Effect of reducing the number of l1ctt equations

Liang HAN
University of Manchester

Aim:study the effect of removing low-accepted l1ctt roads

Scheme:

- Status: 590 PT1(p_t >10) roads in 1/4 sector
- MC training the acceptances of all 590 roads (53k single muons 100> p_t >15 in mb0)
- Sort roads with their MC acceptances, keep the first 449, 400, 368, 326, 287 and 213 roads(based on MC hits cut) respectively

Result I: impact on fake PT1 in pure mb6

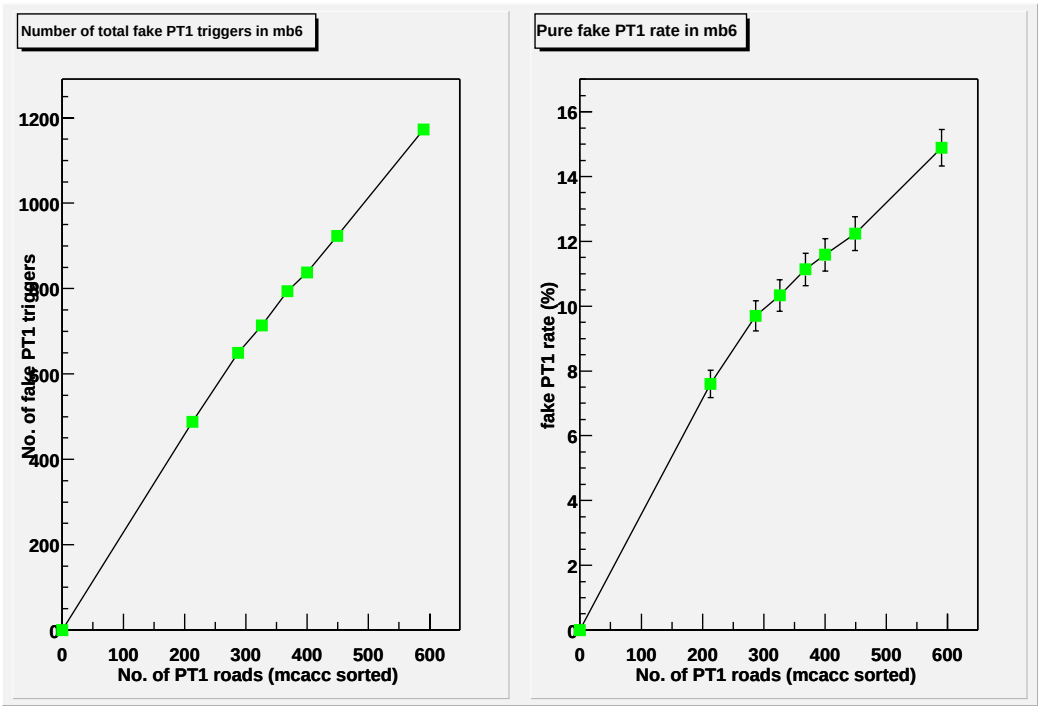

Figure 1: **Number of fake tracks(LEFT) and fake PT1 rate(RIGHT) at different number of equations**

- Sample: 4k pure minibias 6 events (mb6)

PT1 fake trigger rate linearly depends on the number of roads, so can reduce 25% fake trigger by keeping the first 449 high acceptance roads

