

## 106<sup>th</sup> Meeting of the LHC Collimation Study Group, September 21<sup>th</sup>, 2009

*Present:* Ralph Assmann (chairman), Alessandro Bertarelli, Christian Boccard, Chiara Bracco, Alessandro Dallocchio, Bernd Dehning, Marek Gasior, Brennan Goddard, Barbara Eva Holzer, Lewis Keller (SLAC), Thomas Kramer, Keith Kershaw, Luisella Lari, Steven Lundgren (SLAC), Thomas Markiewicz (SLAC), Nicolas Mounet, Adriana Rossi, George Smirnov, Jeffrey Smith (SLAC), Jean-Philippe Tock, Daniel Wollmann.

### Comments to the minutes

Minutes of last meeting are still under preparation.

### Agenda of this meeting

- Regular status reports:
  - a) Hardware and tunnel activities (O. Aberle)
  - b) Remote and beam commissioning (R. Assmann)
  - c) Phase 2 at CERN (A. Dallocchio)
  - d) Phase 2 at SLAC (S. Lundgren)
  - e) FLUKA work (L. Lari)
  
- Detailed status report on Phase II at SLAC (T. Markiewicz)
- Losses on TCTs from asynchronous dump (T. Kramer)
- Performance on BPM integrated in PII collimator. (C. Boccard)
- Collimator Analysis Program (CAP) tool. (C. Bracco) [skipped]

### List of actions from this meeting

Action	People	Deadline
Cabling for phase 2 CERN prototype in SPS	O. Aberle	7-8 October
Define space available for remote handling of phase 2 collimators in the LHC		
Check with background people new proposed settings for TCTs at 3.5 TeV		
Define location and available space in SPS for SLAC prototype		

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

**The next meeting will be September 7th, 2009.**

## 1 Regular status reports

### 1.1 Activity in the tunnel (O. Aberle)

O. Aberle was absent but R. Assmann reported that the hardware commissioning activity in the tunnel is completed. The complete removal of the fifth motor for the TCSG.A5R7.B2 secondary collimator is going on.

### 1.2 Remote and beam commissioning (R. Assmann)

R. Assmann communicated that the installation of the phase 2 prototype collimator with integrated BPM has been postponed and will not take place during the next SPS technical stop (foreseen for October 7<sup>th</sup> and 8<sup>th</sup>). A. Bertarelli commented that, however, during this period the cabling system will be set up.

R. Assmann then reported that works on the commissioning of the LHC collimation system are going on even if with some delay. Single collimator hardwares are tested in parallel with setup sequences of the full system. RBAC and MCS roles have been set up (A. Masi is working on it).

### 1.3 Phase II activities at CERN

A. Bertarelli commented that no big issues have to be reported with respect to the previous meeting. Design for two phase 2 CERN collimator prototypes have been defined, manufacturing and cost have been estimated and the aim is to launch the production within the end of this year or beginning of next year.

R. Assmann introduces Jean-Philippe Tock who is responsible for the displacement of magnets in the dispersion suppressor region for the installation of IR7 cryo-collimators. A. Bertarelli asked the time needed to move a magnet and J.P. Tock answered that it depends on magnet type, he pointed also out that the first magnet could be displaced already at the end of this year. R. Assmann reminded that this topic is in the medium term LHC plan (February 2010). Keith Kershaw, responsible for remote handling of collimators, was also present. Information about space available for this kind of control must be communicated to SLAC people.

### 1.4 FLUKA work (L. Lari)

No news from FLUKA side.

## 2 TCDQ positioning and collimator tolerances (T. Kramer)

T. Kramer presented his results on tracking studies in case of asynchronous beam dump when including realistic orbit and beta-beating (phase advance errors). Studies have been performed at 7 TeV and at 3.5 TeV for different beam distributions and for the worst case of asynchronous beam dump (see slides for details). T. Kramer showed that unexpected losses had been observed on tertiary collimators. He explained that particles with high  $x'$  can escape the TCDQ/TCSG, be transmitted at larger sigma and then intercepted by the TCTs. This could be an issue for the extremely fragile TCTs which could be damaged by these losses. FLUKA energy deposition studies and damage limit must be evaluated. Aperture and retraction of the TCTs with respect to collimators in the dump region could be correspondingly redefined ( $12.3\sigma$  with a  $0.5 - 1\sigma$  retraction is suggested at 3.5 TeV and should be presented at the background meeting).

L. Keller underlined that a similar problem could concern the TCLA which could be damaged by particles scattered by the TCSG.

### **3 LARP Phase II Secondary Collimator RC-1 (T. Markiewicz, S. Lundgren)**

T. Markiewicz presented the strategy for SLAC phase 2 prototype tests in the SPS and in the TT60 line, or any site suitable for robustness test. At present, the choice of installing the newly designed RC1 prototype in the SPS and the old RC0 in TT60 seems the most reasonable one but the final decision has still to be taken. T. Markiewicz pointed out that the final SPS location needs to be checked in order to define jaw orientation and aperture requirements (60 mm×60 mm or 60 mm×80 mm?).

S. Lundgren showed the present status of the SLAC phase 2 design. In particular, he presented progresses in manufacturing of the new designed prototype with integrated BPM. He expects that such a system should allow an alignment accuracy of about 25 μm.

SLAC prototype is planned to be shipped to CERN in August 2010.

R. Assmann commented that in this case the prototype could be installed during the machine shut down and preliminary tests could be done before the new start up.

### **4 Laboratory testing of Buttons integrated in Phase II Collimator BPM prototype (C. Boccard)**

C. Boccard presented first results for tests performed on BPMs integrated in a CERN phase 2 collimator prototype. He illustrated the characteristics of the BPMs and the apparatus used during these tests. The response of the BPM buttons was evaluated both keeping the two jaws at a fixed aperture of 25 mm and moving them with respect to the CuBe wire. These measurements showed a good response of all the BPMs for large gaps while weak response of the buttons located at the centre of the jaws in case of small aperture (2 mm).

A. Bertarelli asked if it could be envisaged to remove these additional pickups since their implementation was a real effort. R. Assmann commented that 2 mm is a typical operational gap at high energy and that these pickups should be kept at least as spares in case we lose ending BPMs due to high radiation dose or other problems.

C. Boccard pointed out that symmetric movements of the two jaws together are preferable since an influence on BPM signals was recorder when moving one jaw at the time.

Impedance measurements were also performed but data are unclear and feedbacks from Fritz Casper are needed for analysis.

He finally affirmed that at now position accuracy cannot be defined because it depends strongly on the electronics. Nevertheless results for these tests were excellent and nothing can be improved, at this time, from the point of view of the design.

### **5 Collimator Analysis Program (CAP) tool (C. Bracco)**

The talk has been postpone due to lack of time.

The next meeting will be October 12th, 2009.