Effect of Dead Channels on the DTBX LV1 Trigger (part 2)

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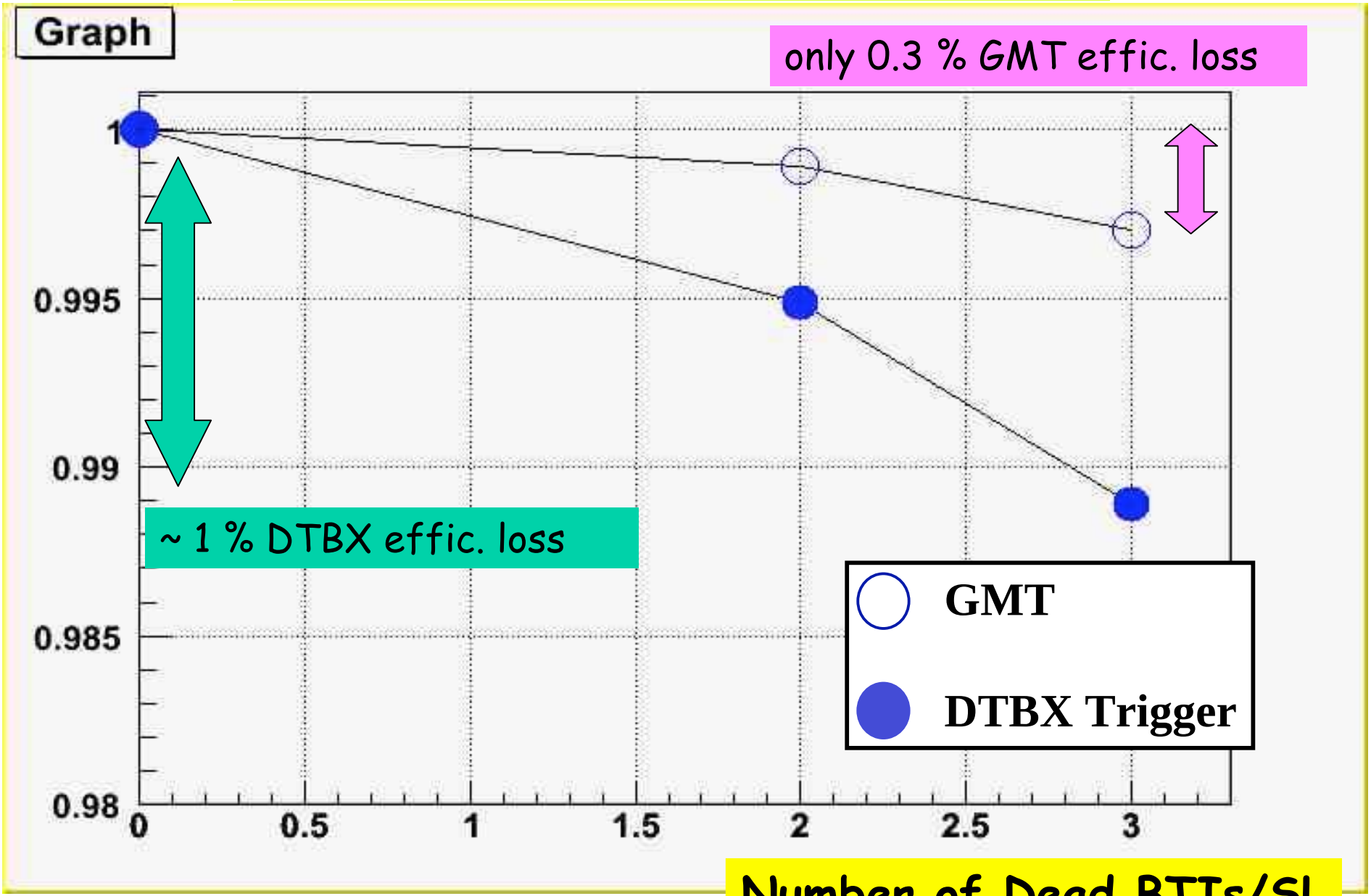
GMT and DTBX Trigger Efficiency loss



Conclusions (sept 05) on the effect of dead cells on LV1 trigger

With the present channels failure rate the effect on DTBX LV1 trigger is essentially negligible.

