

FPCCD Vertex Detector

2013_01_11

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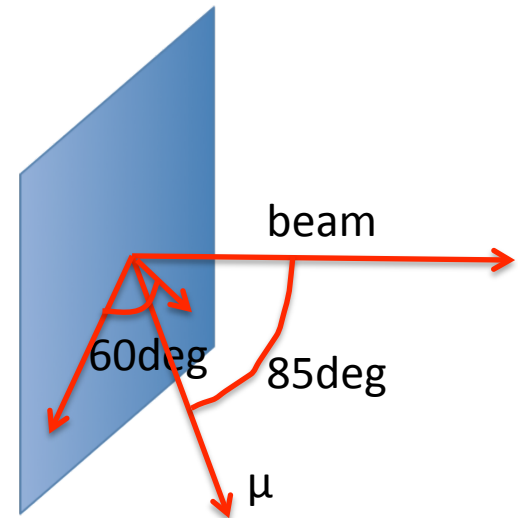
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Tracking Efficiency

- Recently the study of tracking efficiency goes on.
- Today I'll show you some results from the study.

Simulation Setup

- Single muon+ event (2000 events)
- $\theta = 85\text{deg}$ (fixed)
- $-60\text{deg} > \phi > -120\text{deg}$
- Background is cut except for $-45\text{deg} > \phi > -135\text{deg}$ & $110\text{deg} > \theta > 70\text{deg}$ area at the sight of pole-coordinate.
- Momentum = $100\text{GeV}/c$
- 1, 100, 200, 500, 1000 and 2650BX are overlaid on each event. (eepair and backscatter at $E_{\text{cm}} = 1\text{TeV}$)
- Calculation of tracking efficiency is at next page.



Calculation of tracking efficiency

Tracking efficiency: $\eta \equiv \text{Numerator/Denominator}$

- Numerator
 - Among the generated μ tracks, when criteria
 - more than 2 space point in SIT
 - more than 5 hits in VXDare satisfied, it is regarded as count 1.
- Denominator
 - The number of all μ tracks.

Result of tracking efficiency

	# of BX	numerator	denominator	η
all 5um	1	1946	2000	0.971
	100	1934	2000	0.967
	200	1924	2000	0.962
	500	1919	2000	0.960
	1000	1895	2000	0.948
	2650	1675	2000	0.838
5um10um	1	1942	2000	0.971
	100	1940	2000	0.970
	200	1927	2000	0.964
	500	1918	2000	0.959
	1000	1856	2000	0.928
	2650	1524	2000	0.762

η should be almost 100% in 1BX.

The reason 3% is lost at 1BX is

- In the first place, about 50 μ 's MCParticles cannot satisfy criteria.
 - 4hits in vxd, or 1hits in sit

At next page, I'll show you the result whose all μ 's MCParticles satisfy criteria and makes more than 1 hit on each layer in VXD and SIT.

Result of tracking efficiency 2

	# of BX	numerator	denominator	η
all 5um	1	1664	1666	0.999
	100	1662	1666	0.998
	200	1663	1666	0.998
	500	1659	1666	0.996
	1000	1640	1666	0.984
	2650	1451	1666	0.871
5um10um	1	1664	1666	0.999
	100	1664	1666	0.999
	200	1664	1666	0.999
	500	1654	1666	0.993
	1000	1609	1666	0.966
	2650	1323	1666	0.794

This shows almost 100% at a few BX. There is a little difference at many BX between all5um and 5um10um.

