Referees Feedback

Official statement in the LHCC by our referee Yannis Karyotakis:

TDR addresses clearly the physics case,
the chamber technology and construction.

- **Additional questions should be communicated to us by the beginning of August.**
- **A telephone conference with the referees is scheduled for the beginning of September, to communicate our answers.**

LHCb Muon System TDR Questions

Question 6:

Page 23, Table 9. Are the misid charge dependent ??

Answer:

The table below gives the muon identification and misidentification efficiencies for positive and negative charges with nominal background. We don't see any big asymmetry, and it is not obvious how significant the results for pions are. If you insist we can follow this further. The important point for us is that, within the errors, there is no asymmetry for muons.

	ε (negative charge)	ε (positive charge)
muons:	0.9360 +- 0.0063	0.9416 +- 0.0034
electrons:	0.0074 +- 0.0012	0.0082 +- 0.0013
pions:	0.0140 +- 0.0004	0.0161 +- 0.0005
kaons:	0.0148 +- 0.0012	0.0182 +- 0.0013
protons:	0.0027 +- 0.0007	0.0044 +- 0.0008

LHCb Muon System TDR Questions

Question 9:

What is the relative price for RPC and MWPC to demonstrate the cost savings.

Answer:

Construction cost has two aspects: Material cost and Assembling cost.

Material cost:

For a Muon System with only MWPC, the material cost is essentially the same. The additional chambers cost 600-700kCHF; the savings due to a single technology are of the same order, (coming from the RPCs itself, the fact that only one gas system and one FE-chip is needed, and less cost for HV).

Assembling cost:

However additional resources are required (manpower, space and tooling for additional construction sites), which are difficult to determine at present. A first estimate is about 500kCHF.

-> We intend to reformulate the question and the answer !

LHCb Muon System TDR Questions

Question 11:

What is the statistical and systematic precision with which you can measure the trigger and reconstruction efficiencies in the muon system, in particular charge asymmetries.

Answer:

C and P violation in the detection is indeed a general problem for the all components of the LHCb detector. So clearly some global strategy has to be developed. However specific to the muon system...

Geometrical effect, such as the detector efficiency, distortion of geometrical symmetry between the left and right etc. can be corrected by flipping the magnetic field, to the first order at least.

Physics effects should be tested with data as much as possible: for example a possible difference in the muon tagging efficiency between $\mu+$ and $\mu-$. This could be tested by measuring CP asymmetry where no CP violation is expected. Using B->J/ψ X decays and reconstructing J/ψ only with the tracking detector, without muon system, we can also measure $\mu+$ and $\mu-$ identification efficiency of the muon system. The trigger efficiency could be cross calibrated by the events where they are L-0 triggered with muon and something else. Our data sample for those studies must be higher than those for any CP violating channels.

LHCb Muon System TDR Questions

Question 12:

What are the 10% and 50% production milestones for the muon system?

Answer:

Chambers:

MWPC production is scheduled from 01/2003 to 12/2004.
A reasonable date for 10% production is 06/2003, and for 50% 03/2004.
RPC production is scheduled from 05/2003 to 12/2004.
A reasonable date for 10% production is 09/2003, and for 50% 06/2004.

Electronics:

FE-board production is scheduled from 04/2003 to 9/2004.
A reasonable date for 10% production is 06/2003, and for 50% 02/2004.
IM-, SB- and ODE-board production is scheduled from 10/2003 to 12/2004.
A reasonable date for 10% production is 01/2004, and for 50% 07/2004.

LHCb Muon System TDR Questions

Question 13:

What is the R&D status for the inner part of M1 and
how important is this part for the physics of the muon system?

Answer:

The technology options for the inner part of M1 are discussed in TDR section 2.2.3. Details on the ongoing R&D work (mainly on triple GEMs) are discussed in support notes referred to in the TDR. Given the small size of this area and the encouraging status of detector R&D, there is no problem to have a working detector in this area in the second part of 2005.

In the present L0 muon trigger algorithm all 5 stations are used. R1 and R2 contribute about 40% to the total b -> μ X L0 muon trigger efficiency. Alternative algorithms have been investigated, e.g. using M2 and M3 for the P_T measurement of regions R1 and R2. The P_T resolution would deteriorate from ~20% to ~40% in this regions, leading to a loss in absolute b -> μ X acceptance between 10 and 20% for 3% and 1% MB-retention respectively.

For offline muon identification, M1 has no particular importance.