Even if such rate should slightly increase (by a factor of 2 or 3) the effect on the trigger performance would be very small.

Rather sizeable effects (O(1 %)) are expected with a failure rate an order of magnitude larger than the present one

A more realistic case:

If a single wire (or cathode, or strip) draws high current during the run, it is not be possible to disconnect it individually, as it was done at the ISR.

The **smallest HV unit** which can be switched off is half a layer for wires, and one layer for cathodes or strips

Which is the effect on the DT LV1 trigger ?

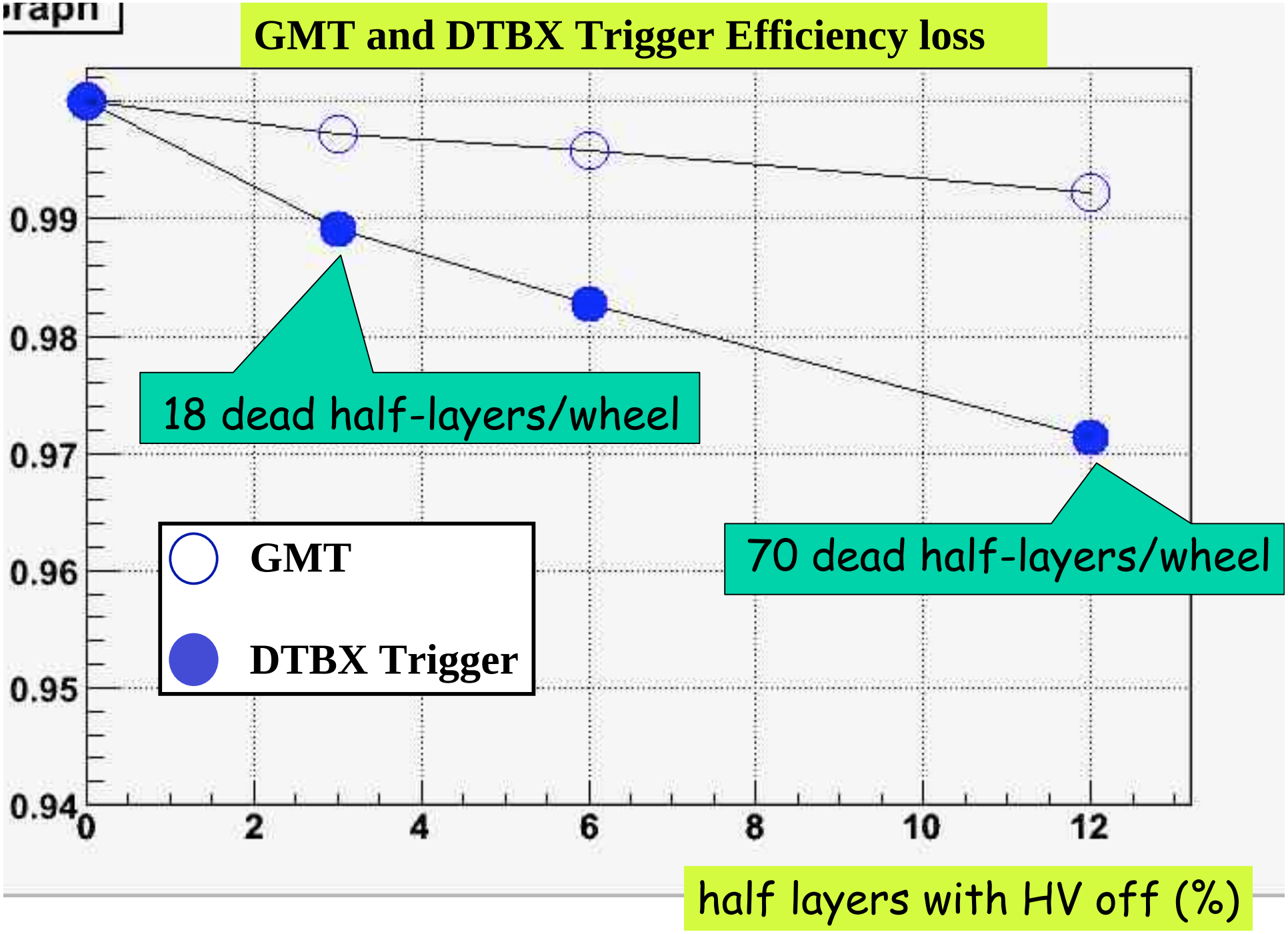
Let's study the case in which all the cells which have already shown problems (and which are already disconnected from HV) would have shown the problem during the run, instead of during the commissioning.

