# EN-MEF involvement with the LS1 PSB Hardware tests.

David Hay EN-MEF

# PSB Hardware tests followed up at FOM

## Minutes of the 1st FOM meeting held on 04.02.2014

Agenda:

1) Follow-up of the last meeting
2) Update on LS1 (S. Mataguez)
3) Start-up planning for Linac2, PSB and PS (D. Küchler, J.-L. Sanchez Alvarez, R. Steerenberg)

***3.2 PSB (J.-L. Sanchez Alvarez)***

J.-L. Sanchez Alvarez reported on the schedule for the PSB restart. The hardware tests will start on the 31 March and will last four weeks. From week 19 to week 22 the PSB cold check-out will take place. On 30 May the PSB Setup with beam will start. On 20 June beam will be delivered to the PS and 10 July ISOLDE setting up will start.

During the PSB hardware tests, the list of equipment to test will be defined by TE-EPC together with the Machine Control Coordinator (J. Betz). One PSB operator will be available from 6 h to 21 h from Monday to Friday.

During the PSB cold check-out there will be 3 shifts per day including weekends. Thousands of systems have to be verified. F. Pirotte asked to add in the schedule the security test of the 5 May. J.-L. Sanchez Alvarez will add it.

The PS Setup with beam will last three weeks (10 days of low intensity and 10 days of high-intensity setting-up). The commissioning of the machine will start with the single rings (from R3 and then R2, R1 and R4). The same approach will be adopted for the commissioning at the higher intensity. On 20 June the PS will be filled using the R3 at low intensity.

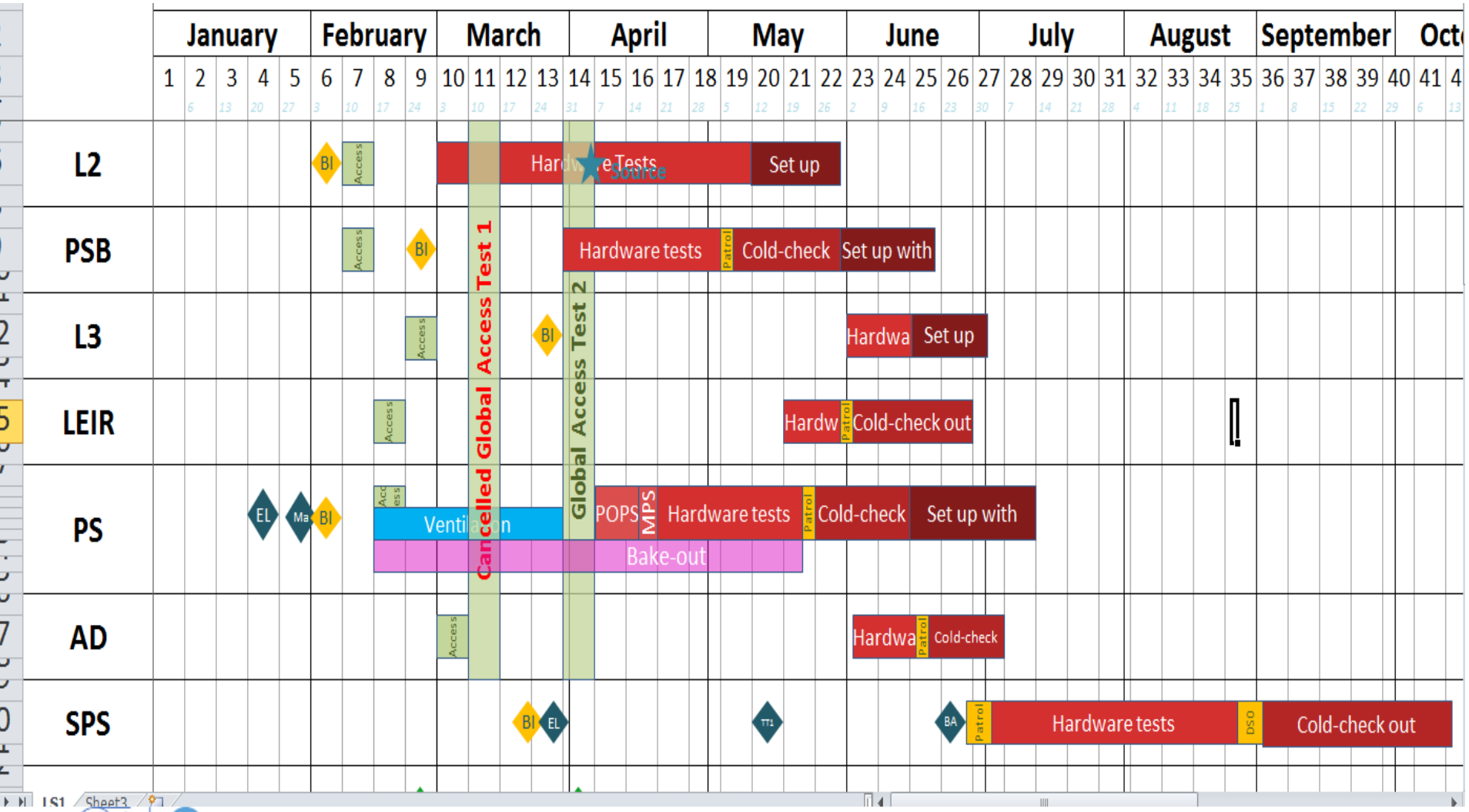
M. Zerlauth asked if the new Beam Interlock System has to be operational from the machine start-up. J.-L. Sanchez Alvarez answered positively.

