<table>
<thead>
<tr>
<th><strong>Infrastructure</strong></th>
<th><strong>Accelerators</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>EL Consolidation and Upgrade of Infrastructure</td>
<td>LIU Baseline Beam Parameters and Planning</td>
</tr>
<tr>
<td>CV Consolidation and Upgrade of Infrastructure</td>
<td>Possibility to Connect Linac4 during LS1</td>
</tr>
<tr>
<td>M. Nonis</td>
<td>Plans for the PS Injector</td>
</tr>
<tr>
<td>R. Garoby</td>
<td>Plans for the PS</td>
</tr>
<tr>
<td>M. Vretenar</td>
<td>Plans for the SPS</td>
</tr>
<tr>
<td>F. Duval</td>
<td>H. Damerau (repl. S. Gilardoni)</td>
</tr>
<tr>
<td>K. Hanke</td>
<td>B. Goddard</td>
</tr>
</tbody>
</table>
Consolidation § Upgrade of EL and CV Infrastructure

- Plans for coherent upgrades during the period 2011-2025: request for project leaders to communicate any change in the assumptions.
- Important EL goal: provide the capacity to power the full Meyrin site from EDF.
- CV planning is based on risk analysis. Meyrin site will be treated first, Prevesfin (SPS) last.
- Remarks:
  - Time interval between long enough shutdowns is increasing => Intense work shutdowns
  - Long term activity which will require continuity and support at adequate level during 15 years. Some additional staff is urgently needed to fulfill the objectives of LS1.
  - Shutdown work on infrastructure will create interruption of services: need for careful advanced planning with users to minimize interference. **Crucial need to minimize thermal stress on linac2!**
LIU beam parameters and planning

• Issues to address in the proton injectors are identified (the needs of heavy ions have not yet been analyzed). A number of actions deserve more study before being launched (e.g. against e-clouds).

• A significant amount of work related to upgrade and consolidation is planned during LS1 (details in the following talks).

• The RCS study will conclude in the summer 2011.

• Baseline and stretched estimates of beam characteristics after LIU (~2020):
  – With all the foreseen actions, the SPS injectors can saturate the SPS and allow for tests beyond baseline performance (« stretched »).
  – Baseline beam characteristics for 25 ns bunch trains cover part of the scenarios envisaged in HL-LHC.
  – Baseline as well as stretched beam characteristics for 50 ns bunch trains are insufficient for HL-LHC.
  – Request for including present beam characteristics, as well as the difference between 1.4 and 2 GeV injection energy in the PS.
  – Need for iteration with HL-LHC...

• No gain is expected for LHC before LS2 if Linac4 is connected to the PSB during LS1, but time would be gained adjusting PSB / PS, and work during LS2 would be eased.
Linac4 connection during LS1 and plans for the PS injector

• Linac4 connection during LS1 is feasible as a minor change to the present planning under the following conditions:
  – LHC shutdown duration is ~19 months for protons. **Possibility of recommissioning with Lead ions?**
  – Decision of (irreversible) modification of PSB has to be taken after Linac4 has successfully accelerated to 100 MeV.
  – H- source will probably not be nominal, but sufficient for getting the usual beam characteristics from the PSB for all users.
  – Resources: no obvious interference identified with the needs of the LHC during LS1...

• Baseline solution for the PS injector is the PSB at 2 GeV:
  – Main subjects: H- injection at 160 MeV and energy upgrade to 2 GeV
  – Report published with detailed hardware analysis, cost estimate (55 MCHF) and planning.

• RCS option under study (conclusion during the summer):
  – Locations: inside PS ring (difficult passage of transfer lines) or outside (longer lines and lack of space on the surface)
  – **The schedule of construction is an essential information.**
Plans for the PS

• PS is less advanced than PSB and SPS (late start)
• Baseline solution is with injection at 2 GeV:
  – Upgrade of the injection system (redesign of bumper, new septum and additional kicker in SS53). **In case of RCS, it should be capable to pulse at 10 Hz.**
  – Low energy corrector magnets may need replacement (under study).
• Main magnets systematically monitored. Bus bars replacement under study. Spare PFWs ordered.
• RF: need for improving RF feedbacks to reduce beam loading effects during gymnastics and displace instability thresholds. LLRF development and MD required to implement new gymnastics.
• Beam dynamics: transverse damper to be made operational and upgraded; longitudinal instability damper to design and build.
• On-going study of the e-clouds effects at 26 GeV and potential solutions.
• **Because of the cluttered cable trays, unused cables should be removed when equipments are replaced.**
SPS plans

• Baseline goal for beam characteristics at SPS ejection result from the SPS WG, in line with the presentation in Chamonix2011 (1.8E11 p/b within 2.5 mm.mrad at 25 ns spacing, 2.5E11 p/b within 3.5 mm.mrad at 50 ns spacing):
  – Based on preliminary results with low gamma-t lattice in 2010.
  – Assumes perfect cure of e-cloud effects, extensive upgrade of 200 MHz RF, improved damper, upgraded beam instrumentation, Kickers impedance reduction, etc.

• Need for MDs (204 h requested out of 336!) to precisely define:
  – Beam instrumentation
  – Cures/mitigation of e-cloud effects and outgassing of components,
  – Beam dump…

• Planning:
  – Some work in LS1 [aC coating of one sextant (some conflict with LHC), preparation for 200 MHz RF upgrade, improvement of beam instrumentation,…]
  – Most installation in LS2 (aC coating of full ring, finalization of 200 MHz RF upgrade,…)

• Resources: ~69 MCHF + 183 FTEs