I assumed that all the problems were "high current" problems (this is not 100 % true)

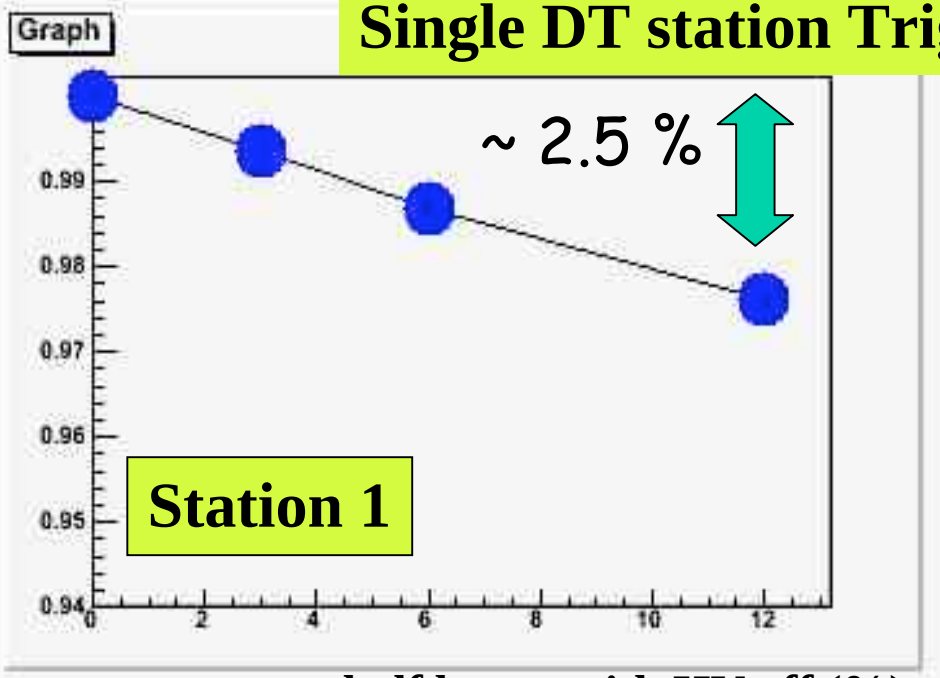
In that case one would not have the possibility to disconnect the single wire/cathode/strip, but has to disconnect the corresponding HV channel

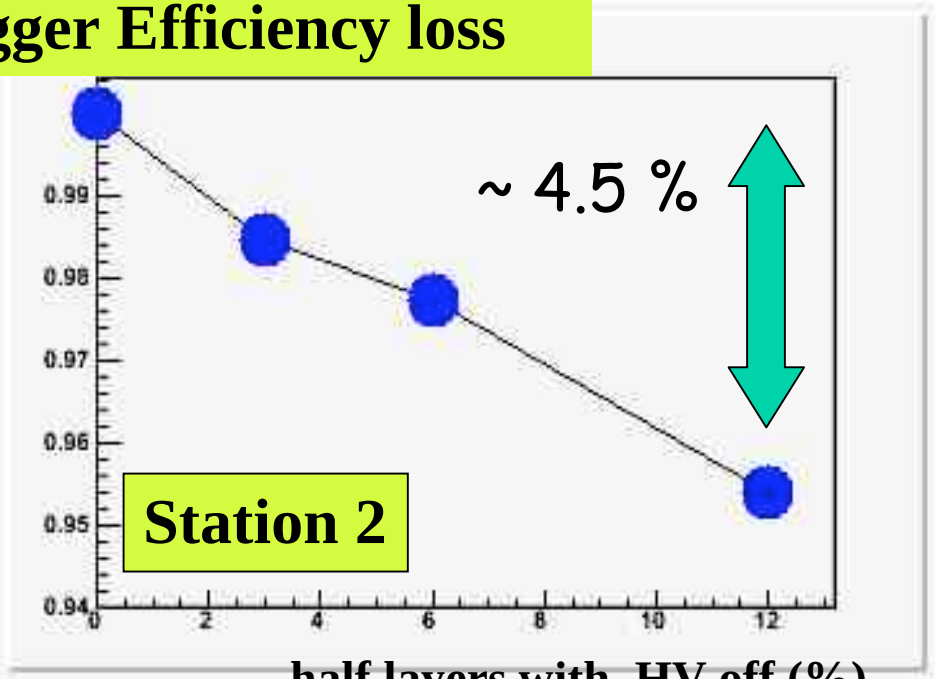
This would correspond to about 12 % of "half layers" (about 70 half layers / wheel)

