



MDs planning for 2014

E. Benedetto

Thanks: G. Rumolo, B. Mikulec and the RF, OP, ABP, BI teams which have already submitted MDs requests

Outline

- List of MDs requests, with tentative dates:
 - Emittance measurements
 - RF studies
 - Beam production
 - Injection/Extraction
 - LIU Transverse Beam Dynamics studies: Optics, Space Charge, Instabilities, Losses, ...
- Flags  
- Not yet synchronized with the rest of the Injector complex, schedule, etc... → Giovanni will present the full picture and planning at some future MSWG.

Wire scanners

Wire-scanner calibration (on LHCINDIV to SPS, ~December)

LIU

OP

Emittance Working Group: monitor LHC beam brightness along the chain. Campaign interesting the entire injector complex.

- Check new calibration with different wire speeds
- Cross-check measurement using different filters/HV with simulations
- Implement the import of longitudinal profile measurements from tomoscope data (de-convolution to subtract dispersion).

Contacts: BI, Guido Sterbini, Jean-Francois.

RF studies

Longitudinal dynamics and beam production (in //, weeks 26 to 31, priority depends on user requirements):

- Longitudinal shaving
- C16 blow up studies (new production schemes for LHC)
- H1+2 synchro studies (new production schemes for LHC)
- Re-bucketing studies
- Single batch transfer
- Other cycle type commissioning

Contact: Alan + Maria Elena

Finemet cavities (in //, weeks 38 to 41 + ½d access in the machine before → ATTENTION! no TS scheduled so far @ beginning Sept.)

Testing the Finemet system in the PSB

Contact: Mauro + Alan + Maria Elena

OP

LIU

LIU

Production of new beams to PS

New LHC beam parameters (In //):



After LS1, LHC beams will be transferred to the PS with larger longitudinal emittances (1.5 eVs for the BCMS and 2.8 eVs for the standard, instead of the present 0.9 eVs and 1.2 eVs, respectively) and bunch lengths compatible with the recombination kicker rise time (150 ns for the BCMS and 220 ns for the standard).

The production of these beams at the PSB (and the possibility of making them operational) will have to be tested by performing a controlled blow up along the cycle with C16 and producing the larger emittances within wanted bunch lengths by using h1 and h2 at 8 kV and in phase just prior to extraction.

Contact: Giovanni + Alan + Bettina

Production of new beams to PS

“Cycles rapprochés” (in //)

LIU

Double-batch injection of LHC beams with reduced time between batches.

Contact: Klaus

“Hollow bunches” (in //, requires PS)

Production of hollow bunches to reduce space-charge at injection in the PS.

LIU

Contact: Adrian + Giovanni + RF + PS

Injection/Extraction

YASP (In //; soon after restart):

OP

Recommission YASP after the optics changes of the transfer lines, the new configuration and some still outstanding modifications to YASP.

Contact: Bettina + Jean-Francois

Orthogonal matching knobs for PSB-PS injection (In //):

Contact: Klaus

OP

Injection/Extraction

Injection kicker MD (Dedicated; autumn?):

OP

LIU

Repeat MD to modify the kick distribution in the 4 injection kickers and measure the resulting emittance. Check the bump closure.

Contact persons: Bettina + Tony Fowler

BI optics (In //; end of summer?):

With the corrected injection line model, optimise the BI optics for max. brightness and min. losses.

Contact: Bettina + Elena

OP

LIU

Injection/Extraction

BTM optics changes (In //; towards summer):

OP

LIU

Compare old to new optics including emittance & mismatch measurements. Some errors have been corrected in the optics and Wolfgang+Jose are working on a new matching to remove 2 bottlenecks.

Contact: Wolfgang + Bettina

Extract beam at 160 MeV (Dedicated; Tbd):

LIU

In preparation of the commissioning of the Linac4 connection. New timings added during LS1 to allow earlier pulsing of the extraction kickers. This important functionality has to be verified and it should be checked if with the optics proposed by Wolfgang the beam can be transported with only small losses to the PSB dump.

