Status from the LDT simulation

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Basic Geometry Setting

・Implement the template geometry successfully (call it as “template-base” in this slide)

・Run the LDT simulation and have a look the momentum resolution

Sub-detector	layer	+/-z(mm)	R(mm)	sigma_xy(mm)	sigma_z(mm)	X/X0(%)
BeamPipe	0	4225	14.5	---	---	0.15
vertex	1	62.5	16	0.0028	0.0028	0.15
vertex	2	62.5	18	0.006	0.006	0.15
vertex	3	125.	37	0.004	0.004	0.15
vertex	4	125.	39	0.004	0.004	0.15
vertex	5	125.	58	0.004	0.004	0.15
vertex	6	125.	60	0.004	0.004	0.15
VXTShell	7	145.	65	---	---	0.15
Si_pixel	8	371.	78	0.0072	0.0866	0.65
Si_pixel	9	665.	189	0.0072	0.0866	0.65
Si_pixel	10	2350	298	0.0072	0.0866	0.65
DC	11-160	2350	300-1800	0.1000	2/9999	1.20 (inne
Si_pixel	161	2350	1811	0.0072	0.0866	0.65

Particle incident polar angle is fixed at 90°

Momentum resolution -- with template base configuration --

・Changing detector composition : (as many studies in last week have shown)

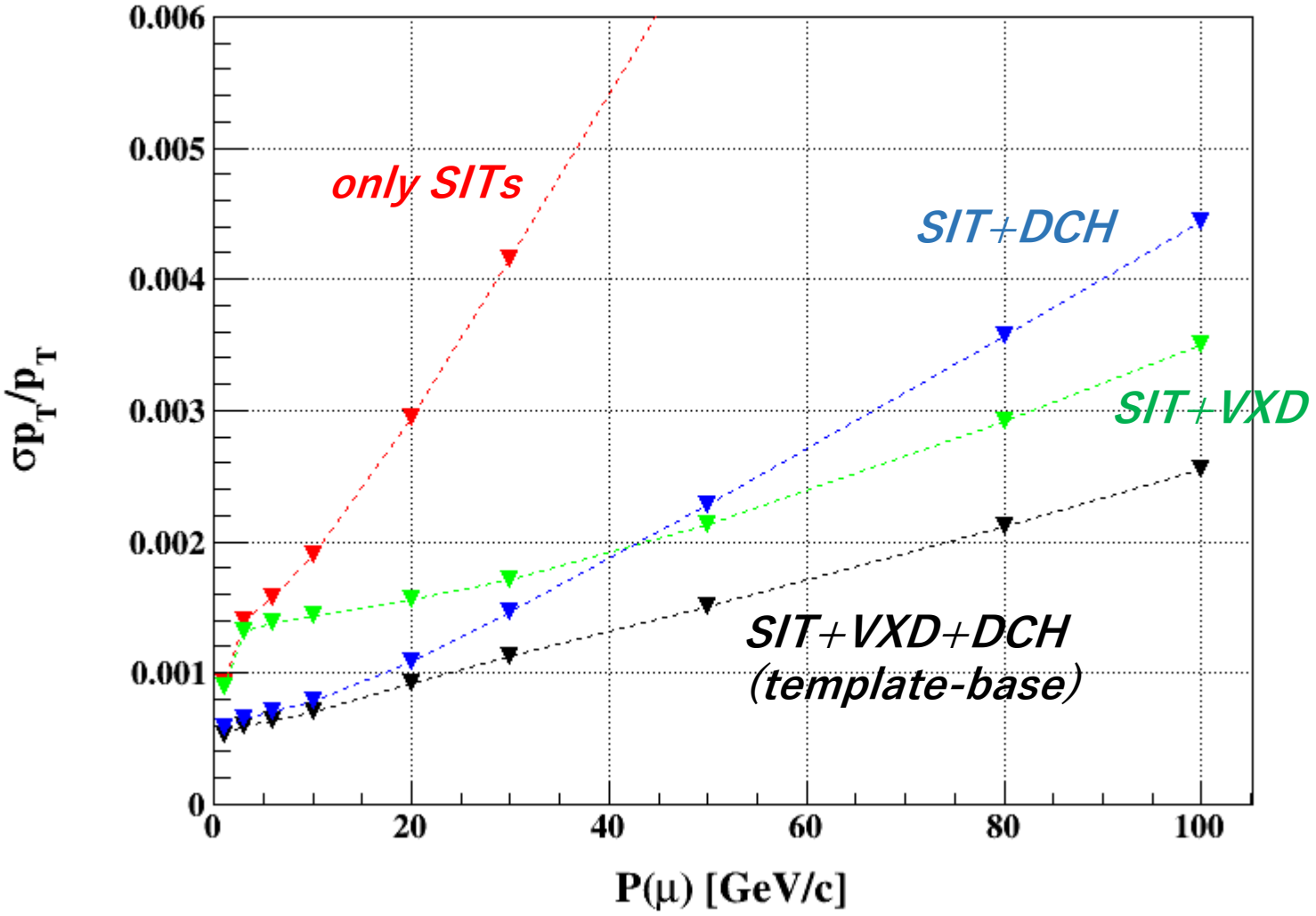
-- only SITs (named as “Si_pixel”)