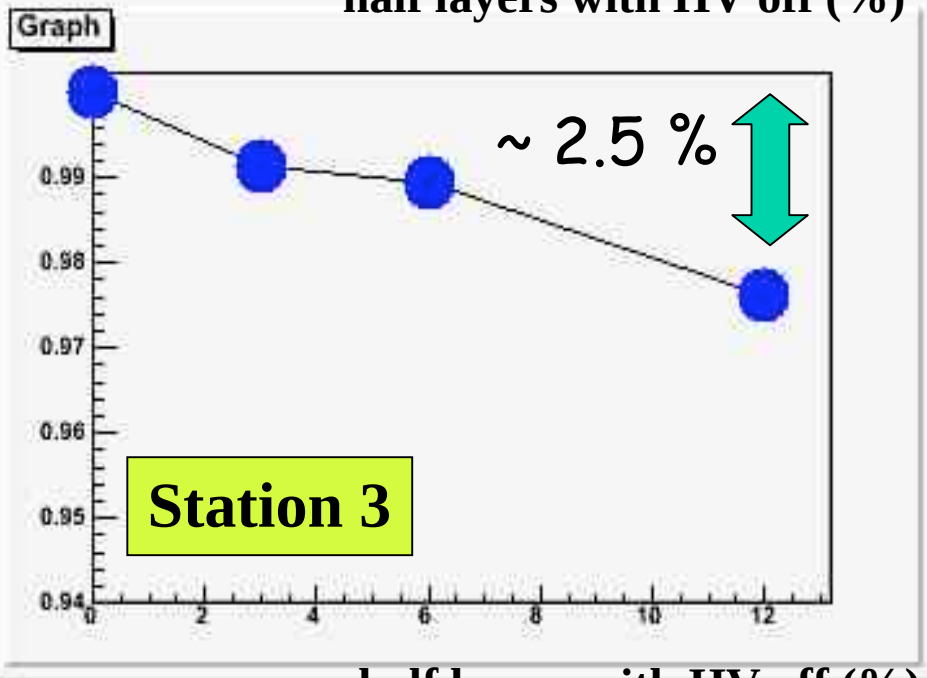
Effect on LV1 trigger ⟶

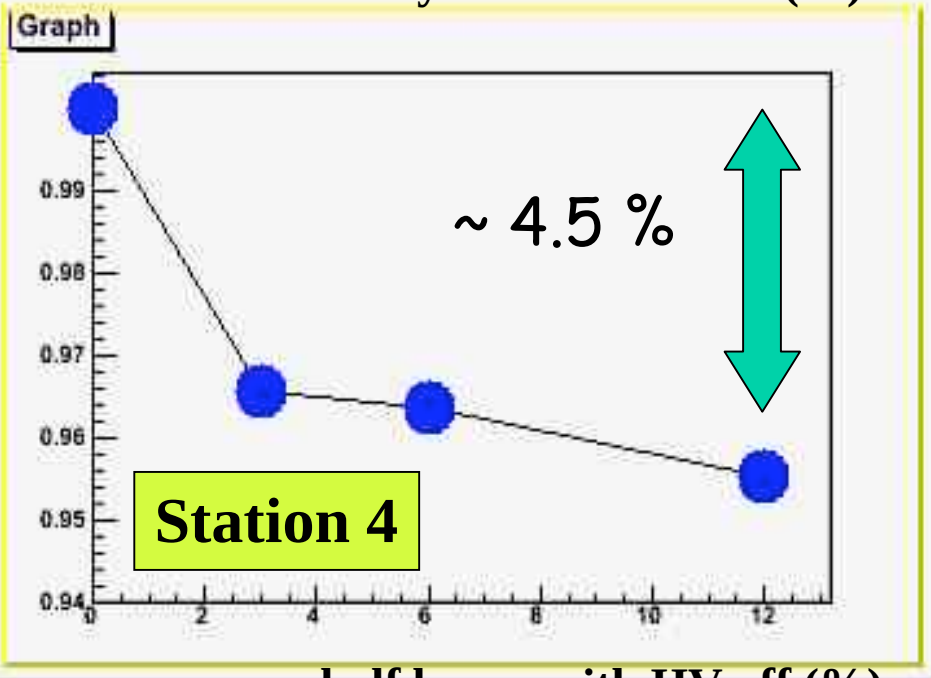

GMT and DTBX Trigger Efficiency loss
0.99
0.98
0.97
0.96
0.95
0.94
0
2
4
6
8
10
12
18 dead half-layers/wheel
70 dead half-layers/wheel
GMT
DTBX Trigger
