Summary of Session 3

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EXPERIMENTS

In terms of β^* configuration, the requests (or proposals) are:

- ATLAS and CMS: as small as possible.
- LHCb: 3m - no change with respect to 2011. This is compatible with the inclined crossing and provides a factor larger than 2 for luminosity leveling.
- ALICE: reduction from 10 m to 3 m to allow satellite-main filling schemes with collision of natural satellites in ALICE.

In terms of bunch length an increasing by up to 10% would be acceptable. The experiments would like to fix the length before the start of the physics production run and to keep it stable thereafter.

The experiments support 50 ns bunch separation as a default scenario. The main aim is to provide as much integrated luminosity as possible ($\geq 15\text{fb}^{-1}$). The experiments also request 5fb^{-1} in time for the ICHEP conference (first week of June).

There are no real show-stoppers expected up to peak pileup of 30 but the detailed analysis is still ongoing. If hard limits are identified, it will be necessary need to investigate ways to limit the pile-up (lower bunch charge, luminosity leveling), even at the expense of some luminosity. For the longer term the 25 ns spacing remains the preferred scenario. The machine is encouraged to plan sufficient MDs to establish the feasibility of 25 ns operation.

For the ion run, the default plan for 2012 is to take data with p-Pb collisions only. ALICE requests both p-Pb and Pb-p beam setups. It is still unclear if ALICE will also need polarity reversals for both setups. In terms of beam energy for p-Pb, most likely the request will be to run at equivalent proton energy of 3.5 TeV, but 4 TeV is still being considered. In terms of optics, the target is smallest β^* for ALICE, ATLAS and CMS. In 2012 LHCb will also join the run for the p-Pb part. The expected luminosity is $\simeq 3 \times 10^{28}\text{cm}^{-2}s^{-1}$, and an integrated luminosity of 30 nb^{-1} is a realistic target.

For TOTEM and ALFA there are two physics goals in 2012.

- Diffractive physics at β^* of 90 m (mainly TOTEM).
- Highest possible β^* to approach the Coulomb interference region for elastic scattering.

Only one physics run can be supported within the present schedule. The tentative proposal is to go for a mixed setup with 90 m in IP5 and 500 m in IP1.

TURN-AROUND TIME

Despite the fact that the injection process was improved in 2011, with an average gain of 1.4 h with respect to 2010, injection was still driving the time to go back into physics. Further improvements are possible in this area, in particular if the stability of the transfer lines could be better understood.

With the same optics and dipole parameters as 2011, the 2012 ramp duration to 4 TeV will be 770 seconds. The 5 minutes waiting time on the flat top for the decay of chromaticity will be removed in 2012. The correction of the decay at 4 TeV will be performed with the MCS correctors.

The expected duration of the squeeze to 0.6 m is 819 seconds.

INJECTORS

Once the double batch 50 ns beam was used by the LHC in 2011, the performance was pushed throughout the injector chain. Gradual intensity increases resulted in approximately 30% higher intensity than anticipated, while the the transverse emittances were kept as small as possible. The 25 ns beam was produced for the first time within nominal specifications.

A new batch compression scheme should be able to provide smaller transverse emittances for similar intensities. Based on harmonic 9 at PS injection, followed by batch compression and splitting, this schema will become available to the PS and SPS later in the fall of 2012. The LHC can most likely not profit from this new scheme before the end of the 2012 run, but some first tests in the fall are not excluded.

It will be a slow process of small increases and careful adjustments.

Might already not be compatible with SPS NA operation
No NA physics during preparation, filling and MDs ?

RF

The first trial of the new blow-up, with Ions at 3.5 Z TeV was very conclusive, with regular and equal lengthening for all bunches. In 2012 the RF group plans the following upgrades:

- Further reduction of capture losses with the longitudinal damper.
- Modification of the blow-up method.
- Batch per batch blow-up at injection to reduces the transverse emittance blow-up by IBS ($\simeq 10\%$ in 30 minutes).

Thanks to the longitudinal blow-up, the longitudinal stability of the beam is independent on the energy, operation at 4 TeV should not cause problems.

In 20122 the RF system has not seen the single bunch intensity limit even with bunch intensities of 3×10^{11} p. The RF system can deal with nominal total intensity (2808b, 25 ns, 1.1×10^{11} p/bunch). Increasing the bunch length helps for heating effects, but in collision the length is limited to 1.4 ns.

On the side of the transverse damper, collimator loss maps with ADT blow up have validated in MD in 2011. This method will be made operational during startup of 2012, as it may result in a significant gain in time for loss maps.

R2E

During the Christmas technical stop a number of mitigation measures have been put in place: firmware patches, shielding and equipment relocation. The activities will continue during 2012, with particular emphasis (analysis) of new failure types.