groningen PANDA Collaboration Meeting,
30 August-3 September 2010

Outline

- Geometry definition.
- Simulation:
  Chambers, layers and tubes numbers definition;
  muons p=1GeV/c;
  muons p=5GeV/c;
- Conclusions.

Geometry definition

1. ASCII file;
2. 6 chambers, each with 4 double-layers (8 layers);
3. For the first and fourth double layers of each chambers the tubes are straight. For the second and the third double layers the tubes are inclined respectively of +5° and -5°;
4. We implement shorter tubes in order to build the neccessary space for the beam pipe following the configuration decided on december 2009;
5. The double layers for the chambers inside the dipole magnet have different sizes;

Properties of straws:

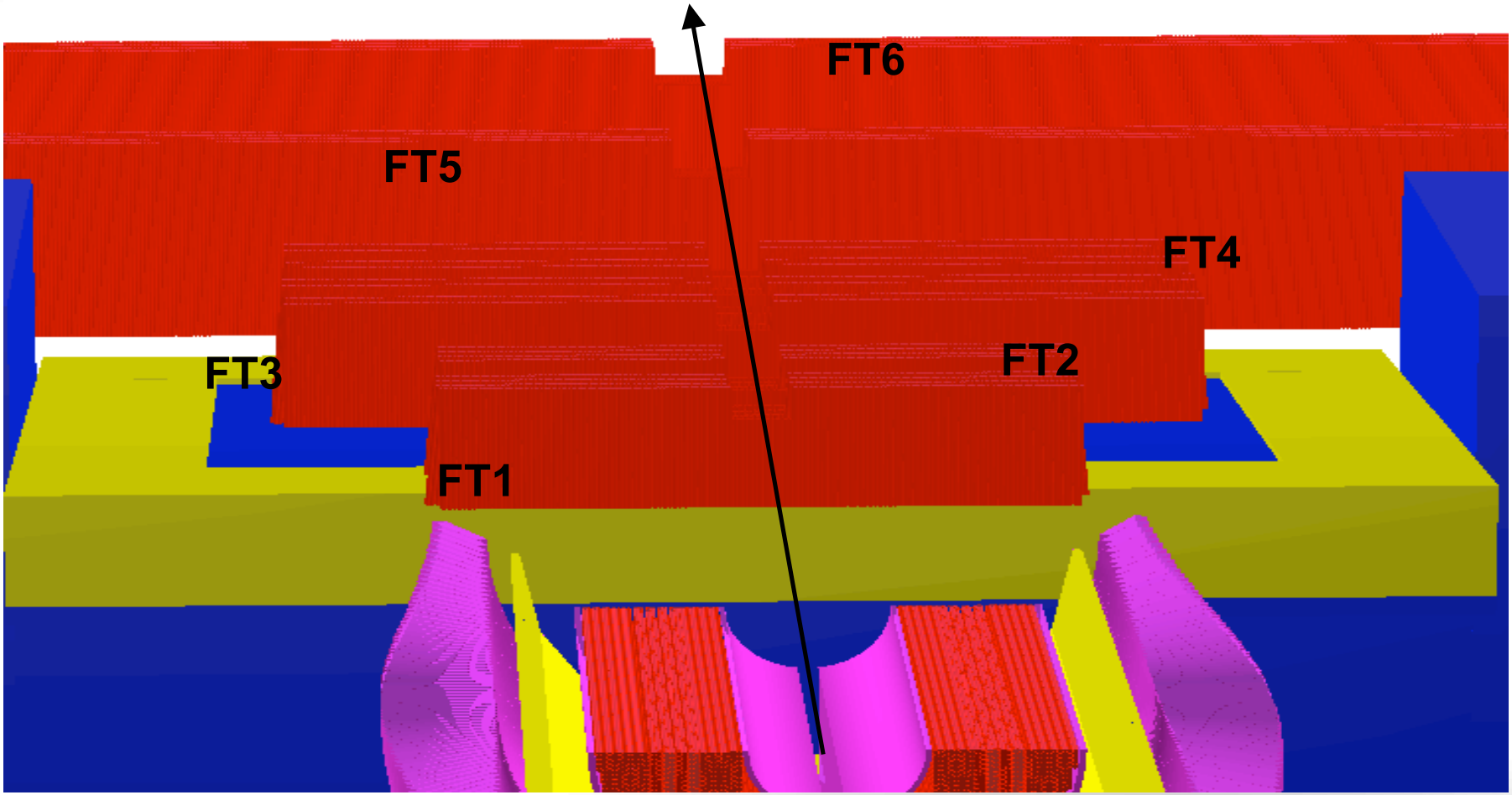
Straw diameter=10.1 mm;

Tube wall=0.03 mm Mylar;

Sense wire diameter=0.02 mm (W)

Gas filling: 90% Ar+10% CO_2 at 2 bar

Geometry definition



Simulation

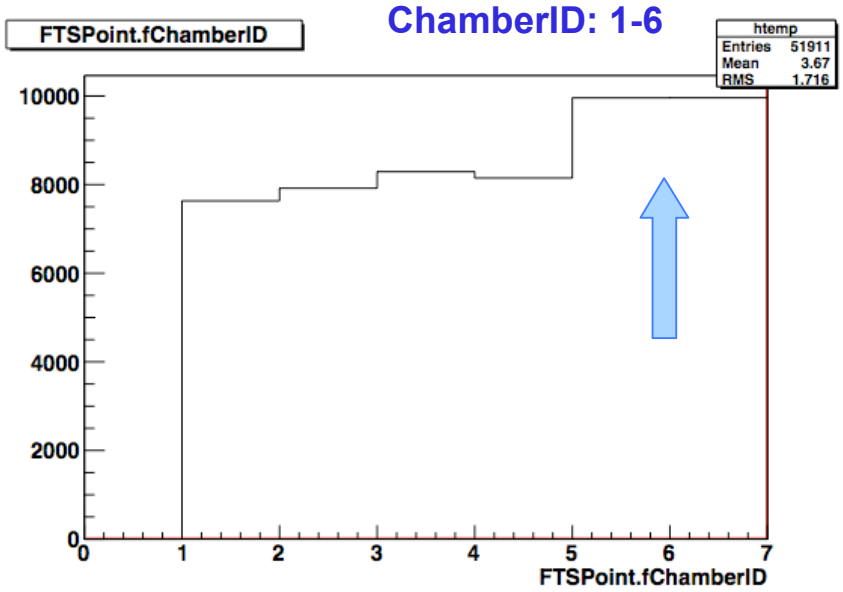
Detector identification: ChamberID, LayerID, TubeID
(FTS Mapper under construction: PndFtsMapCreator)

