

# Structure of review for Beam Interlocks and Machine protection, Monday 11 - Wednesday 13 April

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## **This draft has been worked out with key players in protection systems**

- Mo morning 10:30 – 12:30 introduction to LHC (for the reviewers that are not familiar with LHC)
- 3.5 open sessions with presentations – Mo 14:00 to Wdn 10:30
- Closed session starting after coffee Wdn 11:00
  - One **interactive part** where we would be called upon to answer questions that are raised, e.g. in short ad-hoc presentations
  - One **closed part** for the reviewers to formulate their conclusions
- Open session to present the conclusions 17:00 – 18:00
- Main blocks
  - Introduction
  - Beam interlocks and Safe LHC Parameters
  - Beam dumping system
  - Events leading to beam losses (catalogue of Failures)
  - Equipment and beam Monitoring - connected to the Beam Interlocks
  - System performance

# Reviewers and other information

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- **Marc Ross (SLAC)**
- **Vinh Dang (PSI)**
- **Mike Harrison (BNL) - chairman**
- **George Ganetis (BNL)**
- **Jerry Annala (FNAL)**
- **Reinhard Bacher (DESY)**
- **Coles Sibley (SNS)**
- **Roger Bailey (CERN/AB)**
- **Doris Forkel-Wirth (CERN/SC)**
  
- **Open for attendance of others (information to different WG Members, MPWG, InjWG, ColIWG, ...)**
  
- **WEB site with the relevant information for each main block**
  - <http://lhc-mp-review.web.cern.ch/lhc-mp-review/>
  - some relevant information in the side
  - draft programme soon together with abstracts

# Objective of the Review

Safe operation of the LHC in presence of the energy stored in each beam of up to 360 MJ requires using several systems: collimators and beam absorbers, beam dumping system, beam monitoring, beam interlocks etc. Machine protection will be important during all phases of operation: starting with the beam transfer from SPS to LHC, injection, ramp, squeeze and collisions.

Collimators and beam absorbers must be correctly adjusted, already during injection, when dumping the beam, but also when accelerating and during the store.

Failures are detected by beam loss monitors, by other beam instruments, by the quench protection system and other hardware related equipment. Beam dump requests are transmitted via the beam interlock system to the beam dumping system, and the beam is safely extracted into the beam dump block.

The overall strategy of the LHC machine protection is discussed. The functionality of the systems with respect to machine protection is presented.

Main emphasis of the review is on the interfaces between these systems during beam operation.

The review will discuss interlocking the LHC, in particular the signals that are exchanged between different systems in the LHC as well as between LHC, SPS and the transfer lines between the two accelerators.

# Objective of the Review

Questions to the reviewers:

- Do you consider the overall strategy for machine protection adequate, and what could be the main risks?
- Are there mechanisms for beam losses not being considered that could impact on the strategy?
- Are the interfaces between the different systems clearly specified?
- Are there other protection devices that should be considered?
- Are there other input channels for the Beam Interlock System that should be considered?
- Will the protection systems have the required reliability?
- Will the protection systems allow for efficient operation (availability)?
- Based on experience elsewhere: what is most critical and where have been surprises?