MDs and MPS

How could we handle MDs?

A 1st order proposal for discussion

How to handle MDs?

- Step 1: we classify the MD according to the boundary conditions.
  - Proposal on next slides.
- Step 2: ‘discuss’ with requester (or suggest to say reduced intensity…).
- Step 3: define the conditions for unsafe beams.

MDs: MPS class A

MPS class A

MPS class **A** : MDs with **setup beams**

- Probe bunch (<2e10) – **automatically approved.**
  - But people should be aware that at 3.5 TeV such beams can quench. EiC's should be able to set some limits.
  - **For quench tests – OK needed from MP3.**
- Setup beam – **automatically approved.**
  - But people should be aware that a quench could occur at any energy. EiC's should be able to set some limits.
  - **For quench tests – OK needed from MP3.**

Unsafe beams

General guidelines - **MD request with unsafe beams :**

- MD request should reconsider if the MD could not be done with safe beams.
  - Quite a number of MDs require intensities within factor 2-3 of SBF limit.
  - Some require beams within the 'Relaxed' and 'Very relaxed' SBF reach (3.5 TeV) . Note this is often related to the need for a nominal bunch.

MDs : MPS class B

MPS class B

MPS class **B** : **MD request with unsafe beams at end-of-fill or with physics conditions (no changes of optics or orbit) – any energy.**

- To be approved on a case by case by MPP (or rMPP ?).

MDs : MPS class C

MPS class C

MPS class **C** : **MD request with unsafe beams involving changes of orbit or optics.**

- Safe and controlled machine conditions must first be established with Setup Beams.
  - Orbit interlocks may have to be adapted for injection of unsafe beam.
  - Collimators may have to be moved in some/all phases.
- If orbit/optics changes at 3.5 TeV:
  - (Orbit expert must define the reference orbit for OFB).
  - Test ramp with probe.
  - (Orbit interlocks must be adapted for ramp & squeeze).
  - Test ramp with 1-2 nominal bunches (for collimator setup). Loss maps and asynch dump test.
  - Once qualified, intensity to be approved by MPP (or rMPP?).

MDs : MPS class D

MPS class D

MPS class **D** : **MD request with unsafe beams involving new 'machine territory' – drastic changes of the optics, WP…**

- Such MDs will be **downgraded** to Setup Beam unless full failure analysis is performed.
  - If failure analysis → to class C.

Examples

- Class B

Coupled-bunch instability rise times at flat top and stabilization by Landau octupoles	N. Mounet, E. Metral	2	20	3500	6e13	LHC nominal + HL-LHC	2011/12	x

- Class C

45 degree crossing at LHCb	W. Herr and T. Pieloni	2	16	3500	physics	LHC nominal	2011/12	RA, GP

- Class D

Alternate tune working point stability in the vicinity of the half-integer tune resonance (range: 0.46, 0.48)	Ralph Steinhagen	2	16	450, 3500	1e12	HL-LHC	2012	x

>> drastic impact on some failure cases – never studied !!!

First MD period

- The first MD period will probably be quite ‘experimental’.

- Should we recommend to schedule only MDs of Class A in the first period?