



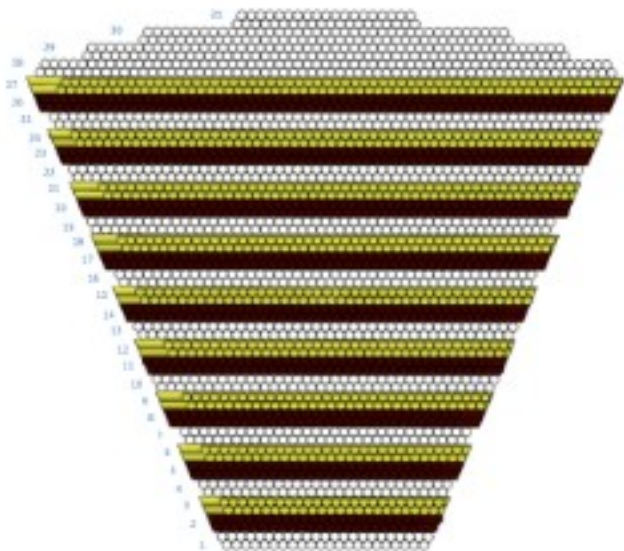
SPD Physics & MC meeting
20 November 2024

Possible changing straw
tube tracker geometry

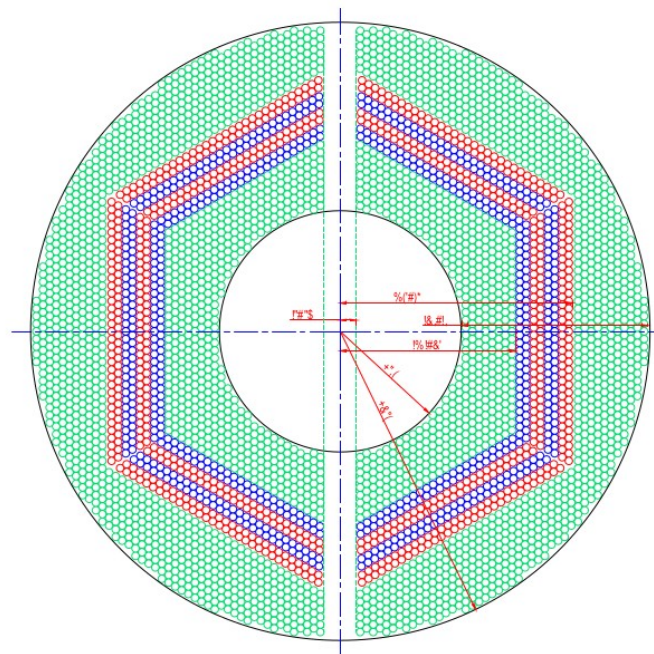
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Straw tubes tracker geometry

SPD



PANDA



1. Tracker detector geometry in SPD experiment:

- gray tube - straw tubes which are parallel to z-axis;
- green and black tubes - tilted straw tubes (tubes are tilted by $\pm 5^\circ$ with respect z-axis, 18 double layers).

2. Tracker detector geometry in PANDA experiment:

- green tube - straw tubes which are parallel to z-axis;
- red and blue tubes - tilted ed straw tubes (tubes are tilted by $\pm 2.9^\circ$ with respect z-axis, 4 double layers).

Straw tubes numbering schema (TDR)

Table 9.2: Straw tubes in different layers of one octant of the ST barrel part.

Layer	1	2	3	4	5	6	7	8	9	10	11	12
Angle, deg	0	+5	-5	0	+5	-5	0	+5	-5	0	+5	-5
Straws, pcs.	45	83	85	53	91	95	61	99	103	73	111	111
Layer	13	14	15	16	17	18	19	20	21	22	23	24
Angle, deg	0	+5	-5	0	+5	-5	0	+5	-5	0	+5	-5
Straws, pcs.	81	119	123	89	127	131	99	139	139	109	147	151
Layer	25	26	27	28	29	30	31	Total				
Angle, deg	0	+5	-5	0	0	0	0	0	+5	-5	0,±5	
Straws, pcs.	117	155	158	123	103	79	39	1071	1071	1096	3238	

“New” numbering scheme for straw tubes:

Layer	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	22	23	24	25	26	27	28	29	30	31	
Angle	0	+5	-5	0	0	0	0	0	0	+5	-5	0	0	0	0	0	0	+5	-5	0	0	0	0	0	0	0	+5	-5	0	0	0

Check quality of fitted track parameters after changing the tracker geometry:

- a) change part of tilted tubes on the tubes which are parallel to z-axis;
- b) there were 18 layers tilted tubes => “new” only 8 layers of tilted tubes;
- c) reduction number of straw tubes in one octant ~355 tubes (~11%)

Fitted track parameters for 1 GeV/c pions

	geometry	dP/P (%)	dPt/Pt (%)	($\Delta\vartheta$ rad*10-3)	$\Delta\varphi$ (rad, 10-3)
nVtx	present	1.62	1.63	2.97	2.32
	“new”	1.68	1.69	4.16	2.40
MM	present	1.41	1.43	2.89	2.43
	“new”	1.43	1.45	3.16	2.44
DSSD	present	1.30	1.32	2.36	1.69
	“new”	1.31	1.33	2.38	1.69
MAPS	present	1.03	1.03	1.92	1.41
	“new”	1.02	1.04	1.93	1.42

6 pions of 1 GeV/c and 1000 events were simulated with $\vartheta \sim 45^\circ$ and $\varphi \sim 90^\circ$ for 1 Tesla uniform magnetic field at vertex position $x = y = z = 0.0$

$$dP/P = (P^{\text{fit}} - P_{\text{gen}})/P_{\text{gen}}, \quad \Delta\vartheta = \vartheta_{\text{fit}} - \vartheta_{\text{gen}}, \quad \Delta\varphi = \varphi_{\text{fit}} - \varphi_{\text{gen}}$$

Fitted track parameters for 0.5 GeV/c pions

	geometry	dP/P (%)	dPt/Pt (%)	$\Delta\vartheta$ (rad*10-3)	$\Delta\varphi$ (rad, 10-3)
nVtx	present	1.57	1.65	5.58	4.37
	“new”	1.60	1.63	6.73	4.50
MM	present	1.29	1.40	5.85	4.54
	“new”	1.29	1.41	6.16	4.53
DSSD	present	1.32	1.40	4.70	3.41
	“new”	1.33	1.41	4.78	3.45
MAPS	present	1.00	1.06	3.92	2.89
	“new”	1.02	1.09	3.96	2.90

6 pions of 0.5 GeV/c and 1000 events were simulated with $\vartheta \sim 45^\circ$ and $\varphi \sim 90^\circ$ for 1 Tesla uniform magnetic field at vertex position $x = y = z = 0.0$

Summary

1. There is almost no different in track parameters for the present and “new” geometry of straw tracker.
2. Main question - what is the best geometry for pattern recognition of tracks ?