Contact: Jose-Luis + Wolfgang + Bettina

Ring Optics

LIU

OP

Nonlinear optics from Turn-by-turn trajectories (in // & dedicated; application not available < autumn, preparatory tests before):

First measurement of the ring optics to compare to the simulations;
Preparation for the connection of the PSB with Linac4.

- Measure trajectories with all 16 BPMs per ring (x 4 rings)
- If possible, use tune kicker at higher voltage (if spare can be made or found)
- Repeat tests with AC dipole (if tune can be made more stable)
- Measurements with chromaticity corrected (*) in both planes
- Measure trajectories with tune altered by 0.5 or 1 (to move phase advance between bpm's away from 90 degrees, reducing systematic error of optics calculations) **(dedicated MD!)**

Contact: Meghan + Bettina + Jose-Louis

(*) Q' correction MD, discussed in a dedicated slide

Ring Optics

LIU
OP

Studies for linear optics from orbit response (in //, after start-up):

- Measurements should be repeated after realignment of LS1
- Data acquisition process will be automated (possibly using Matlab), allowing for faster collection and more precise measurements
- Measurements will be made at multiple working points (**dedicated!**)

Contact: Meghan

Tune scans (in //, after start-up):

LIU
OP

- Measurements should be repeated after realignment of LS1
- Measurements with corrected chromaticity (*)

Contact: Vincenzo + OP

Resonance compensation (in //):

LIU
OP

Investigate resonance compensation (see work of P. Urschuetz)

Contact: Gian Piero + ABP

(*) Q' correction MD, discussed in a dedicated slide

Space-charge

Space Charge measurements @ 160 MeV (In // and dedicated):

LIU

Preparation for the connection of the PSB with Linac4.

- Measurements should be (partly) repeated after realignment of LS1
- Measurements with high intensity, high emittance beam
- Measurements with corrected chromaticity (*)
- Measurements at different tunes (**dedicated MD!**)

Contact: Vincenzo + Magda

Space Charge at “lower” energy (In //, Tbd, requires reprog Bfield)

LIU

To obtain high space-charge tune-shift, different measurements

Contact: Elena + OP + Vincenzo

Effect of octupoles on SpaceCharge (In //, low priority)

OP

LIU

- To excite/cure Montague or 0.25 line

Contact: Vincenzo + Elena

(*) Q' correction MD, discussed in a dedicated slide

Other high intensity effects

LIU

Instabilities and Impedances (in //, Tbd, TFB not available < summer):

- Continue investigations on known instabilities, making use of the upgraded TFB.
- Tune shifts measurements, for impedance model benchmark

Contact: Carlo + Kevin

Loss studies (In //, summer):

OP

LIU

Study loss pattern after transverse and longitudinal shaving. Make use of the new BLMs.

- To be done at present energy but also at ~ 160 MeV and/or with very small emittances

Contact: Magda + Bettina + Elena

Beam Dynamics/OP: others...

Change injection working point (in //, in preparation for MDs)

Setting up special working-point right at injection (instead of moving the tune after injection), for Space-Charge MDs

- Includes optimization BI optics&steering

Contact: Elena + Bettina

LIU

OP

Injection with reduced/increased current (Dedicated, Tbd if feasible)

Studies for protons from Linac4. Check emittance vs. Linac2 intensity, for different steering and kicker delay

Contact: Elena + Bettina + Linac people + kicker experts

(*)MDs with chromaticity correction

Since different teams requested MDs with corrected chromaticity, here a summary of the requests:

- Turn-by-Turn measurements (**Meghan**)
- Tune scans with corrected chromaticity (**Vincenzo**)
- SpaceCharge @160MeV: see evolution losses and profiles (tails) close to the integer or to some 3rd order resonance line (to isolate the contribution of SpaceCharge) (**Vincenzo + Elena + Bettina**)
- Measure tune shift vs intensity (**Carlo**)

Summary

- List of MDs, “as received” from Users (and/or Supervisors)
- Studies concern present Operation and LIU studies, most of them belong to both categories
- Please if you have additional requests, even if preliminary, don't forget to inform us.

MDs coordinator (for the injector complex): **Giovanni Rumolo**

Deputy MDs coordinator: **Hannes Bartosik**

LIU-PSB beam dynamics contact: **Elena Benedetto**