1^{st} Specification and Implementation Meeting Phase 2

Present: O. Aberle, R. Assmann (chairman), G. Bellodi, A. Bertarelli, C. Bracco, F. Casper, F. Cerrutti, A. Dallocchio, B. Dehning, A. Ferrari, J. Jowett, M. Jonker, T. Markiewicz (via telephone), M. Mauri, A. Masi, E. Metral, L. Lari (scientific secretary), S. Redaelli, V. Previtali (scientific secretary), S. Roesler, W. Scandale

1 Mandate and Introduction (R. Assmann)

R. Assmann introduced the meeting, explaining the organization and the mandate. The meeting is part of the white paper project for phase 2 of LHC collimation. All information regarding the next meetings, presentations and the minutes will be available in the dedicated webpage .

A list of permanent members of the meetings and their expertises has been presented. A. Bertarelli asked to include some material experts (e.g. P. Chiggiato, G. Arnau Izquierdo): he will provide the names of the people that he would like to include by email.

A. Bertarelli took the opportunity to announce that on TS side the Phase 2 Design Meeting has begun. The design meeting will study and work out detailed designs, including study of materials and mechanical concepts.

R. Assmann stressed that in this first phase we should try to collect ideas and proposals for improving the collimation system, independent of the phase 1 design constrains (open-minded attitude). A. Bertarelli asked if the phase 2 concerns just the secondary collimators or also the primary collimators: R. Assmann replied that the phase 2 project will review the complete system, including primary collimators and also more advanced objects (e.g. bent crystals). All possible improvements must be analyzed.

2 Round-table discussion on future work

A preliminary list of future topics was presented by R. Assmann. The original list can be found in the presentation. During the discussion the list was widened by the contributions and the ideas of the meeting attendants. This is the updated list of work ahead and future topics:

- Requirements for cleaning performance (p and ions). (C. Bracco, G. Bellodi)

- Requirements for impedance performance (p and ions). (E. Metral)
- Requirements from heat deposition (p and ions). (Fluka Team)
- Improvements expected with SLAC/LARP design (T. Markiewicz).
- Candidate materials for phase 2 collimators. (A. Bertarelli, A. Dallocchio).
- A. Bertarelli stressed the necessity of considering new and innovative materials. A. Dallocchio asked a question question about a possible interest in composite materials and the feasibility of implementing a collimator composed of different materials in the Sixtrack code. R. Assmann commented that such layered solutions should be investigated. Implementation in Sixtrack can be easy or difficult, depending on the direction of layers.
- F. Caspers suggested to consider meta materials (a kind of material mixture, see reference).
- Advanced collimator concepts (rotating, foil, ...).
- Radiation constraints and activation studies with Fluka. (S. Roesler and Fluka Team).
- Innovative concepts towards RF and impedance aspects.
- Simulation of the effects of the collimators on the LHC beam dynamics (cromaticity, impedance, ...). Simulate the instability induced by the impedance. E. Metral pointed out the necessity of manpower for impedance-instabilities studies.
- A. Bertarelli pointed out that the mechanical design needs to be aware of impedance issues. Communication and reciprocal inputs from mechanics and impedance are important. F. Casper and E. Metral supported the importance of this connection.
- Improvement of the transverse feedback system for LHC for handling impedance.
- Revisit on the electron cloud issues (F. Casper).
- Light ion requirements in 2012-2013 (J. Jowett).
- Mechanical constraints and wish list from mechanical design (e.g. deformation with sliced jaws, cooling, ...).

- List of Design Constraints, in particular: accident/failure scenarios, e.g. should we consider the same assumptions as phase 1 (A. Bertarelli). Definition of the acceptable damage is important (A. Ferrari). Occasional damage of a collimator can be allowed if handled in situ (see the rotating collimator design from SLAC) and if any damage is local and not extending downstream.

- S. Redaelli asked when the beam test (robustness) for the SLAC prototypes should be. R. Assmann: A first beam test might be possible middle-end 2009. An important issue for the SLAC design is the possibility to turn the collimator after a damage. There would be problems for testing in the SPS (risk to the clean ultra-high vacuum environment of the SPS). Test in the SPS would be performed in any case well under the melting point. The real robustness tests must be done in a dedicated test facility between the SPS and the LHC (decoupled from the primary beam vacuum).

- Review of the materials used in crystal collimation (W. Scandale). Later results of crystal collimation experiments, predicted and measured improvements.

- Follow up of the implementation of bent crystals in Fluka (G. Smirnov, A. Ferrari).

3 AOB

No other business reported.

4 Next Meeting

Next meeting will be held on Friday 8th February 2008.