DISCUSSION SUMMARY OF SESSION "2012"

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Abstract

The discussion during session "2012" of the LHC performance workshop Evian 2011 is summarised in this paper. Four presentations were given during the session: "View from the experiments including special physics runs", "Outlook for 2012", "Implications of higher energy" and "First thoughts on MD priorities for 2012".

VIEW FROM THE EXPERIMENTS INCLUDING SPECIAL PHYSICS RUNS

B. Gorini presented the considerations from the experiments concerning integrated luminosity by end of 2012, pile-up and special physics requests like higher β* runs.

B. Gorini mentioned the requirement of 15 to 20 fb^{-1} for 2012 integrated proton luminosity for ATLAS and CMS. The question was raised that in case the LHC does not deliver enough integrated luminosity by end of next year whether running in 2013 would be considered. The shutdown coordination for experiments and machine would need a 6 month notice to organize with contractors. Several people in the audience demanded to leave the decision whether to run in 2013 still open.

R. Assmann added that special physics runs should possibly be grouped together to minimize time spent on preparation and switching running conditions. The planning should be prepared accordingly.

B. Gorini questioned the length of the scrubbing run in the schedule and also asked whether it could be moved to a later stage. J.M. Jimenez stressed the necessity of a scrubbing run. Part of the machine would be vented during the shutdown. A scrubbing run would also provide smoother running conditions in 2012. In 2011 the LHC had only been scrubbed up to a bunch intensity of 1.5×10^{11}. When this was exceeded towards the end of 2011, vacuum instabilities occurred. These were originally thought to be related to electron cloud and exceeding the scrubbing conditions. In reality the vacuum problems were due to RF heating and consequent buckling of RF fingers. J.M. Jimenez emphasized that a scrubbing run avoids confusion in diagnosing such vacuum problems.

R. Jacobsson commented on the levelling strategy for LHCb in 2012. Colliding LHCb already during the squeeze of ATLAS and CMS to start the luminosity ramp-up earlier should be discussed. The requirement of a human acknowledgment of levelling requests from the levelling application should also be removed to minimize loss of integrated luminosity.

OUTLOOK FOR 2012

M. Lamont presented the accelerator schedule for 2012 and discussed several possible scenarios and performance reach depending on LHC top energy, bunch spacing and β*.

M. Chamizo Llatas wanted to know why the intensity ramp up proposed in the 2012 planning had to be that long. M. Lamont replied that the machine would be started up from scratch and all machine protection validation tests would have to be repeated. The initial intensity ramp-up would however be faster than in 2011. Only from 800 bunches onwards more time would be spent again at the different intensity steps.

M.J. Jimenez asked whether the operational bunch length would be increased in 2012 to reduce the issue of heating of accelerator components. E. Chapochnikova replied that for bunches longer than 1.35 ns losses from the bucket would increase decreasing luminosity lifetime. For the experiments 10 % longer bunches than in 2011 would still be acceptable. The experiment's limit on the bunch length comes from the vertex reconstruction capabilities of the pixel detectors. G. Arduini mentioned that the MKI heating does not change much with the bunch length. S. Fartoukh added that longer bunches clearly meant less luminosity.

S. Redaelli mentioned that the effects of the long-range beam-beam force should be investigated at an early stage to understand the margin on crossing angles and therefore aperture.

R. Steerenberg asked whether enhanced satellites would be required again in 2012. M. Lamont replied that due to disadvantages with the fairly intense satellites for the experiments in the enhanced satellite scheme, the natural satellites and squeezing ALICE more is the preferred solution for 2012.

IMPLICATIONS OF HIGHER ENERGY

R. Alemany Fernandez summarized the benefits and issues as well as additional commissioning cost for LHC operation at 4 TeV in 2012.

J. Wenninger added that independently of an energy increase, the 120 A correctors around the experiment insertions should be commissioned to nominal values not to be limited during triplet aperture measurements as in 2011. The hardware commissioning team replied that some of these circuits were current-limited due to non-conformities.

R. Alemany Fernandez argued that the risk of a burn-through of a defective 13 kA joint at 4 TeV would be similar to 3.5 TeV. R. Schmidt clarified that for the same number of quenches the risk at 4 TeV is higher than at 3.5 TeV.

M. Lamont asked whether there would be a possibility to go to an energy even higher than 4 TeV. A. Siemko negated this.

FIRST THOUGHTS ON MD PRIORITIES IN 2012

F. Zimmermann presented the Machine Development (MD) priorities for 2012. The MDs were categorised according to “pushing performance in 2012”, “preparing for 2014/15” and “towards maximum luminosity”.

B. Goddard asked what the policy would be in 2012 about pushing operational development into MD periods as it happened in 2011. M. Lamont answered that the commissioning of the squeeze to 1 m β^* in 2011 was exceptional, otherwise no operational development was carried out during MD periods. B. Goddard also mentioned that operational development in MD periods was not MPS classified.

Y. Papaphilippou remarked that the MD priorities need to take into account that the Q20 optics might become the operational SPS optics in 2012. Injection studies with Q20 optics should therefore have a higher priority. F. Zimmermann replied that he did not see any immediate benefit for the current conditions with 50 ns.

S. Fartoukh mentioned that an important topic was to study the BPM stability at nominal $\beta^* = 0.55$ m. F. Zimmermann answered that would be part of the BI MD. S. Fartoukh replied that this then needed to be combined with a low β optics commissioning.