

105th Meeting of the LHC Collimation Study Group, September 7th, 2009

Present: Ralph Assmann (chairman), Alessandro Bertarelli, Chiara Bracco, Alessandro Dallochio, Bernd Dehning, Barbara Eva Holzer, Christoph Kurfuerst, Luisella Lari, Steve Lundgren (SLAC), Daniela Macina, Tom Markiewicz (SLAC), Stefano Redaelli (scientific secretary), Stefan Roesler, Federico Roncarolo, Alexander Ryazanov, George Smirnov, Jeff Smith (SLAC), Daniel Wollmann.

Comments to the minutes

No comments to the previous minutes.

Agenda of this meeting

- News on collimator project organization (R. Assmann)

- Regular status reports:
 - a) Hardware and tunnel activities (O. Aberle)
 - b) Remote and beam commissioning (R. Assmann)
 - c) Phase 2 at CERN (A. Bertarelli)
 - d) Phase 2 at SLAC (J. Smith)
 - e) FLUKA work (L. Lari)

- Discussion on procedure for SPS-LSS5 layout change (A. Bertarelli)
- TCL loss simulations (F. Roncarolo)
- Collimator setting proposal for 3.5 TeV (A. Rossi)
- Collimator data access tool for commissioning (D. Wollmann)

List of actions from this meeting

Action	People	Deadline
SPS-LSS5 layout change		
Mention the issue to the next IEFC	R. Losito	Sep. 12th
Detailed installation planning presented at IEFC	O. Aberle	Sep. 26th
Update Engineering Change Request to update layout	O. Aberle	Sep. 26th
<i>n</i> 1 calculation for the LHC configuration at 3.5 TeV including separation and crossing schemes.	A.Rossi	ASAP

(Complete list at <http://lhc-collimation.web.cern.ch/lhc-collimation/action.htm>)

The next meeting will be September 21st, 2009.

Minutes of the meeting

1 General information (R. Assmann)

R. Assmann reviewed the organigramme of the collimation project and presented the list of topics for future Collimation Study meetings.

R. Assmann also introduced Nicolas Mounet who is a PhD student working with Elias Métral on collimator impedance.

2 Regular status reports

2.1 Activity in the tunnel (R. Losito)

Activity in the tunnel is completed.

2.2 Remote and beam commissioning (S.Redaeli)

S. Redaelli commented that we have one week delay for the deployment in the tunnel of the RBAC. The released version of the middle-ware controls will be done today or tomorrow. The release of the top-level application was done today. The reason for delays was that last week we had to access the tunnel to fix problems with some PX systems that could not be rebooted remotely.

2.3 Phase II activities at CERN (A. Bertarelli)

A. Bertarelli announced that there has been good progress on the pickups integrated in the jaws. Their performance proved to work as expected and even better! He suggested to have the results presented here by the BI team.

The design aspects also advanced. A cost estimate for a full-scale prototype will be ready by this week.

F. Caspers suggested to profit of the wire set-up to measure the impedance of the collimator.

2.4 FLUKA work (F. Cerutti)

F. Cerutti reported on behalf of the FLUKA team on the simulation status. Inputs were provided to MME as requested. The inputs from C. Bracco as discussed at the last meeting were. A note has recently been published to (LHC Project Note 423).

F. Cerutti also stated that there is still a pending issue on the discrepancy of single diffractive contribution as estimated by FLUKA and SixTrack. In addition, he asked inputs for scenarios with machine alignment error only, which represent the biggest contribution to cleaning performance reduction. R. Assmann commented that we need to limit the time on simulations because the collimation team is fully busy on the hardware commissioning of the system. He proposed to start with case without jaw deformation to have a first idea on the performance at reduced energy. Details of the simulation scenarios will be followed-up off-line.

2.5 Phase II activities at SLAC (J. Smith)

J. Smith presented a status of the Phase II activity at SLAC - see the first slide of his transparencies. A detailed report will be given at the next meeting.

F. Caspers asked about the ferrite installation in the prototype. Jeff states that they would welcome suggestions on the brazing. For the moment, the "Cornel solution" seems the most promising.

3 Decision on procedure for changing of SPS-LSS5 layout (A. Bertarelli)

A. Bertarelli stated that we need to define officially the planning for uninstallation of the old SPS collimator prototype and for the installation of the Phase II prototype in the SPS-LSS5. The present tight baseline:

- Uninstall the present collimator on the 2nd of November (8h technical stop of the SPS).
- Prepare support and cabling for the new prototype in the same day.
- Install the new prototype in the first slot available: most likely in Feb. 2010, but possible also in Dec. 2009.

This baseline will obviously have to follow possible changes of the SPS schedule.

R. Assmann stated that we should present the proposal at the IEFEC. He reported that G. Arduini confirmed that the aperture is fine - good news. To proceed, we need a detailed planning and a radiation maps after survey. A. Dalocchio reported that RP confirmed that the radiation levels in the region are low, however they need a detailed work plan before giving the official authorization to proceed. This should be prepared by O. Aberle (**ACTION**). As Oliver is away this week, we will wait until he is back for his feedback.

S. Redaelli pointed out that the present collimator prototype is very important for the UA9 crystal experiment (last MD would be after Nov. 2nd). We should try to keep it in the SPS until the foreseen MD are finished. A. Bertarelli commented that from the planning it seems that the opportunity of Nov. 2nd is the only option and we cannot miss it. R. Assmann suggested to ask feedback on dates from IEFEC. Things might still change.

