How could we study the trigger performance with the coming simulation?

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Introduction

- **More realistic description of the muon stations, chambers, digitizations, ... will be available soon.**
- **Evaluate the effect of each detail on the performance of the muon system.**
- **Lost at the percent level have to be understood and corrected**
- **The most popular estimator is the trigger acceptance on $B \rightarrow \mu X$ events when the MB retention is fixed to 1−2%.**

- **We proposed to:**
  - Use common reference samples
  - Use common reference layout
  - Use commom tools
  - Share the work

Reference samples

- **Minimum Bias event generated within 4π with 1 interaction**
- **B $\rightarrow \mu$X events with 1 interaction**
  where the true muon coming from the B decay hit at least station M1 and M2:
  - **The μ is in the LHCb acceptance and it is identified by the muon detector ([1])**
  - **Similar to the data set which will be selected by physics groups ([2])**
    - **This data set is the most sensitive one to optimized the muon system**
    - **A perfect trigger has to keep all them**
    - **A perfect muon system has to maximize their amount**
- **High statistic samples are required to estimated effects at the percent level**
  (10^4 B$\rightarrow \mu$X events, 10^5 MB)

([1]) It will be identify by the Calorimeter if it does not reach M2
([2]) No analysis routine required to selecte them.

Reference layouts

- **TP like layout:**
  - Region scale in a ratio 1:2
  - Station equiped with pads
  - Pad granularity is the TP one
  - Generic detector description (data v222 + dbase v229)
  - Distance between 2 sensitive layer 16 cm
  - FOI optimized at each working points

- **Mar'00 layout:**
  - Region scale in a ratio 1:2
  - Station equiped with pads ans strips
  - Mar'00 granularity
  - Generic detector description (data v222 + dbase v229)
  - Distance between the 2 sensitive layers: 4 cm
  - FOI optimized at each working point

Common tools

- **Use the l0muon package developed by the Marseille group:**
  - **SICBDST application running the Marseille/Theoretical trigger**
  - **Tool to optimized the FOI**
  - **Tool to plot the B→μX acceptance as a function of the MB retention**
  - **Tool to plot the logical layout**
  - **...**
- **To start with the reference layout Mar'00+4cm:**
  - `cd mycmt`
  - `getpack l0muon v3r1`
  - `cd l0muon/v3r1`
  - `source mgr/setup.csh`
  - `Edit sicb.dat to select your data and running conditions`
  - `dol0m`
  - `less mcint.lis`
- **To submit a batch:**
  - `edit l0mbatch to select data and running conditions`
  - `qsub < l0mbatch`
- **Our tool is ready to work with the coming simulation** (l0muon/v4)

Work to be done

- **Evaluate and understand the effects of the:**
  - Chamber geometry (infinite time window+perfect digitization)
  - Time window (perfect digitization)
  - Cluster size
  - Dead time
  - Chamber noise
  - Spill over
  - ...
- **Studies have to be performed as a function of the background level:**
  Nominal, M1× 2, (M2−M5)×5, Maximal
- **Studies have to also take into account the muon generated by the machine.**

- **Studies can be shared between detector and trigger people.**

Conclusions

- We have to evaluate quickly the effects of the chamber geometry and of the digitization.
- Percent effect have to be understood and corrected.
- We proposed to use common tools and to share the work between muon and trigger groups.
- These studies will be summarized in a note.
  It will be cited in the muon TDR.