J.-L. Sanchez Alvarez asked to M. Gourber-Pace if during the cold check-out period a CO specialist could be available even during the week ends and festivity. M. Gourber-Pace replied that the request would be discussed.

EN-MEF involvement.

- Schedule.
- Access.
- Field coordination (Safety).

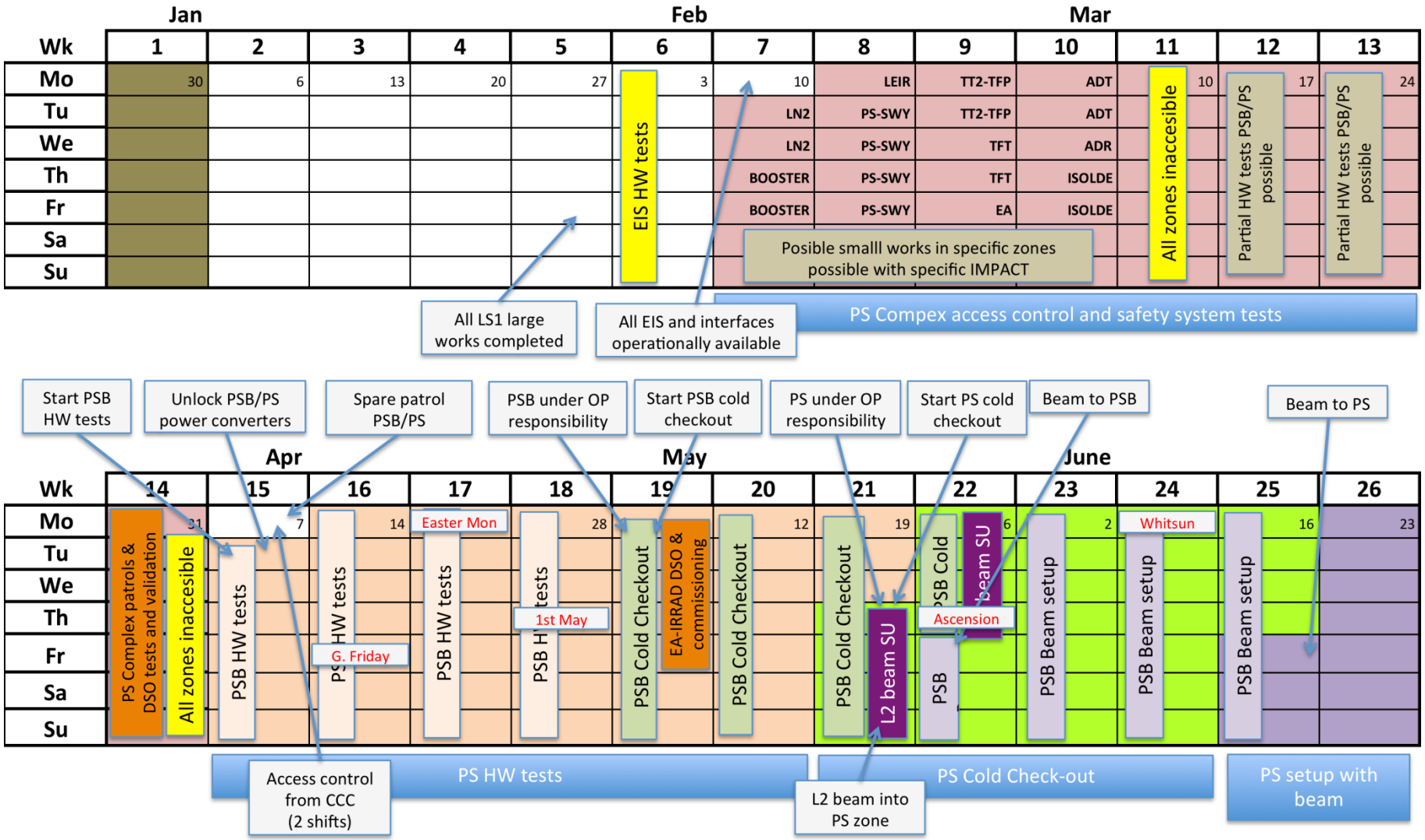
# Global view




Courtesy K. Foraz

# Planning Proposal: align and streamline activities

## *FOM 8/10/2013*

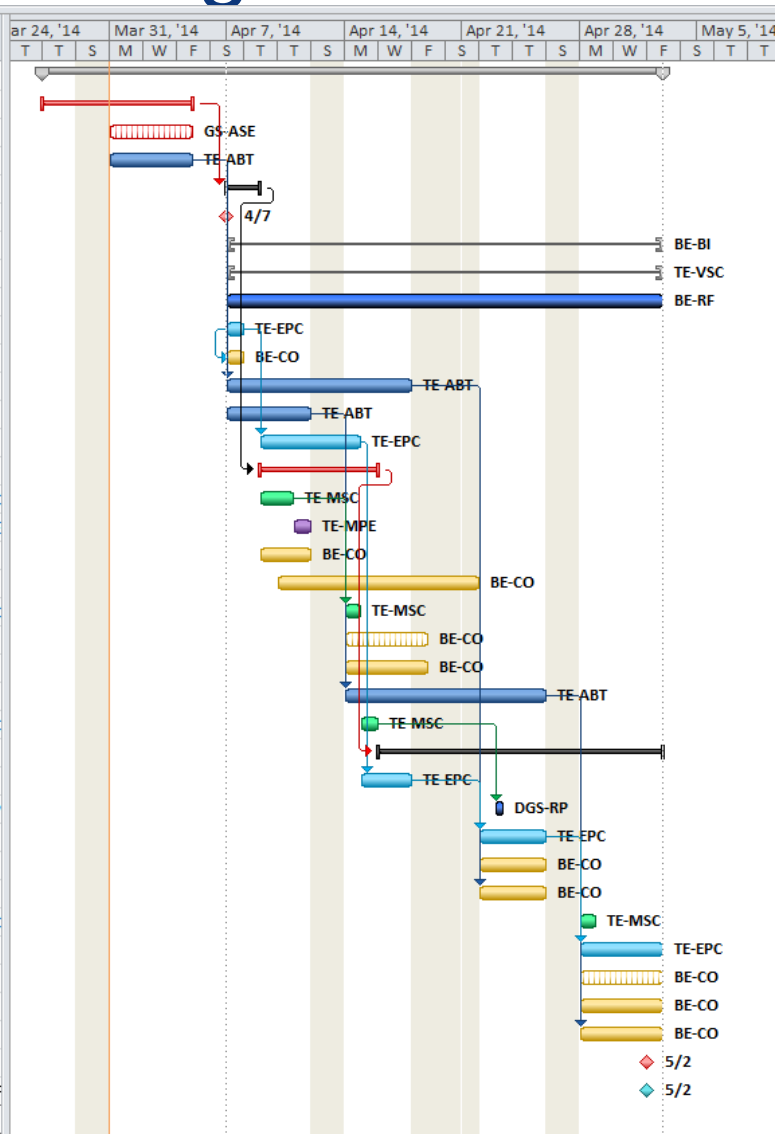


# Startup Schedule – Main Dates

| Machine | Start HW Tests | Start Cold Comm. | Receiving First Beam |
|---|---|---|---|
| Linac2 | 03 March | 04/17 April | 24 April (L2 tunnel) |
| PSB | 31 March | 05 May | 30 May |
| PS | 31 March | 22 May | 20 June |
| Linac3 | 02 June | 16/19 June | |
| LEIR | 19 May | 30 May | 30 June |
| ISOLDE | 10 April | 21 April (stable beams) | 10 July |
| AD | ~~03 June~~ | ~~20 June~~ | ~~10 July~~ 1 August/29 September?? |
| East Hall | | 30 June | 10 July |
| n-TOF | | | 10 July |
| SPS | 03 July | 1 September | 8 September |