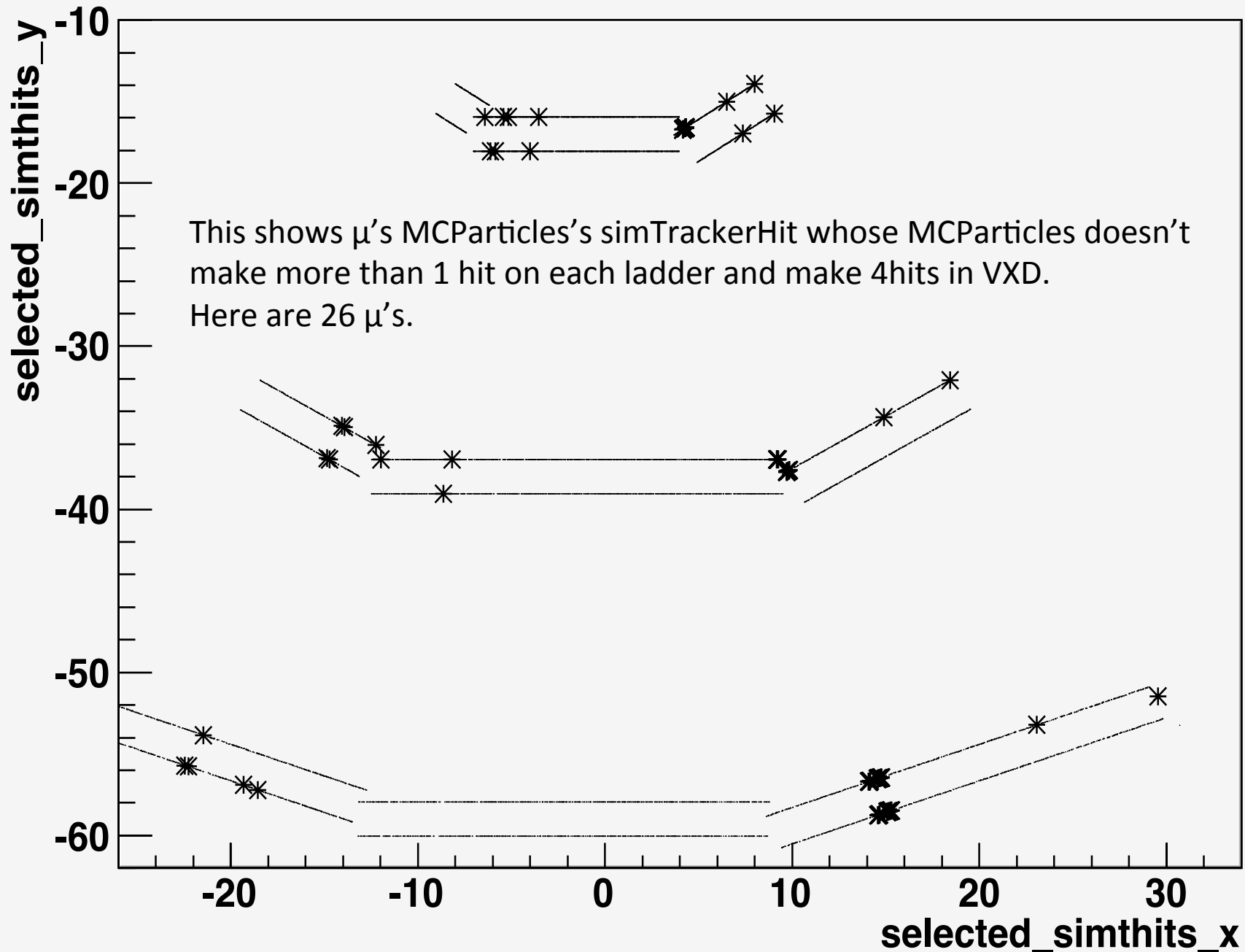
Denominator decreases from 2000 to 1666. This means that 334 μ 's MCParticles don't satisfy