Simulation parameters:

1000 μ^- (μ^+) events simulated with BoxGenerator
p=1Gev/c and p=5Gev/c;
phi range: [0°-360°];
uniform distribution in cos(theta);
theta range: [1°-5°];
Beam momentum: 15 GeV/c

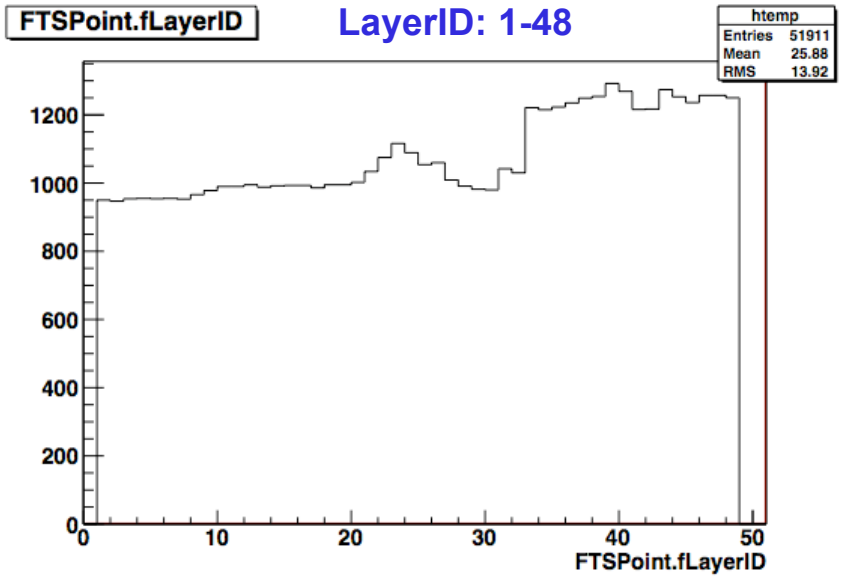
Simulation: 1GeV/c muons

ChamberID: 1-6



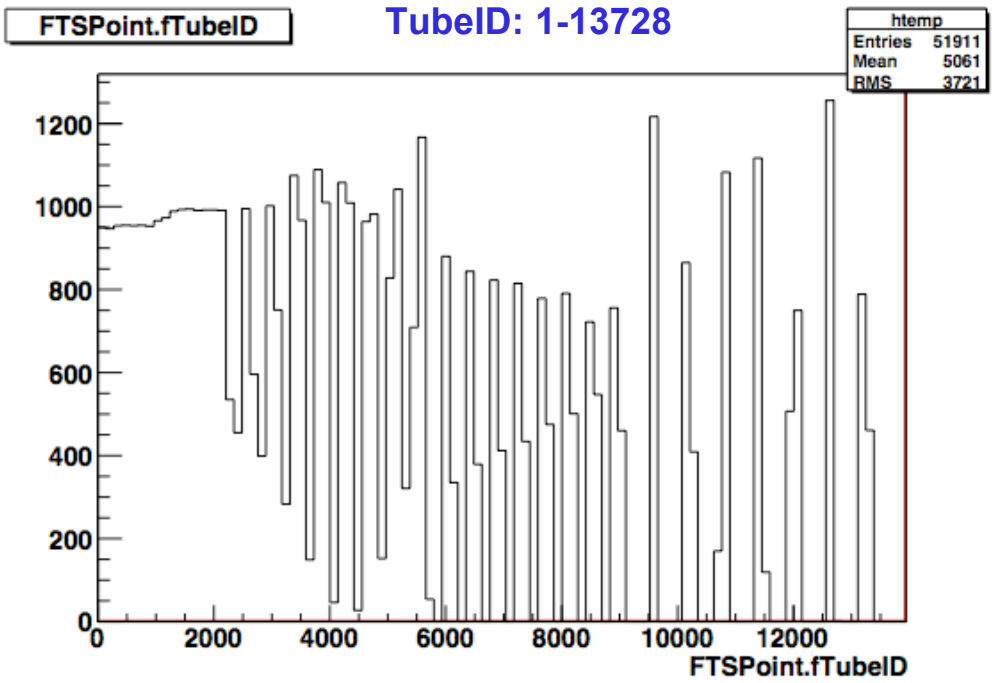
The bigger counts for the last two chambers is due by the dipole magnetic field which bend the trajectory of particles.