-- SIT+DCH

-- SIT+VXD

-- SIT+VXD+DCH (base)

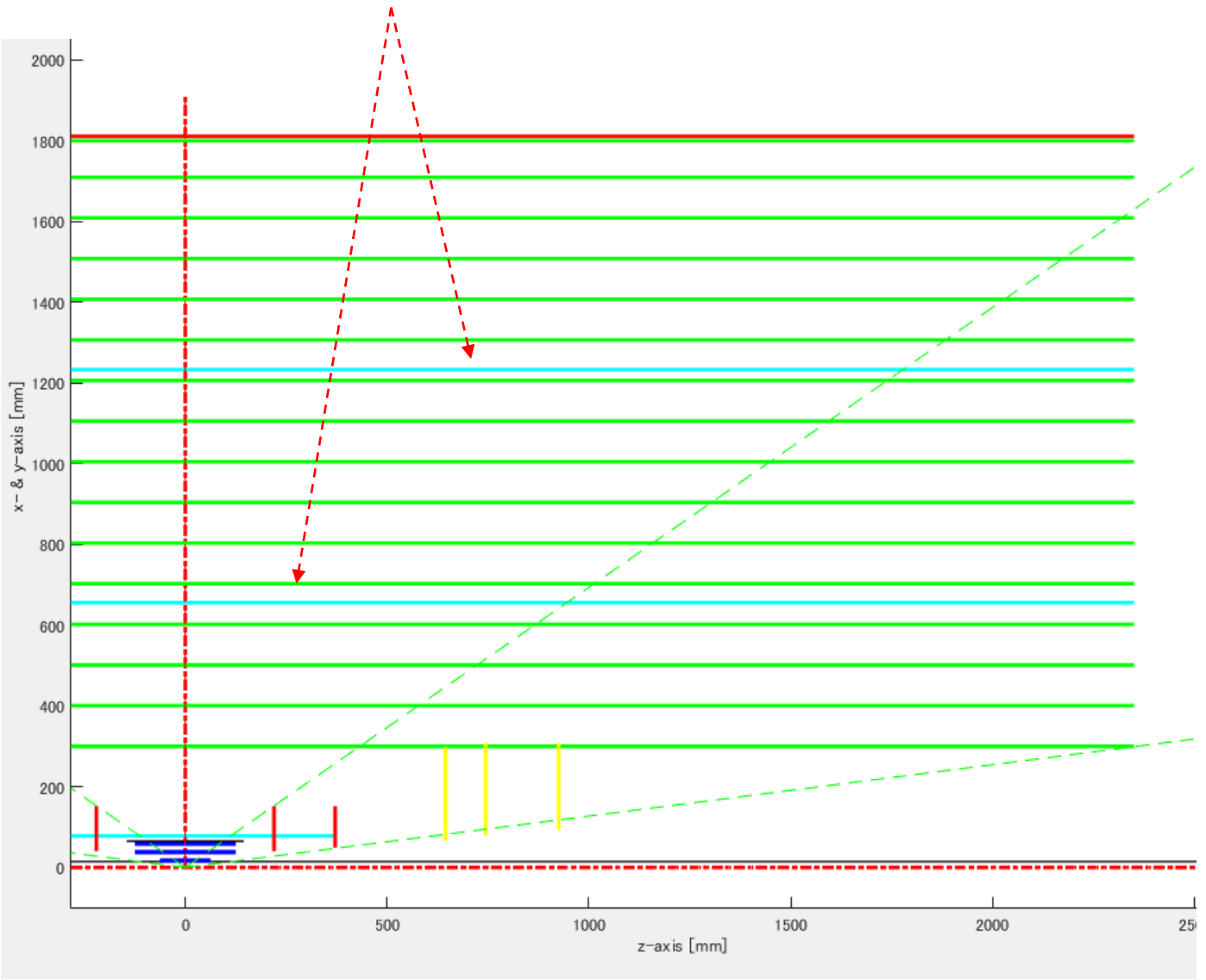
・Resolution improvement at lower momentum range is greatly achieved by DCH.