It was decided that R. Losito, who participate to the IEFEC, will give a pre-warning at the next meeting in 10 days and then a detailed planning will be worked out and presented to the following meeting two weeks later (**ACTION**).

R. Losito asked if the IEFEC is the most appropriate forum to discuss this topics. R. Assmann commented that this was agreed with N. Gilbert in the past, so we should proceed with this approach. R. Losito also commented that there should be an ECR. R. Assmann maybe an update of the old one is sufficient and should be updated by O. Aberle (**ACTION**).

4 TCL collimation studies (F. Roncarolo)

Federico Roncarolo presented detailed studies on the losses downstream of ATLAS from the physics debris, in the context of the feasibility study for the installation of the AFP (ATLAS Forward Physics) experiment. The details of these studies are available in Federico's slides. F. Roncarolo proposed two possible scenarios that allow the operation of the movable beam pipes at 220 m:

- Move the TCL5 downstream, in front of Q6. This would improve the protection of the dispersion suppressor while guaranteeing enough cleaning at the Q5 by a proper choice of settings (e.g., 30-35 sigmas) of TCL4.

- Add an additional TCL6 and relaxing the settings of the present TCL5.

F. Roncarolo pointed out that there is a significant error between the tracking results of `SixTrack` and PTC for energy errors of the order of 30%. R. Assmann commented that this is not shocking. It was estimated that these errors do not have an impact on cleaning of the circulating beams.

F. Roncarolo suggested a list of open issues to be addressed once the AFP project is approved. These items will be followed-up by Rob Appleby, who will take over this studies and will replace Federico who joins the BI team.

R. Assmann welcome the thorough work.

In response to a question by Federico, R. Assmann commented that TCL4 are built and the cabling is available so they are ready for installation. But they can only be installed if the TOTEM Roman pot stations are removed.

As a comment to F. Roncarolo's results, R. Assmann pointed out that the simulations consider the perfect case. Clearly optics and aperture imperfection should be taken into account. Federico agreed however pointed out that for single pass the effect of some errors should be small. R. Assmann does not agree. Federico also added that the first aim of his study is to assess the effectiveness of a TCL6 against a TCL5 and any machine imperfection/erro would contribute in the same way at he two locations, on top of the presented results.

F. Roncarolo requested feedback on the AFP Approval. R. Assmann stated that our baseline for the moment is to keep the TCL5 is its nominal position and then the real beam experience will tell if this is sufficient to protect the Q4. He suggested that the request of adding another TCL (TCL6) to improve the physics program should be brought forward, possibly as a part of the IR upgrade.

F. Roncarolo commented that the TCL6 would be a good key player for the radiation level in the RR's. F. Cerutti stated that the beneficial effect is not guaranteed and FLUKA studies are needed.

5 Collimator setting proposal for 3.5 TeV (A. Rossi)

A. Rossi presented a proposed set of collimator settings for the 3.5 TeV operation. As a machine configuration, Adriana assumed a flat machine with zero separation and crossing in all points and $\beta^* = 2m$ in IP1 and IP5, $\beta^* = 3m$ in IP8 and $\beta^* = 10m$ in IP2. The calculation of the collimator settings is based on the MADX calculation of the n1 values around the ring. As expected, the aperture bottleneck is found in the triplets of the various points and the baseline for settings - as requested by the experiments - is to set the TCTs such that they ensure the biggest aperture.

Adriana presented a table with the proposed settings in all the points. These settings will be used for simulating the performance of the system at 3.5 TeV (simulations will start soon). R. Assmann commented the setting table will be distributed to the colleagues of the dump and injection projects. If there are not objections, these values will then be used as baseline for the generation of collimator settings for the early operation of the 2009-2010 run.

R. Assmann commented that the proposed settings with relaxed TCLA opening will have to be validated with FLUKA energy deposition studies, because in the nominal configuration they have a major impact is reducing the losses in the cold part. This contributions cannot be assessed by the approximated calculations based on n1.

J. Jowett commented that ALICE is bringing forward a new request to operate at a $\beta^* = 2 m$. If this was confirmed, the settings will have to be upgraded accordingly. The operational machine configuration for the first LHC run is being worked out at the LHC commissioning working group [meeting](#).

M. Sapinski asked if loss maps are available. A. Rossi replied that she is starting the simulations now and results will be distributed as soon as possible.

S. Redaelli commented that for the aperture calculation the configuration with parallel beam separation and crossing angle (if needed) should be considered because this corresponds to tighter aperture settings (**ACTION**).

6 Collimator data access tool for commissioning (D. Wollmann)

D. Wollmann presented the tool that he has prepared to access the collimator position data and make them available for detailed analysis. The tool uses API provided by the logging team to extract the collimator data from the Measurement database and to store them on a dedicated collimator server.

A. Dallochio asked why not extracting data on change instead of getting all the big amount of data. D. Wollmann replied that for convenience of data analysis it is easier to have the complete, synchronized set of data.

J. Jowett commented on the data format and reminded that at LEP the attempts to create standard format failed because everybody use his own data format. How does this compare with the work done for collimators? S. Redaelli replied that the format is standard for logging time series and does not use the more popular SDDS format, which is not optimized for time-dependent series. Daniel also commented that the program is used to handle large data sets, which is not easy with the Timber tool provided by the logging team.

R. Assmann also commented that C. Bracco is working on a JAVA CAP tool to analysis these data. She will present the tool a the next collimator meeting.

The next meeting will be September 21st, 2009.