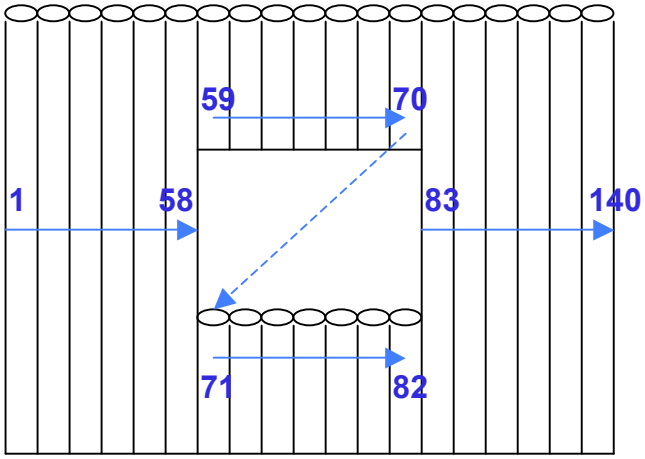
LayerID: 1-48



Chamber 1⇒layers 1 - 8
Chamber 2⇒layers 9 - 16
Chamber 3⇒layers 17 - 24
Chamber 4⇒layers 25 - 32
Chamber 5⇒layers 33 - 40
Chamber 6⇒layers 41 - 48

Simulation: 1GeV/c muons





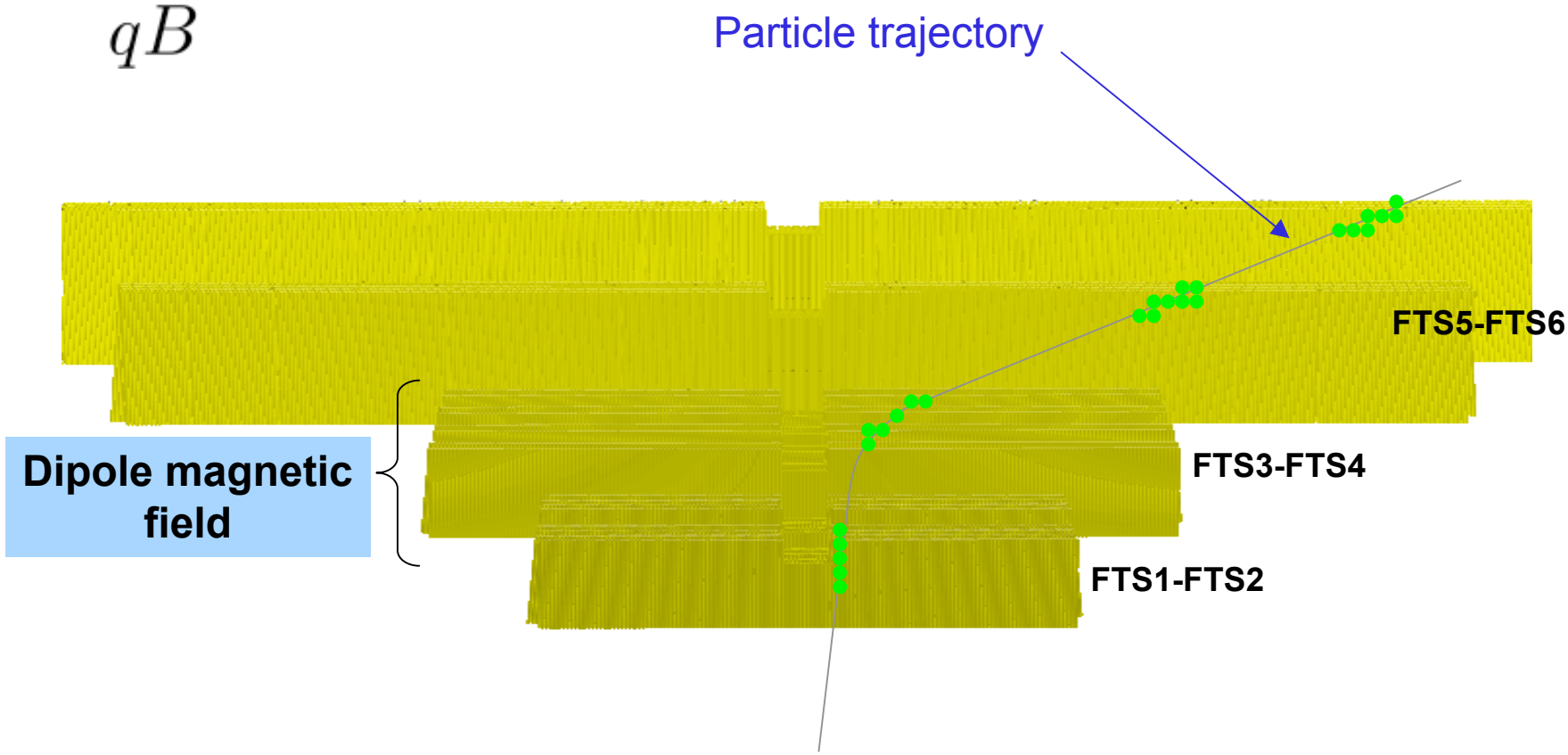
Chamber 1: TubeID 1-1120
Chamber 2: TubeID 1121-2240
Chamber 3: TubeID 2240-3872
Chamber 4: TubeID 3873-5504
Chamber 5: TubeID 5503-8848
Chamber 6: TubeID 8849-13728

