

# DISCUSSION SUMMARY OF SESSION ON LUMINOSITY PERFORMANCE

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## *Abstract*

The discussion during the session “Luminosity Performance” is summarised in the following.

### **CAN WE GET RELIABLE ON-LINE MEASUREMENTS OF THE TRANSVERSE BEAM SIZE? FEDERICO RONCAROLO & EMITTANCE PRESERVATION – VERENA KAIN**

Due to time constraints the presentation on “Can we get a reliable on-line measurements of the transverse beam size?” from session Beam Diagnostics and Feedbacks was combined with the presentation on “Emittance Preservation”.

B. Goddard asked whether the turn-by-turn matching screens will be available for the 2011 start-up. E. Bravin answered “probably not”. They will come during the run. M. Lamont asked whether from the data of the experiments the stronger vertical blow-up in beam 2 could be seen. V. Kain answered that during the beginning of the 150 ns run the vertical luminous region data follows the beam size of beam 2, which is larger than beam 1 before the ramp. Towards the end of the 150 ns run the vertical emittance from the luminous region becomes smaller (around 2.5  $\mu\text{m}$ ), as does the vertical beam size at injection. The reason for that is not clear, G. Arduini mentioned the timing in of the beam 2 injection kicker. That however would only affect the first bunch and does not seem to be the explanation. S. Redaelli asked whether the effect of the nominal optics at the wire scanners and BSRTs for calculating the emittance instead of the measured optics has been evaluated. F. Roncarolo answered “no”.

### **BEAM-BEAM – WERNER HERR**

The matching between the two beams is important for beam-beam effects, W. Herr answered to O. Brüning’s question. O. Brüning then added that time will have to be spent on correcting  $\beta^*$  and equalising the emittances. W. Herr also commented that from the 2010 experience we know that the effect of the beam-beam separation is less severe than expected, however PACMAN seems to be stronger than previously thought. Concerning the beam-beam limit, it was asked whether it originates from head-on or long range effects. W. Herr answered that at the moment the LHC is head-on limited, but later the beam-beam effects will most probably be long range dominated.

W. Herr stressed that the observed sudden losses were clearly related to luminosity scan, and only observed at the time we were applying a tune split.

S. Myers asked if we can do better on head-on tune shift? W. Herr answered “yes, we have to try to push it as much as possible”. S. Myers said that MDs should be planned to understand the beam-beam limit.

### **STRATEGY FOR LUMINOSITY OPTIMISATION – SIMON WHITE**

A similar tool as for luminosity optimisation could be useful also for “distance scale calibration”. The interest of having a feedback every few minutes on luminosity optimisation, like at PEP II, was also mentioned by Witold Kozanecki. W. Herr replied that shaking the beam over and over again would cause emittance growth. Violating the collimation hierarchy during VdM scans was mentioned several times. R. Schmidt commented that the violation of the hierarchy is not as problematic as exposing the triplet. R. Assmann remarked that VdM are not too worrying as they are only done under special circumstances following special procedures. For the automated tools, limits on the correctors should be in place. It was also stressed that maintenance and development of the software is to be taken into account as Simon White is leaving.

### **THE LHC OPTICS IN PRACTICE – ROGELIO TOMAS**

J. Wenninger asked for a possibility to have the results of the beta-beating online in the control room for comparison. A solution will be put in place for next year’s start-up. R. Assmann asked whether any effect of “aging” will be expected for the extremely reproducible LHC optics. The LHC will not be re-aligned for the next run. This will be followed up at the LMC. E. Todesco wanted to know whether hysteresis was seen to be a big issue. R. Tomas Garcia replied that currently this is not the biggest error. For the next year all the trim quadrupoles should be driven during the squeeze to make the corrections effective. F. Zimmermann remarked that for the coupling correction at  $\beta^* = 2$  m, some of the correctors are already reaching their limit. R. Tomas Garcia answered that local correction using the triplet correctors will be needed there. B. Dehning asked for an estimate of the systematic errors of the beta-beating measurements. This can only be fully answered with k-modulation as cross-check.

**HUMP: HOW DID IT IMPACT THE  
LUMINOSITY PERFORMANCE? –  
GIANLUIGI ARDUINI**

S. Myers asked whether it would be possible to find a working point away from the hump. G. Arduini answered that the hump has a varying frequency, all frequencies from 0 – 0.5 are affected. G. Arduini also insisted that the Hump buster is used more frequently

**LHC BEAM PARAMETERS: PUSHING  
THE ENVELOPE – ELIAS METRAL**

E. Metral mentioned a minimum emittances of  $1.5 \mu\text{m}$  in case of 2 batch operation from the booster. B. Goddard remarked that the machine protection implications for such small emittances should be investigated.