Some Remarks on the Sub-triggers

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I. Behaviour of the L0 sub-triggers

- overflap between them
- conditional probabilities -> how useful is a sub-trigger given the "main trigger"?

II. Efficiency for hadron-dominated channels : $B_s \to D_s K$

- relative importance of the various sub-triggers
- some Monte Carlo studies

Overlapping L0 trigger rates (off-diagonal terms)

Exclusive L0 trigger rates (diagonal terms)

M. B. rate (kHz)	hadron	electron	photon	π^0 local	π^0 global	muon	Σp_T^μ
hadron	561	47	50	58	76	27	24
electron		27	11	44	51	4	4
photon			44	43	53	5	4
π^0 local				7	81	6	5
π^0 global					15	7	6
muon						13	93
Σp_T^μ							51
Inclusive M. B. rate (kHz)	705	103	126	110	145	110	145

Inclusive trigger rates

"L0 Conditional Triggering": Minimum Bias Events

How often does the L0-hadron trigger given that the we had a L0-electron trigger?

On 46 % of the cases in minimum bias events …

-> large redundancy between all electromagnetic triggers …

-> is the π^0-global trigger really "optimal" as it is defined now?

Probability (%)	hadron	electron	photon	π^0 local	π^0 global	muon	Σp_T^μ
hadron		46	39	53	53	24	17
electron	7		9	40	35	4	3
photon	7	10		39	37	4	3
π^0 local	8	43	34		56	5	4
π^0 global	11	50	42	74		7	5
muon	4	4	4	5	5		64
Σp_T^μ	3	4	3	5	5	85	

Sub-triggers "importance": $B_s \to D_s K$ Example

Max. efficiency obtainable inclusively by each trigger!

