Summary Session 2: Injection, extraction and Beam Dump

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Injection and beam dump

- Related to the most critical failure scenarios
- The only way we quenched the machine with beam outside MDs
- Better get it right – as they are so fast…

LBDS Kickers – Nicolas Magnin (I)

- Wearing out of the system more likely from testing than from operation with beam: 3 x more pulses in local
  - Coherent with assumed operational scenario?
  - Effect on dependability numbers and maintenance
  - Are all those pulses justified?
- Availability good – as expected
  - Confirmation of safety model, but need to assign to precise failure MODES for real confirmation. Study launched.
- Some failures have been masked and continue operation
  - Procedures needed, for the experts
  - Masking to be made visible, not to forget
- Too many false XPOCs – reset by OP
  - Find solution for over-injection and BLM data buffer
- MKB vacuum noisy signal resulting in false dumps
  - 13 dumps in 2011/2012
  - Fix foreseen by the vacuum group?

LBDS Kickers – Nicolas Magnin (II)

- LBDS serious failures
  - MKD generator spark after cooling installed
    - Limit operation to 5 TeV, 'lucky'
    - Generators upgraded, all done for LS1
  - Trigger Fan Out driver chip burned: asynch trigger of 2 MKDs
    - Re-configured TFOT
  - Wiener power supply leading to asynch trigger
    - LBDS powering review: add 2nd UPS, fuses for each PSU crate
  - 12 V failure would have resulted in not being able to dump
    - Did not happen
    - Installed watch dog - full consolidation LS1
- LBDS serious fixes
  - Connect BIS to LBDS re-trigger line - be able to dump without TSU
  - Modifications of LBDS powering
- Full system commissioning starting end of THIS YEAR
  - BIS – LBDS connection to be tested beginning 2014
  - Scan of MKD waveform with beam and direct BLM dump

Dump System Protection – B. Goddard (I)

- Brennan still waiting for the 1st Asynch dump with full machine at top energy
- With running at 6.5 TeV and repeated dumps expect dump block TDE $\Delta p = 0.23$ bar
  - Check / watch venting of N_2 pressure of TDE block
- Improved protection
  - TCDQ from 2 to 3 blocks: 9 m of CfC diluter: HL-LHC
  - TCDQ in BETS – but need electronics which allows masking for setting up. Work ongoing – MPP
- Requests to Beam Instrumentation
  - BPMS dynamic range and PM buffers (to XPOC)
    - **Improving availability is improving safety**
  - Abort gap monitoring more reliable – automatic cleaning and dump !
    - Combine / back-up with other systems: diamonds / experiments

Dump System Protection – B. Goddard (II)

- System tolerances – IPOC / XPOC / BETS
  - Keep them tight (if it doesn't complicate too much, procedures)
- Standardise ***when*** asynch dump loss maps need to be made
- Procedures – commissioning (changes) in case of interventions or non-conformities
- Need to continue rMPP as online active body

Injection – Wolfgang Bartmann

- MKI magnet upgrade
  - The end of the heating problem (gain factor 3 – 4)
  - E-cloud: NEG coating of bypass tube and more
  - UFOs: improved cleaning
- TDI upgrade
  - Only intermediate solution for LS1
- Connection to injection BETS of MSI current and TDI gap
  - In discussion phase
- Transfer line collimators TCDI settings to go with the right optics
  - Define a virtual β^* for transfer line and use SIS
- BLMs in injection region: LICs & sunglasses as back-up
  - Requires MPP approval
- IQC – to contribute to safety need fewer resets
  - Software can never be safety critical

Changes in SPS interlocking – J.Wenninger

- SIS was initially designed for SPS and used heavily
- BIS and SIS need to be cycle dependent for the SPS
- Up to LS2 no major improvements
- SPS extraction interlocking
  - New extractions to be confirmed for about 2016: AWAKA, SBLNF
  - Different beams identified by the beam energy @ extraction: OK
  - Interlocking of beam position at extraction under-performing for LHC beams
- CNGS Success Story: PJ and μSv
- "The diagnostics of timing problems for LHC beams remains rather tricky" -> wrong beam to the LHC
- LS1: SPS power converters from ROCS to FCG
- Proto-type crab cavity in LSS4 – movable – interlocking
- New Mister / Missis MP for the SPS

Thank you