- More than 1 hit on each layer in VXD and SIT

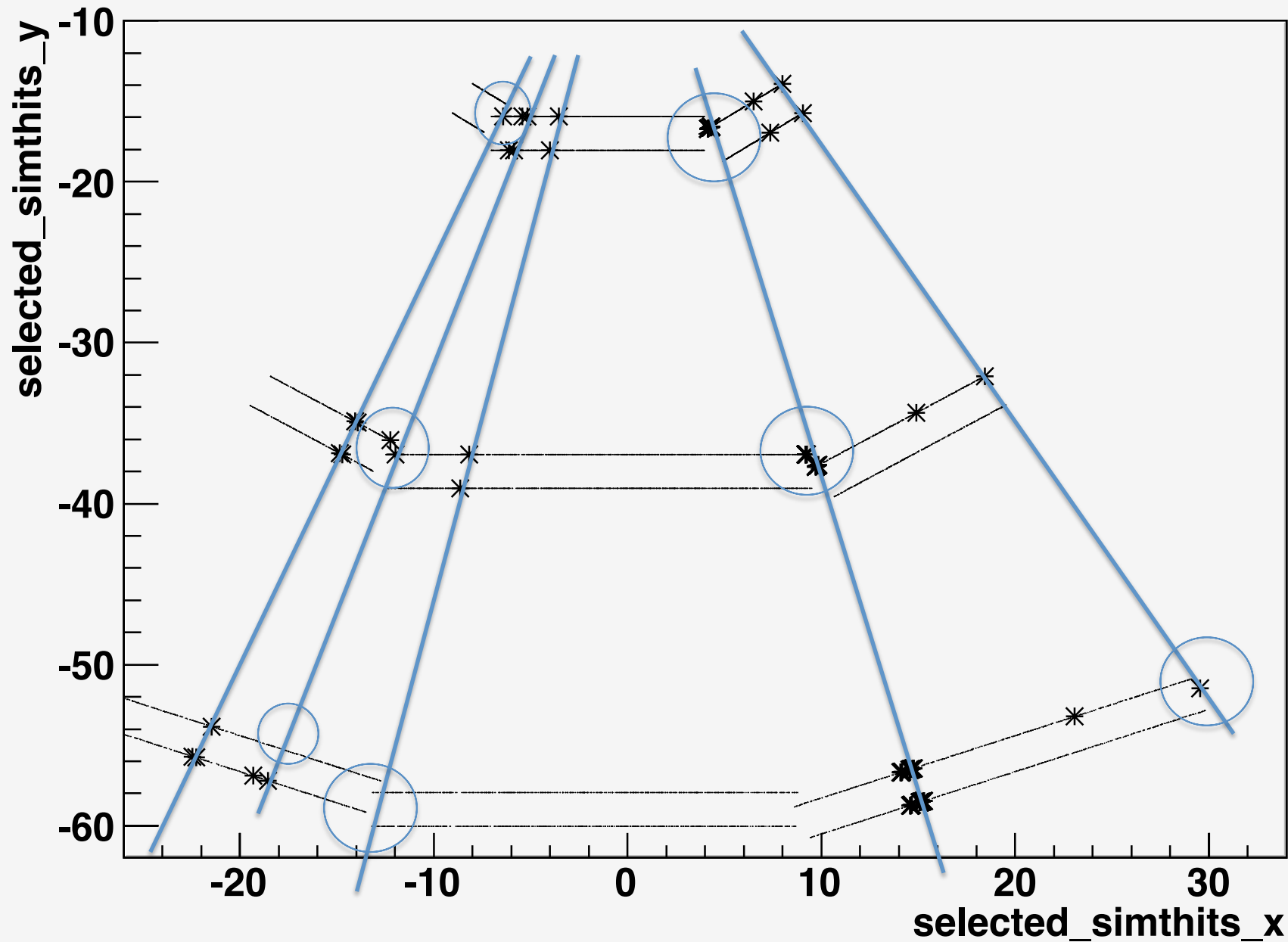
I think one of the reason may be like the following.

- The μ 's go through between a ladder and the next ladder in VXD and the same thing goes for SIT.
 - The μ 's don't make enough energy deposit for simTrackerHit to be generated.
- I checked those 2 things in VXD.

selected_simthits_y:selected_simthits_x {selected_nsimthits == 4}



selected_simthits_y:selected_simthits_x {selected_nsimthits == 4}



selected_simthits_y:selected_simthits_x {selected_nsimthits == 5}

And also about 5hits.
(Here are 158 μ 's)