half layers with HV off (%)

Single DT station Trigger Efficiency loss









HV channels off: summary

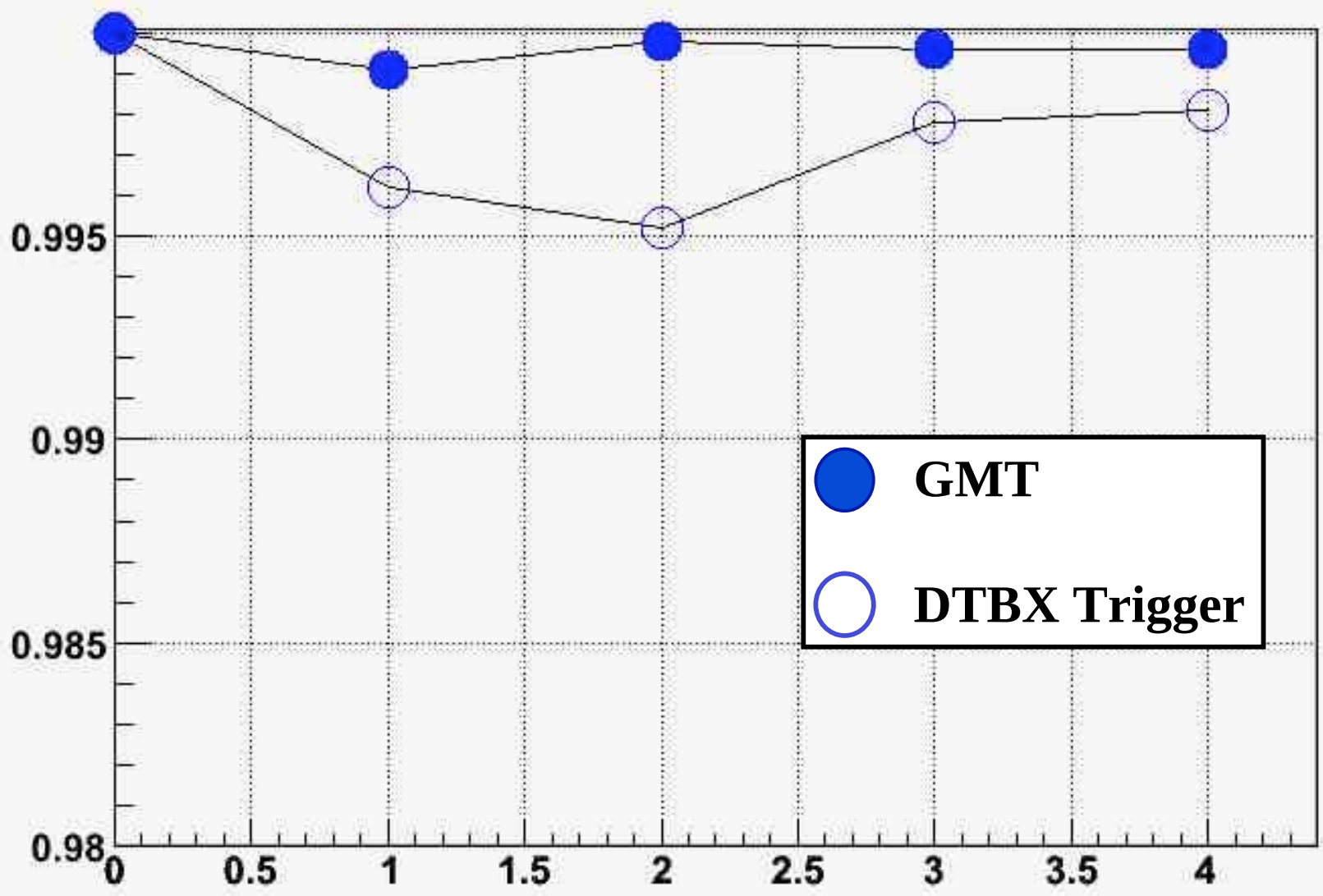
The effect of HV channels switched off can be summarised as a DTBX efficiency loss of
~ 0.5 % for every 10 disconnected half layers/wheel