Result II: impact on track lost

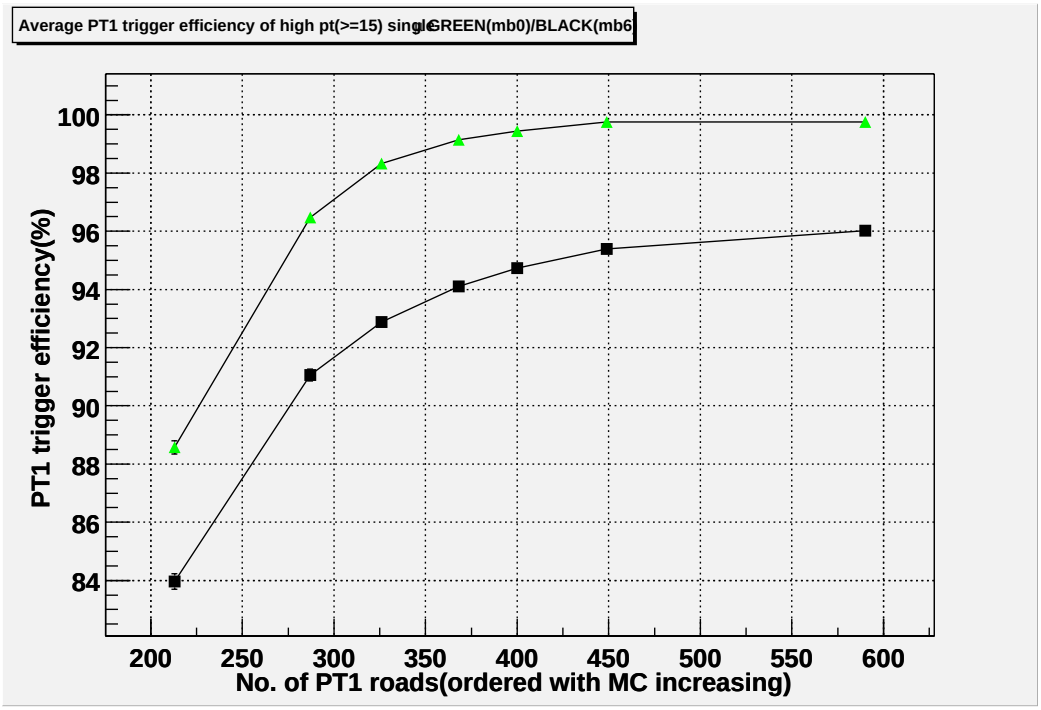

Figure 2: **PT1 efficiencies of different MC-sorted Lists**

- Sample: 20k single muons($p_t \geq$15) in mb0(GREEN) and mb6(BLACK) respectively

MC449 List has nearly no track lost in mb0, and about 1% more lost than 590 List in mb6

	PT1 efficiency of μ (%)	PT1 efficiency of e (%)
$W/Z \to \tau \to e/\mu$ (1312/1381)	96.72±0.69 (649/671)	93.38±0.93 (663/710)
$W/Z \to e/\mu$	97.88 ±0.27	94.04 ±0.41

Table 1: **PT1 efficiencies for zero-IP and non-zero IP tracks**

Result III: impact on non-zero IP

- Sample: MC processes $p\bar{p} \to W/Z \to \tau$ and $p\bar{p} \to W/Z \to e/\mu$ in mb2.5, where e/μ are $p_t > 15$ and in CFT
- Scheme: all 590 List

With 590 List scheme, about 1% non-zero IP high p_t tracks will be lost compared to zero IP ones.

N_{mb}	#valid MC events	PT1 efficiency of 590 List (%)	PT1 efficiency of 449 List (%)
2.5	1381	95.00±0.59 (1312)	94.35±0.62 (1303)

Table 2: **Effects of non-zero IP onto 590 and MC449 Lists**

Result III: continued

- Sample: $p\bar{p} \to W/Z \to \tau \to e/\mu$
- Note: the large PT1 inefficiency is due to the e contribution

MC449 List has about 0.6% more tracks lost than 590 List for non-zero IP high p_t tracks.

(x_0, y_0) (mm)	#valid MC events	PT1 efficiency 590 List (%)	PT1 efficiency 449 List (%)
(0.2, 0.2)	3769	99.63±0.10 (3755)	99.58±0.11 (3753)
(0.5, 0.5)	3751	98.88±0.17 (3709)	98.61±0.19 (3699)

Table 3: **Effects of beamspot shift onto 590 and MC449 Lists**

Result IV: impact on non-zero beamspot

- Sample: 4k single muons($100 > p_t > 15$) in mb0 from different beamspot (x_0, y_0)

The difference between 449 and 590 List on non-zero beamspot tracks is about 0.3% for beamspot in 0.5mm shift.

Conclusion

The clue of using reliable acceptance to reduce the number of equation will become very important for 16-Singlet equation scheme.