ZPD performance: best tick selection

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What is a gain of selecting best tick for ZPD

- what is best tick
- what is good track

- The quality is equal to number of hitted superlayers (nHits). (nHits$-a \cdot z0err$ is considered but found to be about the same)

- Best tick is tick where quality of the track is maximal.

- The track is found in several ticks if ticks have tracks in the same sector with the similar curvature and tanDip (difference less than 4)

- Wrong tick is when track is rejected by DecMod in best tick but accepted in another ticks

- the comparison is done for events passed L3OutDch and for events rejected by L3 (all L3 bits but L3OutL1Open are 0)

Track performance, Track quality = nHits

There are large number of tracks found, but many are rejected by Decision module :

Run 44246 (colliding beams, but ConfigAlias=BACKGROUND) :
4 tracks / event,

75% of all found ZPD tracks have DecMod bit0 set ($p_T > 0.8$, no $Z0$ cut)
60% of all found ZPD tracks have DecMod bit1 set ($p_T > 0.2$, $Z0 < 15$)
3% of tracks are rejected by DecMod in best tick, but accepted in other ticks.

Comparison with L3. Track quality = nHits

Run 44246 (colliding beam, ConfigAlias=BACKGROUND)

Nevents 16926	L3OutDch accepted 1564		L3 rejected 14946	
Accepted by ZPD DecMod in	best tick	wrong tick	best tick	wrong tick
bit 0, $p_T > 0.8$, no cut on Z0	1299	3	6650	61
bit 1, $p_T > 0.2$, $\|z0\| < 15$	1517	3	10673	237

run 44256 , HER only

Nevents 10965	L3OutDch accepted 94		L3 rejected 10765	
Accepted by ZPD DecMod in	best tick	wrong tick	best tick	wrong tick
bit 0, $p_T > 0.8$, no cut on Z0	31	2	3658	41
bit 1, $p_T > 0.2$, $\|z0\| < 15$	93	0	6966	182

The wrong L1 trigger decision due to wrong tick selection is made in 3% cases of L3 rejected events (less than 0.5% in tick before best tick)