Simulation: 1GeV/c muons

$$R = \frac{mv_0}{qB}$$

p=1GeV/c

- Hit tube

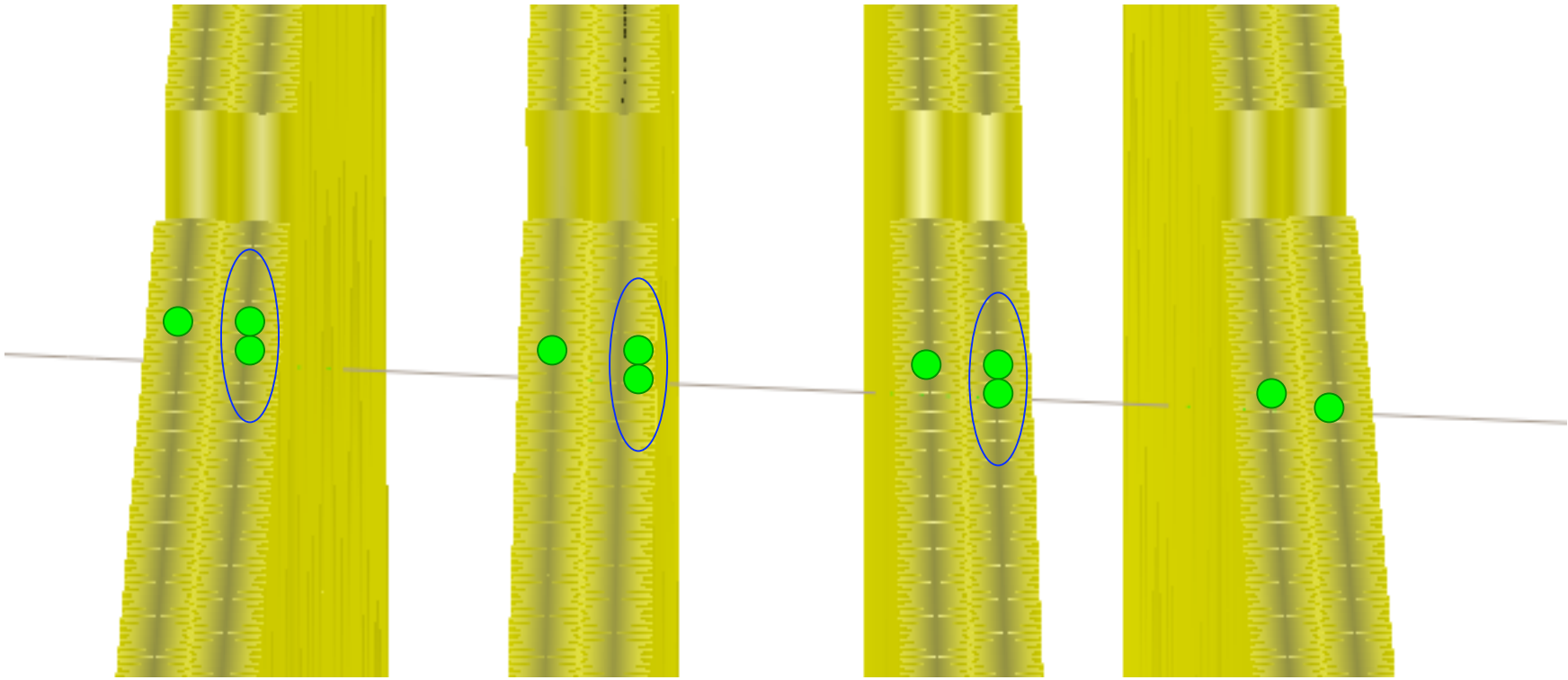


Simulation: 1GeV/c muons

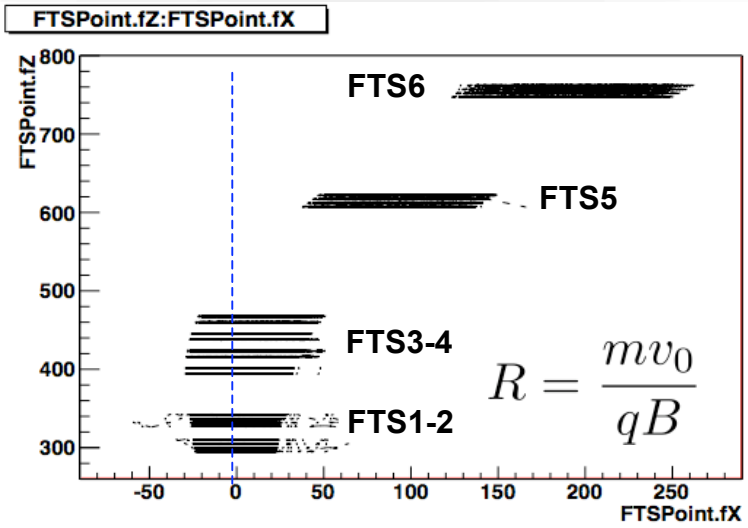
p=1GeV/c

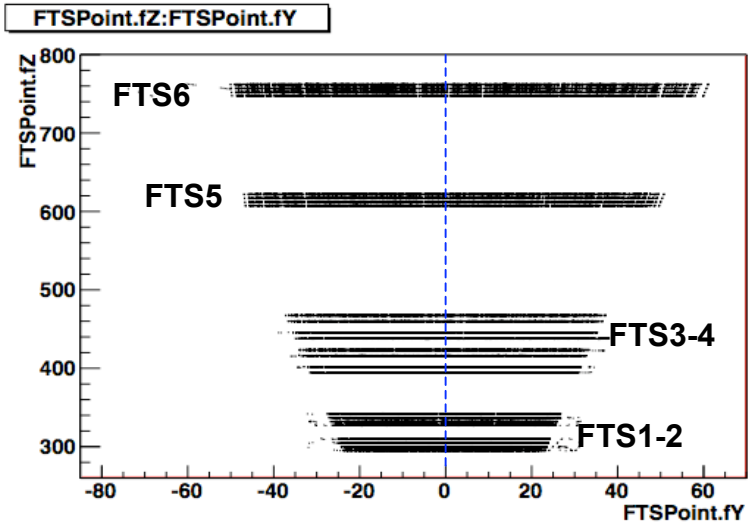
- **Hit tube**

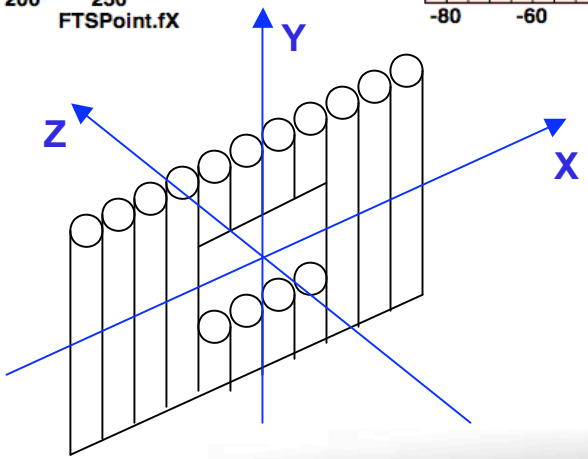
Zoom of chamber 6



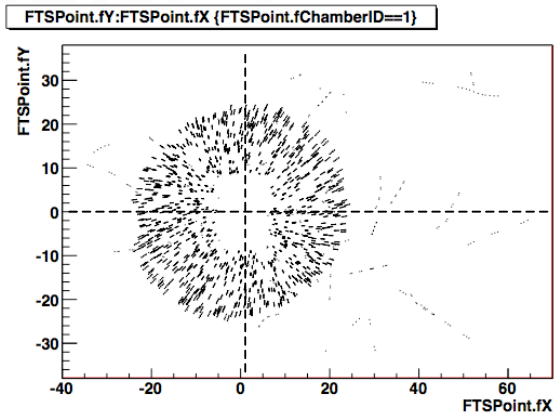
Simulation: 1GeV/c muons

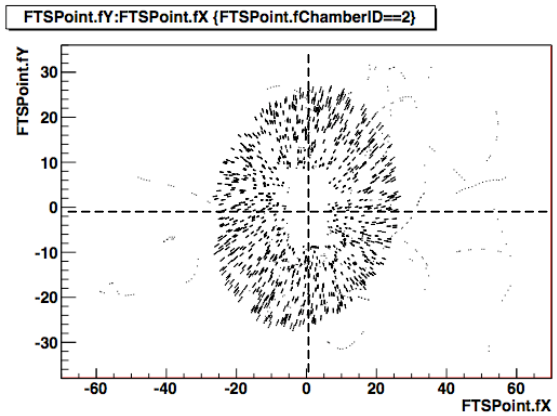


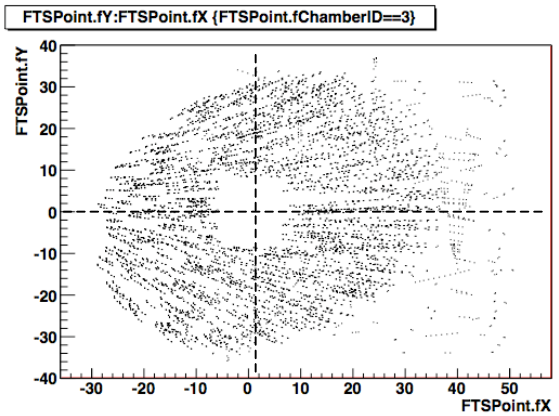


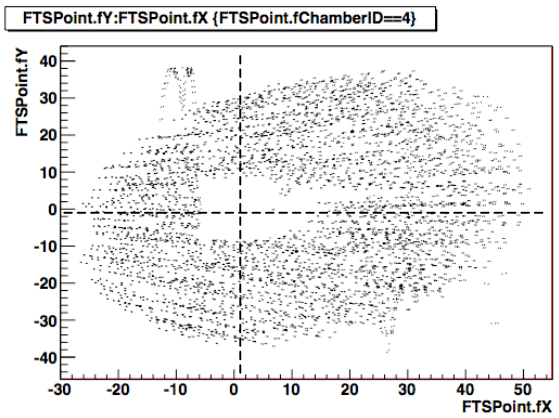


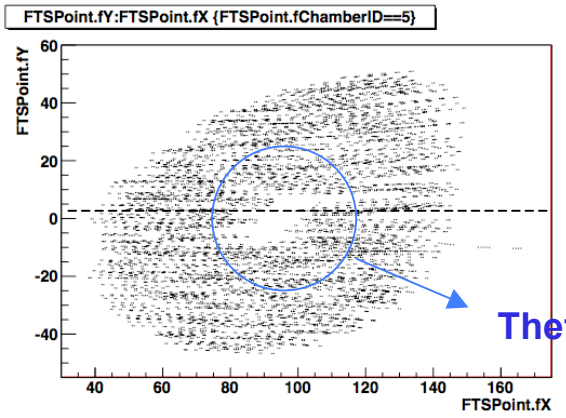
Simulation: 1GeV/c muons

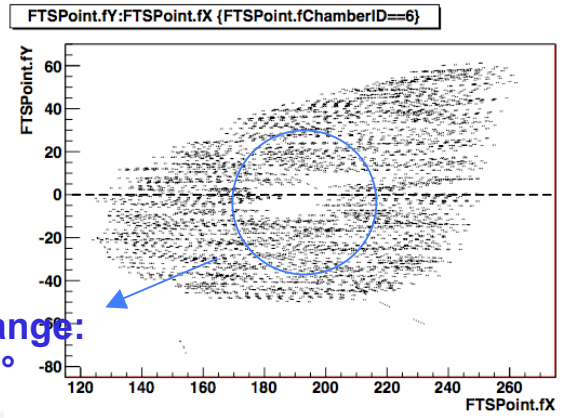






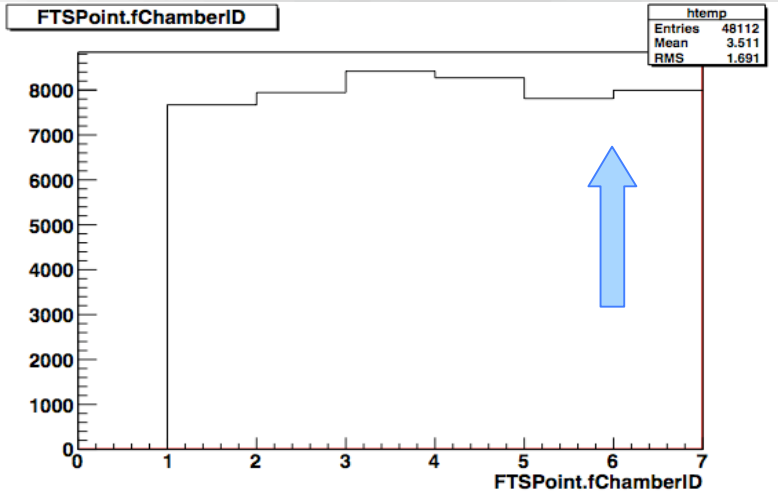