Put SITs in middle of the DC -- test configuration --

・ This configuration is/was considered as the SDT activity in last year.

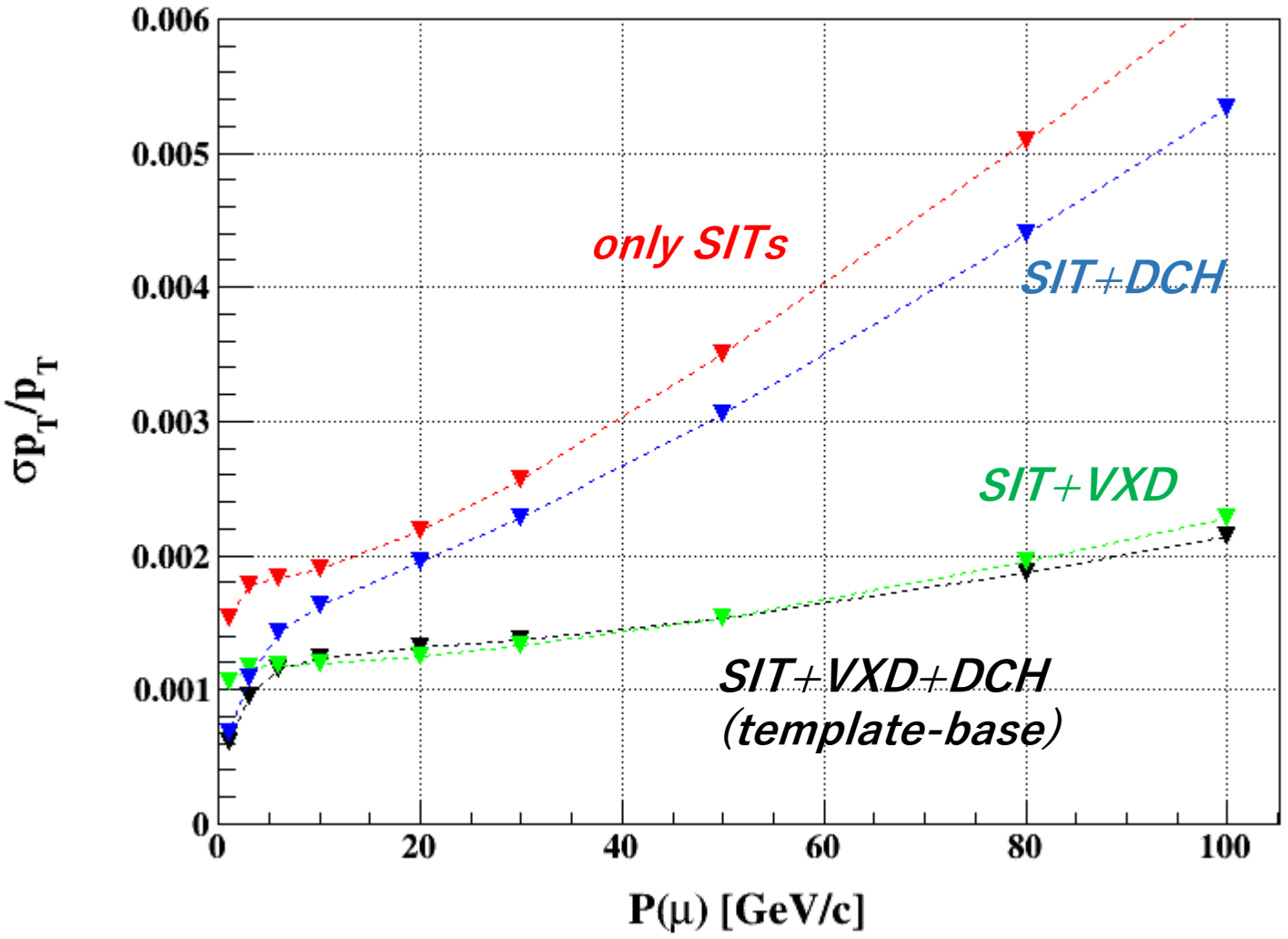
・DCH's wall material shall be an issue, if we increase the number of DCHs.



