

108th Meeting of the LHC Collimation Study Group, November 9th, 2009

Present: Oliver Aberle, Ralph Assmann (chairman), Giulia Bellodi, Alessandro Bertarelli, Chiara Bracco (scientific secretary), Francesco Cerutti, Alessandro Dallocchio, Lewis Keller (SLAC), John Jowett, Luisella Lari, Steve Lundgren (SLAC), Thomas Markievicz, Nicolas Mounet, Stefan Roesler, Adriana Rossi, Mariusz Sapinski, Jeffrey C. Smith (SLAC), Vasilis Vlachoudis, Daniel Wollmann.

Comments to the minutes

No comments to the previous minutes.

Agenda of this meeting

- Regular collimation status reports:
 - a) Hardware and tunnel activities (O. Aberle, EN/STI team)
 - b) Remote and beam commissioning (R. Assmann, BE/ABP)
 - c) Phase 2 at CERN (A. Bertarelli, EN/MME team)
 - d) Phase 2 at SLAC (T. Markievicz, SLAC team)
 - e) FLUKA work (V. Vlachoudis, FLUKA team)

- Energy deposition in the point 7 warm section at 3.5 TeV (F. Cerutti)

- Beam losses and collimation cleaning at 3.5 TeV (A. Rossi)

List of actions from this meeting

Action	People	Deadline
List of proposal for measurements during beam commissioning		next CWG meeting
Provide FLUKA people with data for primary proton losses in warm region plus flag for single diffractive scattering at 3.5 TeV	A. Rossi C. Bracco	

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

The next meeting will be November 23rd, 2009.

Minutes of the meeting

1 General information

R. Assmann invited people to present at the next CWG meeting a list of proposals for measurements which should be performed during beam commissioning: cleaning efficiency, energy deposition, impedance. These proposals should be implemented in the commissioning planning. He reminded that the LHC Beam Commissioning working group meeting is held every Tuesday at 15:30 in room 874-1-011.

2 Regular status reports

2.1 Activity in the tunnel (O. Aberle)

No news from the tunnel.

2.2 Remote and beam commissioning (R. Assmann)

R. Assmann announced that Machine Protection tests, without beam, have been successfully performed for about 90% of the LHC collimators, tests will be completed this week. Collimators have been highly used during last injection tests and they worked fine. The beam was dumped on the collimators which turned out to be strongly radioactive. Data for proton and ions losses have been recorded, all the results must be collected and presented in order to define the plan for future studies.

2.3 Phase II activities at CERN (A. Bertarelli)

A. Bertarelli presented the status of the CERN phase II prototype collimator. He pointed out that, except for a two weeks delay due to overwork of the welding lab, the prototype is fully machined and ready to be assembled. Coast estimate and manufacturing of the tank will be also done in the next weeks. Thermal mechanical calculations are on going and first results based on FLUKA inputs are already available. New studies, with detailed geometry provided by L.Lari, are on going. L. Lari commented that she will present FLUKA results for Cu and Al tapering at the next CWG meeting.

A. Bertarelli reported also on EUCARD collaboration: a meeting with people from “Politecnico di torino” is planned for this week in order to discuss about hydrodynamic simulations. He added that news and updates can be found on the web (see link in his talk) and that phase II design meetings will be soon resumed. O. Aberle asked about a new assembly of tables for phase II collimators. A. Bertarelli answered that a standard table will be used for the prototype to be installed in the SPS but that a new table is foreseen for phase II collimators and that has already been assembled and can be seen in building 252. R. Assmann proposed to organize a visit there.

Nicolas Mounet asked about possible impedance measurements with the new SPS prototype collimator. A. Bertarelli answered that a mixed design jaw with carbon insert will be installed in the SPS, so that same impedance as for standard collimators can be expected. R. Assmann proposed to start studies of collimator induced impedance at 3.5TeV.

2.4 Phase II activities at SLAC (T. Markiewicz)

T. Markiewicz presented an update on SLAC phase II collimator design and manufacturing (for details see slides). An exchange of information is ongoing, about jaw orientation and aperture available at the location of the SPS where the prototype will be installed. He explained that studies on trapping modes have also been performed and will be repeated with the newly updated version of the tank model. T. Markiewicz added that documents to be sent together with the prototype are being assembled as well.

R. Assmann commented that several preliminary tests (like for example vacuum tests) should be performed before installing the prototype in the SPS. He reminded that this collimator should be delivered at CERN within August 2010. T. Markiewicz answered that these tests are foreseen and will be started before Christmas.

L. Lari pointed out that she has received the technical drawings of SLAC tank, she has implemented the new FLUKA geometry model and simulations are running. She will be able to present results for this case in about one month.

3 Energy deposition in the point 7 warm section at 3.5 TeV (F. Cerutti)

F. Cerutti summarized first results obtained for energy deposition studies on magnets of the warm betatron cleaning insertion at 3.5 TeV. He pointed out that the FLUKA model of IR7 is still evolving but results show already a clear scaling of the power deposition with energy. He showed that 72% of the total power is deposited on the horizontal primary collimator (simulations for horizontal halo: the most critical one) while less losses are recorded on the TCLA, with respect to top energy, due to their larger aperture. Energy deposition on passive absorbers is a factor of 2-3 lower but a higher load on water pipes is expected due to less focused showers. This aspect must be analyzed in order to exclude vacuum problems.

F. Cerutti explained that dose on MBW and MQW, which are shielded by the passive absorber, is again a factor 2-3 lower than at top energy. He underlined, anyhow, that only showers from collimators are taken into account while direct losses of protons should be considered. R. Assmann confirmed that peaks of direct proton losses in warm regions are much more important at this energy with respect to 7 TeV. V. Vlachoudis suggested to provide these data together with the aperture model in order to evaluate the impact of such losses on the magnet load. A. Rossi and C. Bracco will send this information, moreover simulations at 3.5 TeV with the flag for single diffractive scattering events will be also performed.

M. Sapinski asked if BLM are also included in the model and F. Cerutti answered that this is the case. R. Assmann commented that these studies should be used also as an input for BLM studies in order to fix , and eventually relax, interlock thresholds. He added that a similar analysis should be performed for ions (relevant towards the end of 2010). F. Cerutti ended his presentation remarking that, due to the large aperture of the absorbers, peak power density on the cold section should be evaluated as well.

4 Beam losses and collimation cleaning at 3.5 TeV (A. Rossi)

A. Rossi presented results of simulations performed for background studies at 3.5 TeV. She set collimators at the intermediate settings (relaxed tolerances, see slides) but, initially, she kept the momentum collimators as they are at injection. The aperture of tertiary collimators was defined in order to satisfy the requirements for the protection of the triplets and to minimize the background at the experiments. A. Rossi showed the loss maps of horizontal, vertical and skew halo for beam 1 and beam 2. She underlined that high peaks of direct proton losses

in IR3 and IR7 are visible in all the cases analyzed. She also pointed out that the beam 1 skew halo seems to be the most critical for direct losses in the cold region. Finally A. Rossi presented the behavior of losses in IP3 for different settings of the momentum collimators.

5 A.O.B(S. Lungdren)

S. Lungdren showed some drawings and images of the SLAC phase II collimator prototype and tank (see slides). Oliver Aberle commented that all electrical and mechanical interfaces have to be defined before the installation, an offline discussion followed the meeting.

The next meeting will be November 23rd, 2009.