What is planned for the long shutdown?

S. Baird & K. Foraz

Summary of sessions 2 & 3 from the 2011 LHC workshop at Chamonix
Chamonix 2011 sessions 2 & 3

• 16 talks
  – Testing for 7TeV operation before the shutdown; RP issues
  – Splices (what & how); DS Collimator installation; all other Cryo-magnet activities; R2E; work in Experiments
  – Vacuum; QPS; Cryogenics; CV; EL; Access & Safety
  – RF; kickers & dumps

• How long do we need?
  – What drives the length of the shutdown?

• 2012 or 2013?
  – Start in December 2011 or December 2012?

• Open issues
What drives the length?

- Ensure operation @ 7TeV & high beam intensity
  - Splice Consolidation
  - Cryo-magnet repairs
  - Experiments
  - R2E mitigation activities
  - Collimator upgrade (Installation in DS @ point 3)

- Ensure reliable operation & performance
  - Full Cryogenic, CV and EL Maintenance programs
  - Improvement programs; UPS, Cooling redundancy etc...
  - Individual system maintenance & upgrade programs
    - QPS, Safety, access, RF, kickers etc...
How long do we really need?

- 7TeV tests = 1 month
- Warm-up = 1 month
- Splice consolidation = 14 months
- Last Cool-down = 1 month
- QA HWC.. = 2 months
- Cryo maintenance = 14 months
- R2E = 15 months
- Other cryo-magnet activities = 19 months
- DS Collimators = 12 months (8 months if 2013)
- Experiments = 15 months
- CMS bakeout?

Beam off: 19 months
Beam on:
2012 or 2013?

• Preference for 2012
  – EL, CV maintenance,
    • no full maintenance for 3 years (January 2009)
    • Reliability in 2012?
    • AUG UPS performance?
  – R2E: Concerns with SEU in 2012?
    • Will it affect luminosity production in 2012?

• Preference for 2013
  – DS Collimator
    • Availability of hardware
  – Kickers & Safety systems
    • Preparation/development time
  – Experiments
    • Uncover New physics
    • Discover Higgs particle
  – R2E
    • For major CE work to displace the safe room @ point 7

• Other issues for delaying to 2013
  • Experiments may advance work from 2016 to 2013/4 (special Be vacuum chambers)
  • Need 3 month technical stop at the end of 2011 (EN/EL & Experiments)
  • Additional Induced radio-activity (factor 2) is not a limiting issue (DGS/RP)
Open issues

• Parallel activities
  – Splices, DS collimators & cryo-magnet repairs use the same resources from TE/MSC and elsewhere...
  – R2E, maintenance and upgrades of services, plus CCC, & bldg 513... need the same resources from EN/EL & EN/CV
  – Work in Injectors? LIU?

• We need trained experienced manpower
  – 60FTE (out of 200) “missing” for splices
  – <1/3 expert manpower for other MSC cryo-magnet activities
  – External Contractors need close supervision by CERN experts to avoid “mistakes”
Open issues

• Not planned to replace 12 MB’s & 2 SSS in 3-4 with wrong type of beam screen
• Co-activity in tunnel
  — ......
IC “train” - splice consolidation activities

- e.g. activity “open & close W bellows”
- For ~ 70-80 IC / week, requires 20 mechanics organised as 7-8 teams working in parallel
- Cost ~2 500 kCHF
<table>
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<th>Equipment</th>
<th>Point 1 activity [weeks]</th>
<th>Point 5 activity [weeks]</th>
<th>Point 7 activity [weeks]</th>
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* re-commissioning during the hardware re-commissioning and powering
Cryomagnets, Interconnections, Superconducting Circuits: 
**What to do in 2012/13 if you are not consolidating splices?**

The work location

- Cryo-dipole
- SSS
- High inner splice
- Highest leak
- Electrical integrity issue
- Reversed beam screen(s)
- Beam optics
- SAM (He, DN160)
- Y-lines repair
- CC Consolidation / Inspection
- DN 200 installation
- Triplet braid
- Circuit and splices issues

Spread all around: work on leaks, PIMs,
Open issues

- Not planned to replace 12 MB’s & 2 SSS in 3-4 with wrong type of beam screen
- Co-activity in tunnel
  - Splice trains will need clear access
  - R2E shielding will block passage for several 1 month periods
  - DN 200 installation (600 units)
  - DS Collimators = 32 cryo assemblies removed modified re-installed
  - 17 other cryo-magnets to be exchanged
- Think long-term
  - Need to consider activities for Shutdowns 1 and 2 together
Conclusions

• When? = 2013
• How long?
  – First estimate → 19 months
  – Next step is to develop a realistic planning
    • Prioritized activities and contingency
    • Available Resources and Manpower (with the required knowledge etc...)
    • Safety and Co-activity issues
    • Using optimized technical solutions
    • ...........