Momentum resolution -- with this test configuration --

・DCH wall is the one used in the template.
(thus, not realistic yet)

・The resolution tendency is slightly different.
A little bit better at higher momentum side and worse at lower side.



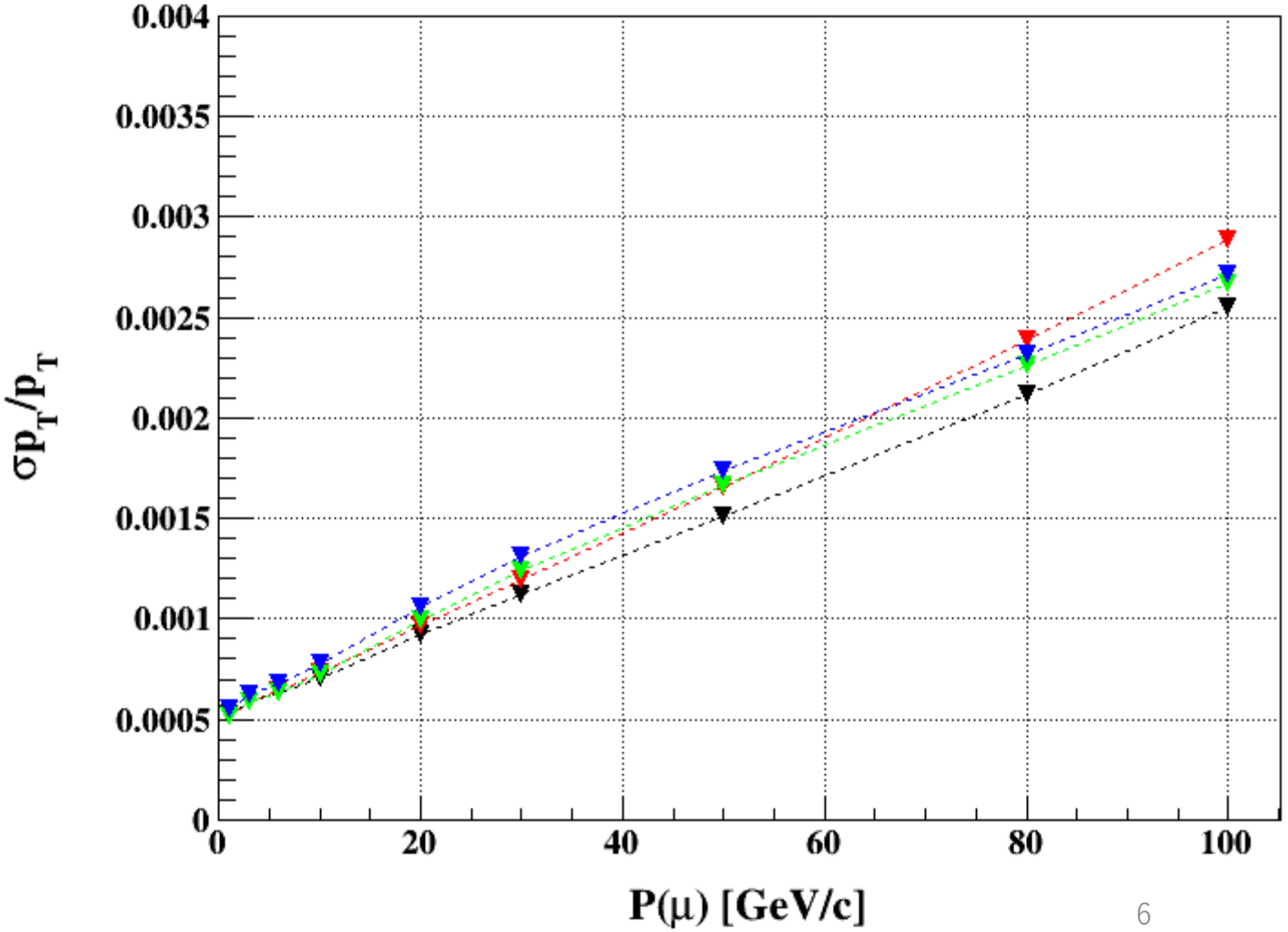
Another trial: Changing the number of SITs between VXD - DCH