➔ **dominance of the hadron trigger**

➔ **one would expect the efficiency to "strongly" depend on the hadron threshold ...**
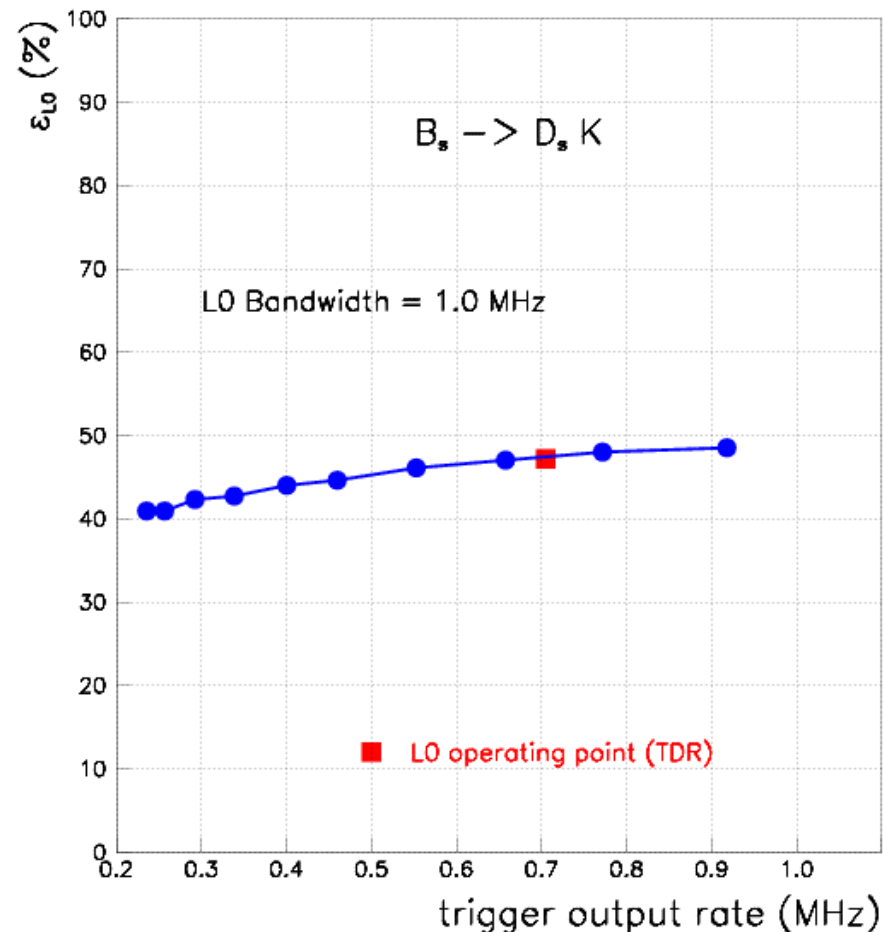
But ...
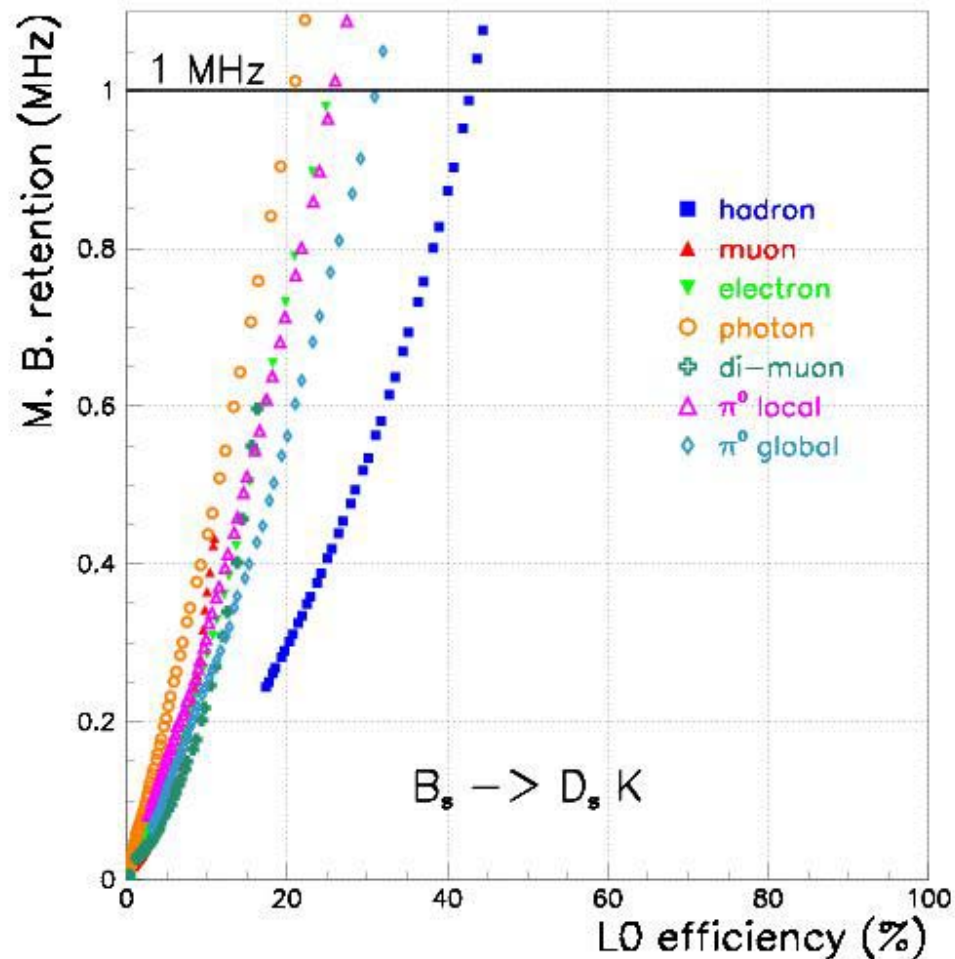
Procedure:

- fix the hadron trigger to a certain bandwith

- let all other thresholds free, to fill the 1.0 MHz

  bandwidth, and optimize L0

- scan from "no hadron trigger" to

  "hadron trigger = full bandwidth"

→ dependency is rather flat !

→ why ?

→ what is recovering the events ?

Sub-triggers Performance: B_s -> D_s K Example

Configuration	L0 efficiency (%)
TDR Efficiency	~ 47.2
ECAL+HCAL triggers only	~ 46.7
HCAL trigger only	~ 46.4
ECAL triggers only	~ 33
π^0 triggers only	~ 33
e + γ triggers only	~ 28

➔ **not completely clear yet how the efficiency is always recovered …**

➔ **looking into the MC particles**

 associated with the L0 candidates …

➔ **a few more checks needed:**

 - MC association to π^0 not obvious

 - π^0's do not seem to be the

 "only responsible"

 - are the π^0's triggering from B decays?