

CERN-RRB-2011-094

14 OCTOBER 2011

# PRINCIPAL LHCC DELIBERATIONS

27<sup>TH</sup> MEETING OF THE LHCC RESOURCES REVIEW BOARD

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19 OCTOBER 2011

EMMANUEL TSESMELIS

SCIENTIFIC SECRETARY, LHCC

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## GENERAL

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This document summarizes the principal LHCC deliberations concerning LHCb at the Committee's sessions in June 2011 and September 2011.

**The LHCC considers that LHCb has made excellent progress in all aspects of the experiment and the Committee congratulates the LHCb Collaboration on its achievements.**

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## CONCERNS FROM THE PREVIOUS LHCb RESOURCES REVIEW BOARD

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SUB-SYSTEM	CONCERN	STATUS
Ring Image Cherenkov (RICH-1)	Observation of high current in Hybrid Photon Detectors (HPDs).	The HPDs are replaced whenever possible; faulty ones are preferably placed at the detector edges so that the physics impact is small. Unfortunately, some of the replaced HPDs have to be substituted again. The five faulty HPDs in the RICH-1 detector will require an access during the 2011-2012 Technical Stop.

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## STATUS OF EXPERIMENT

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### OPERATIONS

LHCb continues to use the luminosity leveling method (lateral displacement of intersecting proton beams) to limit the average number of interactions  $\langle\mu\rangle$  below a value of  $\langle\mu\rangle=1.5$  and a luminosity of  $3.5 \times 10^{32} \text{ cm}^{-2} \text{ s}^{-1}$ . This value is considerably higher than the original value of  $2 \times 10^{32} \text{ cm}^{-2} \text{ s}^{-1}$  and represents a good compromise for manageable event topologies for the trigger and high efficiency at a bunch spacing of 50 ns. Values of  $\langle\mu\rangle=2.5$  have been explored. Some  $865 \text{ pb}^{-1}$  have been collected and LHCb continues to optimise the luminosity; however, while small improvements may be possible no significant increase should be expected for the current system. More than  $1 \text{ fb}^{-1}$  total are to be expected by the end of the year 2011.

The availability of the detector components typically exceeds 98% and is often better. LHCb uses a stringent requirement on the availability of all components and hence quotes an overall efficiency for data-taking and quality at 90%; some 4% of the remainder are attributed to genuine dead-time of the data-taking (at 3 kHz); another 4% arise from the DAQ itself and the rest can be associated with safety precautions for the Vertex Locator (VELO) detector and high voltage system. LHCb is very interested in the forthcoming run with 25 ns bunch spacing that will reveal the amount of spillover from preceding bunches. The longer fills increase the data collection efficiency.

High current continues to be drawn in some of the Hybrid Photon Detectors (HPDs) of the Ring Imaging Cherenkov (RICH) system due to ion feedback. The HPDs are replaced whenever possible; faulty ones are preferably placed at the detector edges so that the physics impact is small. Unfortunately, some of the replaced HPDs have to be substituted again. The five faulty HPDs in the

RICH-1 detector will require an access during the 2011-2012 Technical Stop. At the same time a low voltage board can also be replaced. The carbon box foreseen to separate the active gas ( $C_4F_{10}$ ) in the RICH from the aerogel volume is due for gas tightness checks in the coming weeks. Aging effects of the Electromagnetic Calorimeter (ECAL) are observed and monitored while the Outer Tracker is simply monitored for potential such effects. The monitoring is performed either with radioactive sources or with the data ( $\pi^0$  in the ECAL). Up to now there is no detrimental effect on resolution.

### PHYSICS ANALYSIS

LHCb has presented a wealth of results at the summer conferences, which were typically based on  $300 \text{ pb}^{-1}$  of collision data. Many results concerning  $B_s$ -physics are now the world's best and the  $B_d$  results are very competitive. Two channels are particularly sensitive for new physics: the LHCb limit on  $B_s \rightarrow \mu^+ \mu^-$  decays is within a factor five of the expected Standard Model rate; the precise phase analysis of CPV in  $B_s \rightarrow J/\psi \phi$  and  $B_s \rightarrow J/\psi f_0$  yields a value for  $\phi_s$  that resolves uncertainties arising from earlier data from the Tevatron. The RICH detector figures highly in resolving rare hadronic B-decays. Important contributions on the measurement of the CKM parameter  $\gamma$  can be expected. Baryon spectroscopy has just begun and is already very competitive. To date ten papers have been published in refereed journals, seven papers are in collaboration-wide review and 17 analyses presented at the summer conferences will be turned into publications. The LHCC notes with pleasure the increase in physics publications and encourages the Collaboration to swiftly finalize the results presented at the summer conferences 2011 before they may be superseded by the higher statistics available towards the end of the year.

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### LHCb UPGRADE

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The LHCb Collaboration has formed a Steering Panel to investigate and oversee the organization of the upgrade plans that were introduced with the Letter of Intent in March 2011. Overall co-ordination will be provided by the upgrade co-ordinator. However, the three specific areas of tracker & tracking, particle identification and data processing & trigger will be guided by one or two representatives that interact closely with the existing technical working groups. Such a structure is expected to generate minimum overhead and efficiently taps the expertise of the existing working groups without disrupting current data-taking. The overall schedule foresees the organization and implementation of the R&D projects within the collaborating institutes in 2011/2012 and a Technical Design Report in 2013. The installation of the upgrade detector is planned for the second Long Shutdown (LS2) in 2018, which will then enable the Collaboration to run efficiently in the high luminosity phase of the LHC.