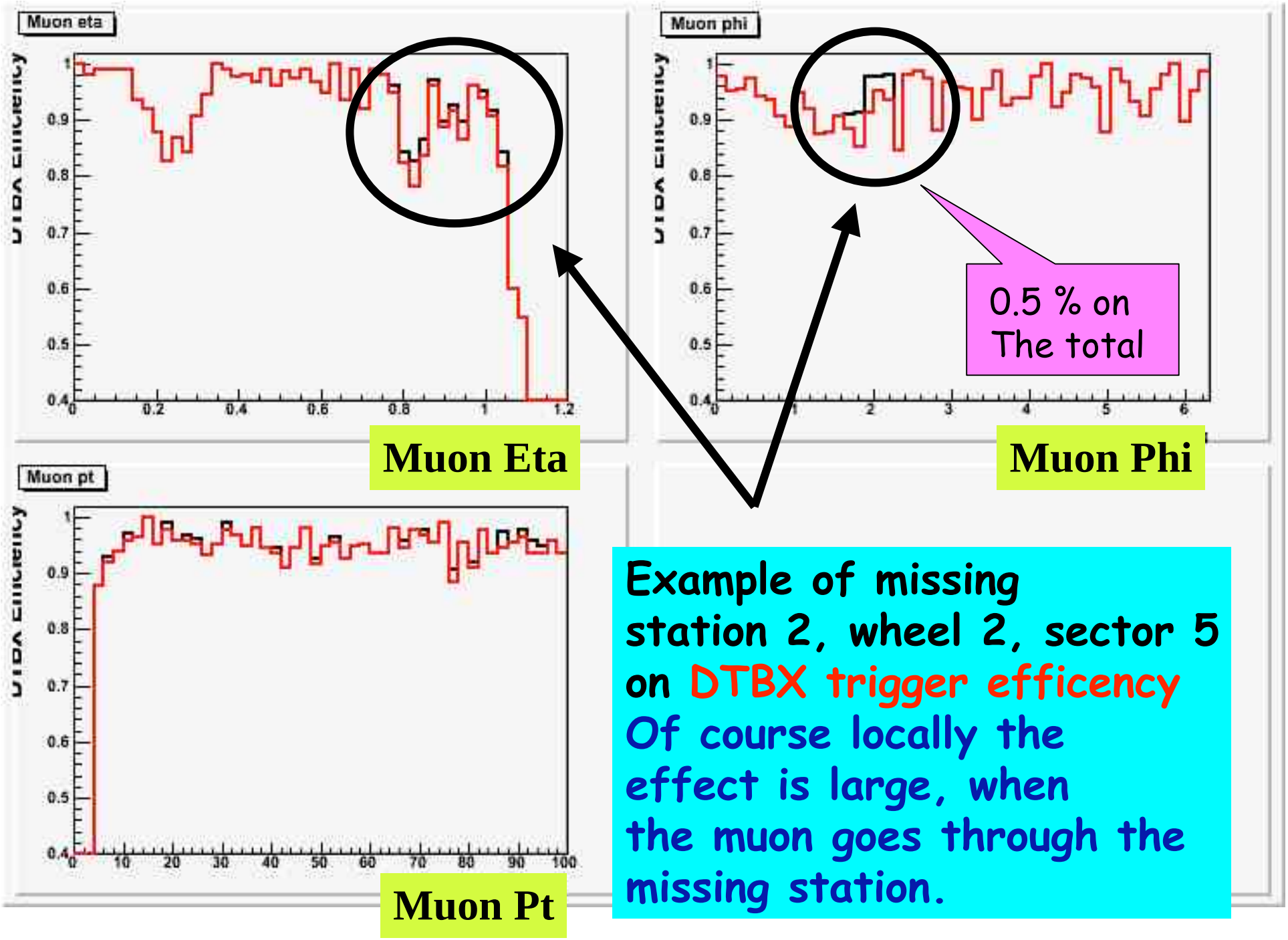
The effect on the GMT is ~ 3 times smaller