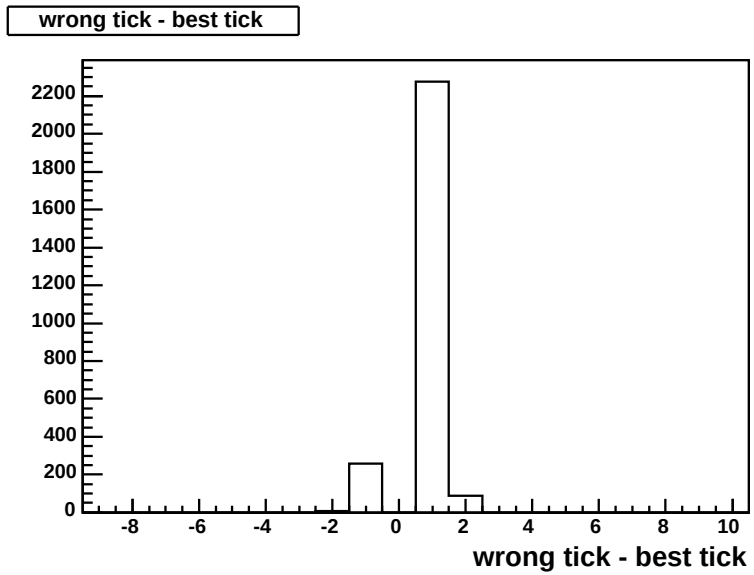
MC. Track quality = nHits

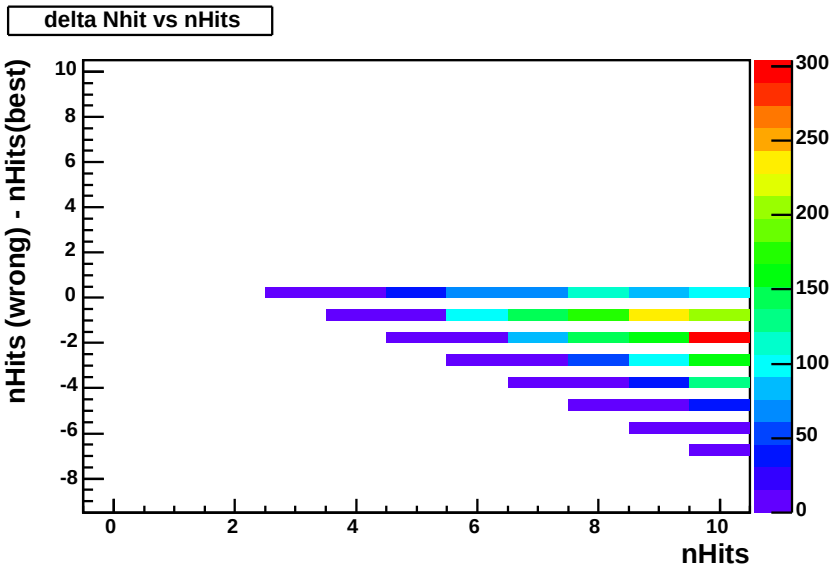
999 BBbar events

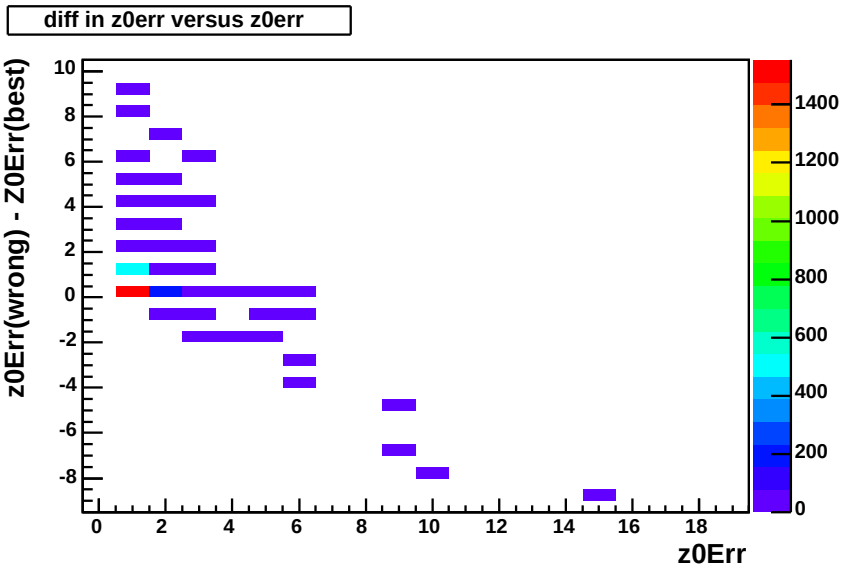
Nevents 999	L3OutDch accepted 997		L3 rejected 0	
Accepted by ZPD DecMod in	best tick	wrong tick	best tick	wrong tick
bit 0, $p_T > 0.8$, no cut on Z0	877	10	0	0
bit 1, $p_T > 0.2$, $\|z0\| < 15$	997	0	0	0