template setting

	Black	Red	Green	Blue
SIT1	78 mm	78	78	78
SIT2	189	298	151	133
SIT3	298		225	188
SIT4			298	243
SIT5				298

All the other parameters are the same as template setting.

from this small parameter space, the black (SIT1-SIT3+SET1) line seems to be the best



Summary

・On the momentum resolution, as presentations in last meeting shown, the LDT results also suggests that contribution from the DCH at the low momentum range is important.

・The number of SIT layers between VXD-DCH is changed to see their impact on the momentum resolution. For this particular case, we could find a local minimum of the resolution.

Next

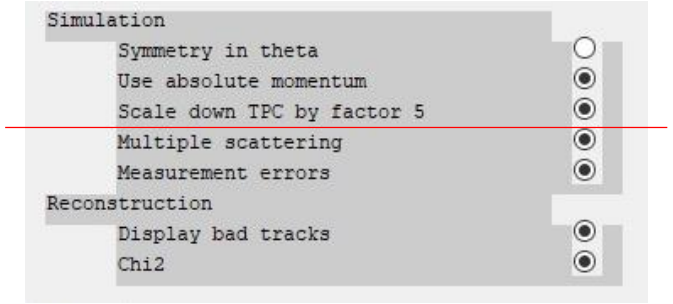
・Try to look some physics quantity, i.e. di-muon invariant mass from a Z boson, with assumed detector resolution from the LDT/fast simulation tool.

Backup

Reference

- Compare the numbers on momentum resolution
- It slight differs, depending on the scaling-down option in LDT

(maximum ~ 10% ? at lower momentum, where DC has large contribution)



	w/I DC, MS on.					
pT (GeV)	from the original slide		Turn on scale down 5 option		Turn off scale down 5 option	
	dpT/pT	d(1/pT)	dpT/pT	d(1/pT)	dpT/pT	d(1/pT)
1	0.00058513	0.00058513	0.000585125	0.000585125	0.000528319	0.000528319
2	0.00064628	0.00032314	0.000646277	0.000323138	0.000576779	0.000288389
4	0.00068243	0.00017061	0.000682429	0.000170607	0.000611860	0.000152965
6	0.00071450	0.00011908	0.000714503	0.000119083	0.000645195	0.000107532
10	0.00079016	0.00007902	0.000790158	0.000079015	0.000726052	0.000072605
20	0.00099687	0.00004984	0.000996872	0.000049843	0.000952921	0.000047646
40	0.00137359	0.00003434	0.001373593	0.000034339	0.001357482	0.000033937
60	0.00175756	0.00002929	0.001757560	0.000029292	0.001749636	0.000029160
80	0.00216951	0.00002712	0.002169512	0.000027118	0.002160476	0.000027005
100	0.00260253	0.00002603	0.002602531	0.000026025	0.002587943	0.000025879