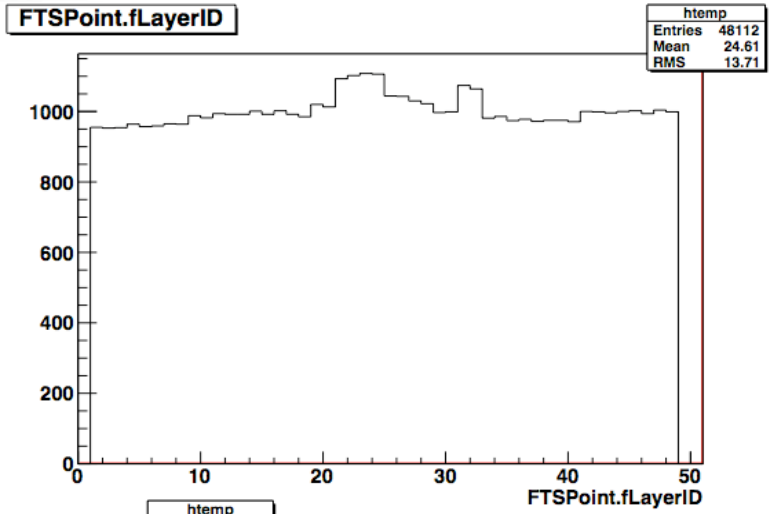


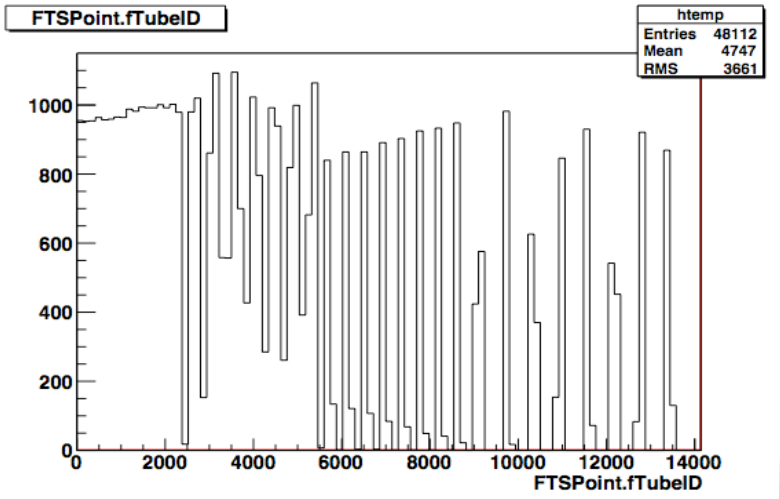


Theta range: 1°-5°

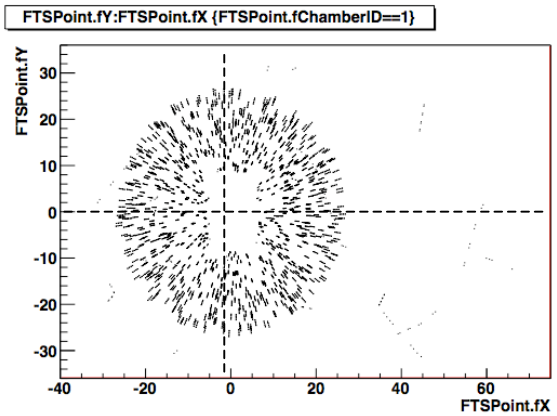
Simulation: 5GeV/c muons

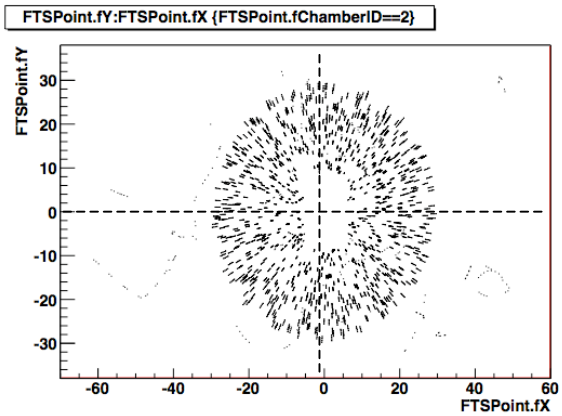


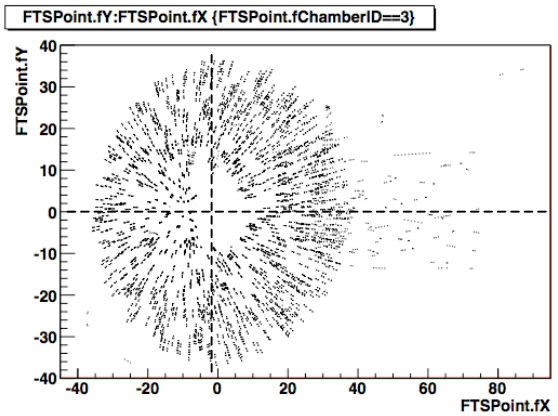


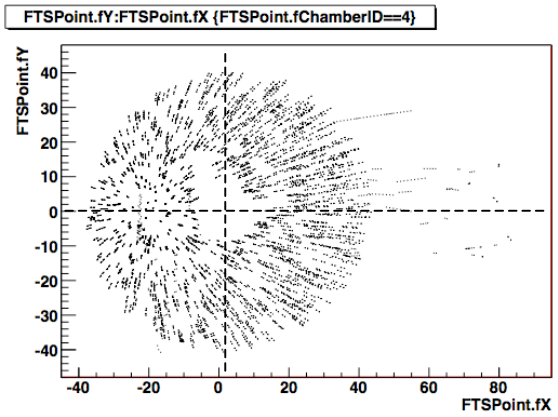


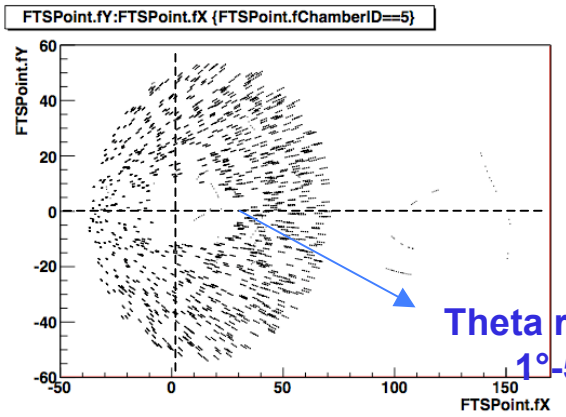
Simulation: 5GeV/c muons

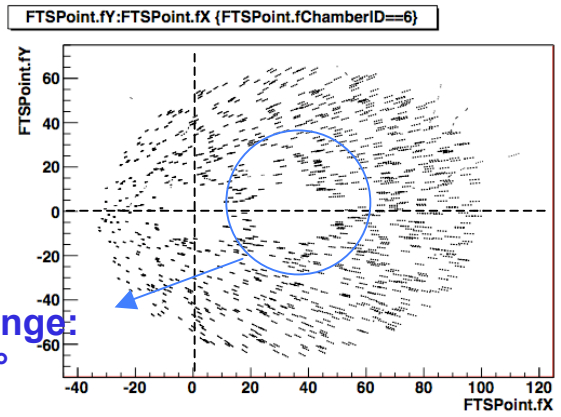










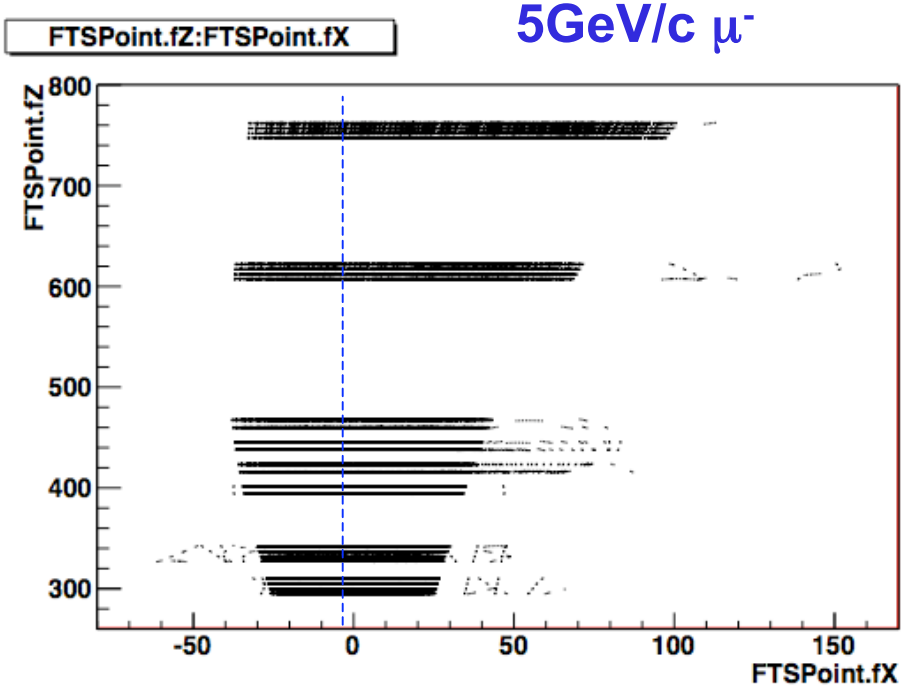


Theta range: 1°-5°

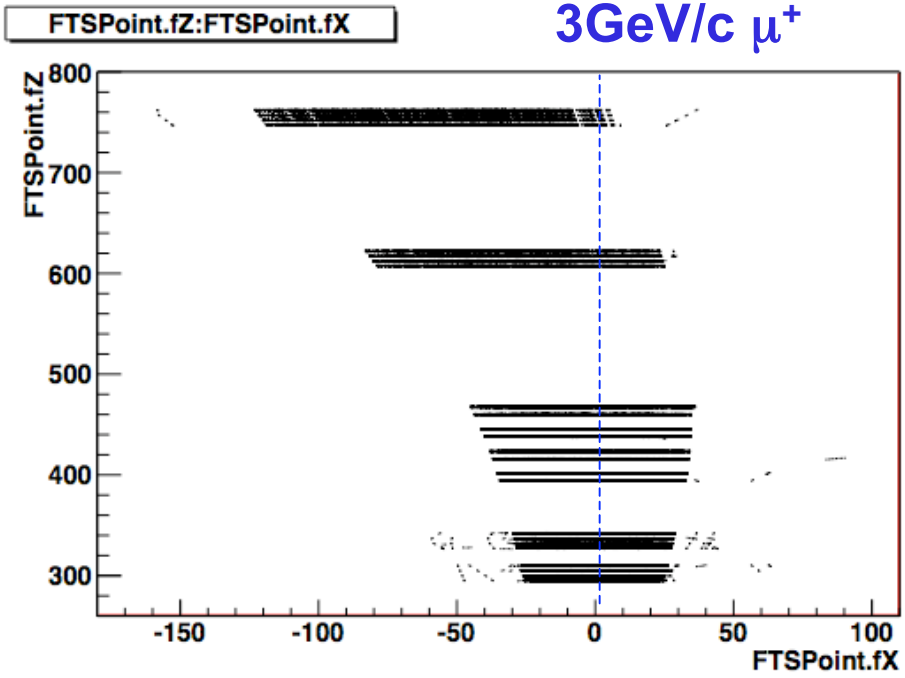
Simulation: muons

$$R = \frac{mv_0}{qB}$$

5GeV/c μ^-



3GeV/c μ^+



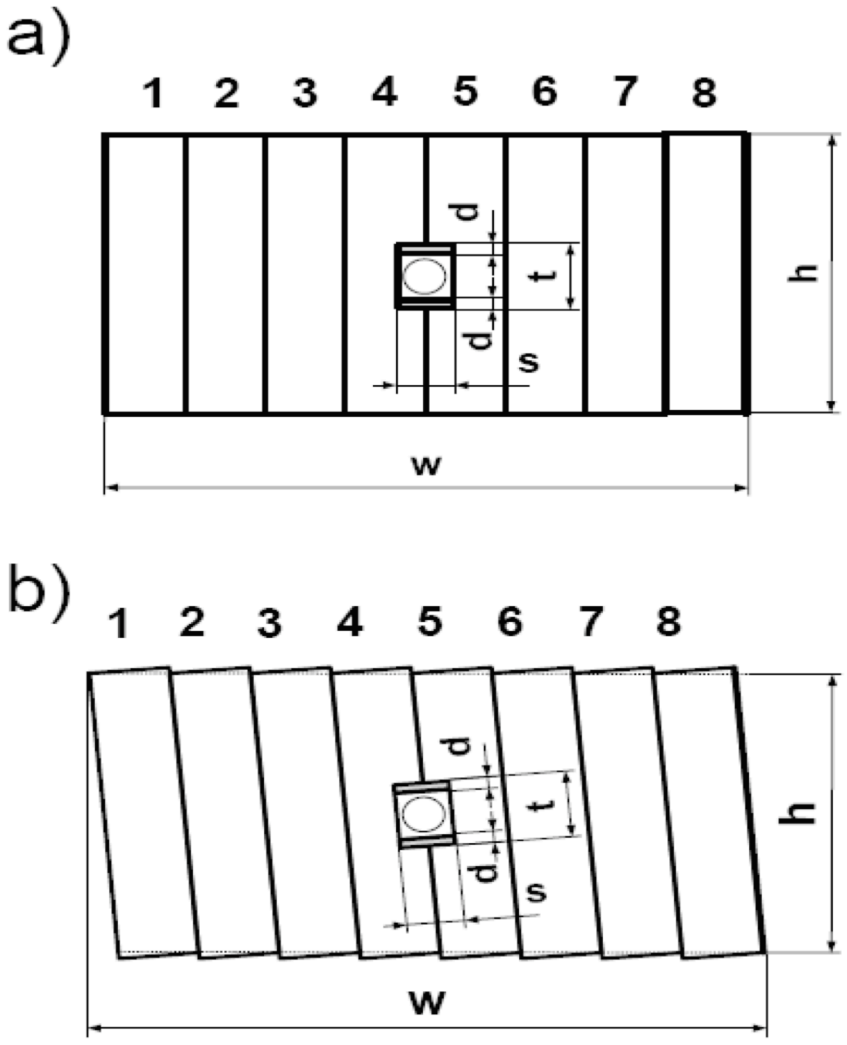
Conclusions

- The construction of geometry was done;