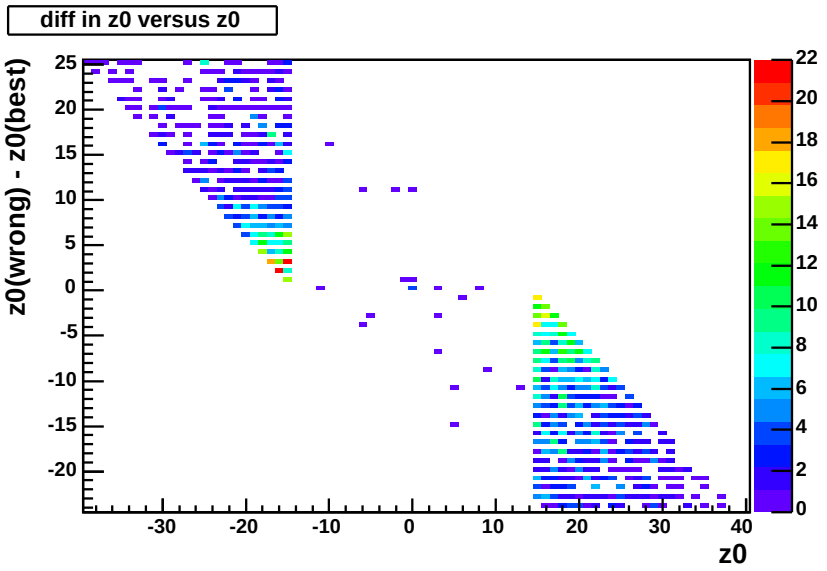
MC efficiency is as expected

Events selected in wrong tick, Track quality = nHits



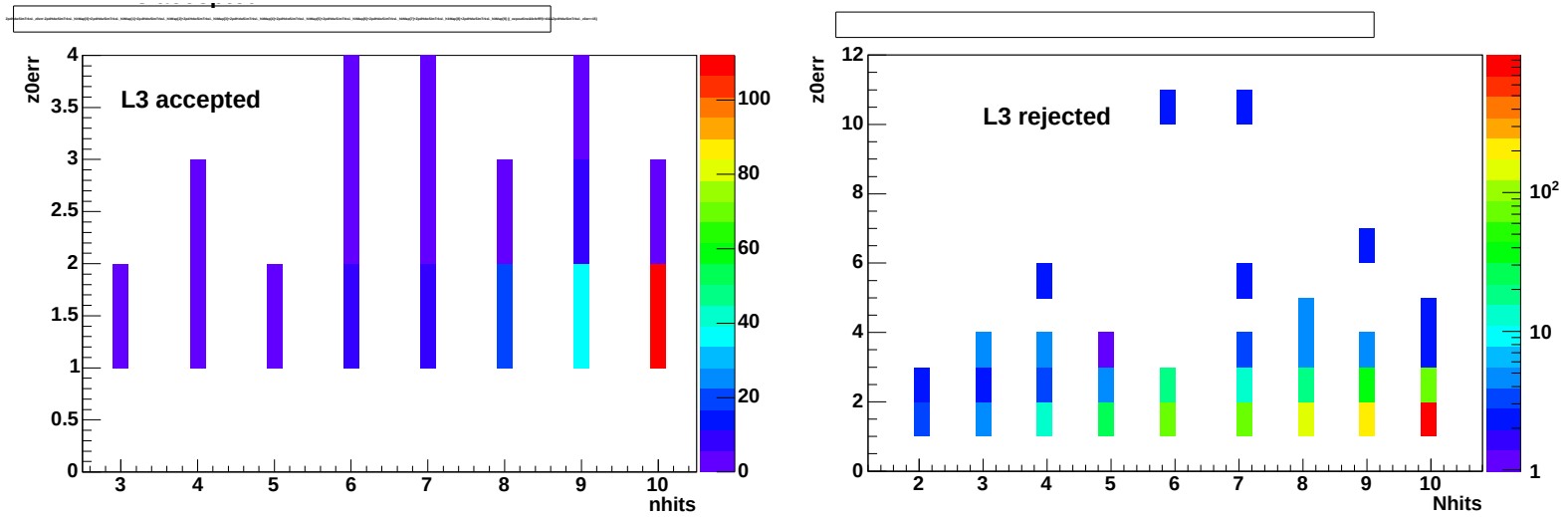






events are from all data samples : beam background, HER only, LER only, cosmic

Attempt to use z0err



z0err may be used to select best tick, however the proportion of the wrong selected events is about the same.
The stronger cuts on z0err in decision module helps more than selection of the best tick

Conclusions

- One could reduce background by selecting making decision in best tick.
- This requires calculation of number of the hitted superlayers
- The gain is about 3% of the events which are rejected by L3, and 15% of the L3OutDch accepted events (beam background)
- The stronger cuts on Z0, Z0err on decision module, might help as well.