Combined Muon/Calorimeter Trigger Rates

UPDATE

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- The task of calculating the 1st level trigger output rates was accomplished by studying combined calorimeter/muon triggers:

$$\mu\, e, \quad \mu\, j, \quad \mu\, \Sigma E_t, \quad \mu\, E_t^{miss}$$

- A set of trigger thresholds was proposed to maintain the 1st level output rate at 30 kHz.
- The thresholds are low enough to fulfil the CMS physics program presented in TP.
- The results indicate a possibility of important gain in several physics channels, especially in CP violation studies.

$B^0_d \to J/\psi\, K^0_s$; $\quad J/\psi \to \mu\mu$ or ee; $\quad b_{tag} \to \mu$ or e

$p_t\,(\mu) > 2\text{-}4$ GeV $\quad p_t\,(e) > 5$ GeV

$B^0_d \to \pi^+\,\pi^-$; $\quad b_{tag} \to \mu$ or e

$B^0_s \to D_s\pi \to \varphi\pi\pi \to K K\pi\pi$; $\quad b_{tag} \to \mu$ or e

$p_t\,(\mu) > 2\text{-}4$ GeV $\quad E_t\,(\pi\pi) > 12$ GeV

Trigger rates at $L=10^{34}$

trigger type	threshold [GeV]	rate [kHz]	cumulative rate [kHz]
ΣE_t	400	0.48	0.48
E_t^{miss}	80	1.29	1.70
e	25	6.84	8.34
e e	12	1.45	9.52
j	100	2.06	10.7
j j	60	2.17	11.6
j j j	30	3.16	13.3
j j j j	20	2.96	14.3
e j	12, 50	1.35	14.9
μ	20	7.8	7.8
μ μ	4	1.6	<u>9.2</u>
μ e	<u>4</u>, <u>8</u>	<u>5.5</u>	<u>14.4</u>
μ j	<u>4</u>, <u>40</u>	<u>0.3</u>	<u>14.4</u>
μ E_t^{miss}	<u>4</u>, <u>60</u>	<u>1.0</u>	<u>15.3</u>
μ ΣE_t	<u>4</u>, <u>250</u>	<u>0.2</u>	<u>15.3</u>

<u>underlined numbers — this study (preliminary results)</u>

Trigger rates at L=10^{33}

trigger type	threshold [GeV]	rate [kHz]	cumulative rate [kHz]
ΣE_t	150	1.04	1.04
E_t^{miss}	40	2.11	2.82
e	12	10.3	12.3
e e	7	1.54	13.1
j	50	1.98	13.5
j j	30	1.63	13.9
j j j	20	1.02	14.1
j j j j	15	0.68	14.2
e j	9, 15	5.98	15.2
μ	7	9.8	9.5
$\mu\ \mu$	2-4	0.5	10.1
μ e	2-4, 6	2.5	12.2
$\mu\ e_b$	2-4, 5	3.5	13.4
μ j	2-4, 12	2.2	14.5
$\mu\ E_t^{miss}$	2-4, 40	0.8	14.7
$\mu\ \Sigma E_t$	2-4, 150	0.8	14.7

underlined numbers — this study (preliminary results)