- The FTS Mapper (PndFtsMapCreator) is under construction;
- The simulation seems to work correcly;
- The digitalization is started (we hope to have good results for the next Panda Collaboration Meeting);

Thanks to Pavia group for the collaboration…

…Thanks for the attentions

Back-up



Tracking station	Double layer	Straw inclination	Number of modules (straws)	*z*-coordinate [mm]	Active area	
					w [mm]	*h* [mm]
FT1	1	0°	8 (2x128)	2954	1297.9	640
	2	+5°	8 (2x128)	3004	1358.8	640
	3	-5°	8 (2x128)	3054	1358.8	640
	4	0°	8 (2x128)	3104	1297.9	640
FT2	1	0°	8 (2x128)	3274	1297.9	640
	2	+5°	8 (2x128)	3324	1358.8	640
	3	-5°	8 (2x128)	3374	1358.8	640
	4	0°	8 (2x128)	3424	1297.9	640
FT3	1	0°	12 (2x192)	3945	1944.3	690.3
	2	+5°	12 (2x192)	4019.75	2013.2	703.4
	3	-5°	12 (2x192)	4165	2015.4	728.8
	4	0°	12 (2x192)	4239.75	1944.3	741.9
FT4	1	0°	12 (2x192)	4385	1944.3	767.3
	2	+5°	12 (2x192)	4459.75	2020.0	780.4
	3	-5°	12 (2x192)	4605	2022.2	805.8
	4	0°	12 (2x192)	4679.75	1944.3	818.9
FT5	1	0°	25 (2x400)	6075	4045.1	1180.0
	2	+5°	25 (2x400)	6125	4163.7	1180.0
	3	-5°	25 (2x400)	6175	4163.7	1180.0
	4	0°	25 (2x400)	6225	4045.1	1180.0
FT6	1	0°	37 (2x592)	7475	5984.3	1480.0
	2	+5°	37 (2x592)	7525	6136.6	1480.0
	3	-5°	37 (2x592)	7575	6136.6	1480.0
	4	0°	37 (2x592)	7625	5984.3	1480.0

Tracking station	Double layer	Straw affected by opening (split straws) 1st layer/2nd layer	*s* [mm]	*t* [mm]
FT1	1	59-70 / 59-70	116	172
	2	59-70 / 59-70	116	172
	3	59-70 / 59-70	116	172
	4	59-70 / 59-70	116	172
FT2	1	59-70 / 59-70	116	172
	2	59-70 / 59-70	116	172
	3	59-70 / 59-70	116	172
	4	59-70 / 59-70	116	172
FT3	1	91-102 / 91-102	116	166
	2	91-102 / 91-102	116	166
	3	91-102 / 91-102	116	166
	4	91-102 / 91-102	116	166
FT4	1	91-102 / 92-103	116	166
	2	91-102 / 92-103	116	166
	3	91-102 / 92-103	116	166
	4	91-102 / 92-103	116	166
FT5	1	197-215/ 197-215	187	238
	2	197-215 / 197-215	187	238
	3	197-215 / 197-215	187	238
	4	197-215 / 197-215	187	238
FT6	1	298-316 / 299-317	187	238
	2	298-316 / 299-317	187	238
	3	298-316 / 299-317	187	238
	4	298-316 / 299-317	187	238