The ghost rate does not increase (it actually decreases by some factors)

Effect on the DT Trigger if one station is completely lost

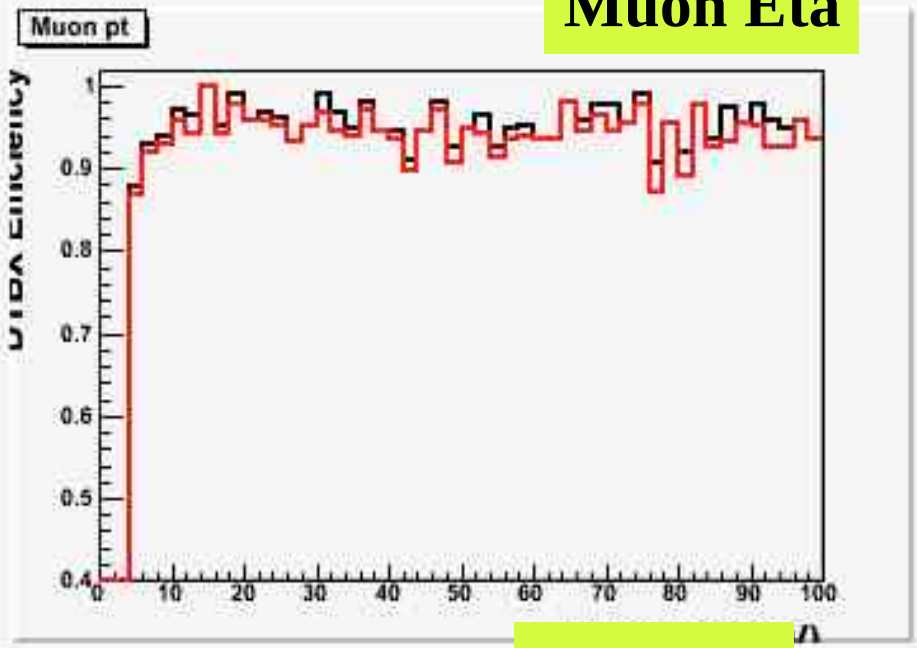
Effect on the LV1 Trigger if one station is lost




Muon eta
Muon phi
Muon pt
Muon Eta
Muon Phi
Muon Pt
0.5 % on
The total
Example of missing
station 2, wheel 2, sector 5
on DTBX trigger efficency
Of course locally the
effect is large, when
the muon goes through the
missing station.

Muon Eta

Muon Phi



Muon Pt

If **both station 1 and 2** are lost in the same wheel, the total DTBX trigger efficiency drops **by 1.2 %** The effect on the **GMT** is only **0.1 %**