| North Area | | | 09 October |
| HiRadMat | | | after NA setup (tbc) |

# PSB Hardware test planning

| | Task Name | Duratic | Start | Finish | Pre | Resou Name |
|---|---|---|---|---|---|---|
| 0 | **PSB Hardware tests** | **25 days** | **Thu 3/27/14** | **Fri 5/2/14** | | |
| 1 | No access to the machine authorised | 7 days | Thu 3/27/14 | Fri 4/4/14 | | |
| 2 | PSS access control tests 2. Machine closed- No Access | 5 days | Mon 3/31/14 | Fri 4/4/14 | | GS-ASE |
| 3 | EC test & recommissiioning Septa | 5 days | Mon 3/31/14 | Fri 4/4/14 | | TE-ABT |
| 4 | Restricted access | 2 days | Mon 4/7/14 | Tue 4/8/14 | 1 | |
| 5 | Start hardware tests | 0 days | Mon 4/7/14 | Mon 4/7/14 | | |
| 6 | Intermittent access BE-BI. | 18 days | Mon 4/7/14 | Fri 5/2/14 | | BE-BI |
| 7 | Intermittent access TE-VSC | 18 days | Mon 4/7/14 | Fri 5/2/14 | | TE-VSC |
| 8 | Hardware commissioning tests BE-RF | 18 days | Mon 4/7/14 | Fri 5/2/14 | | BE-RF |
| 9 | Local test MIL1553 converters | 1 day | Mon 4/7/14 | Mon 4/7/14 | | TE-EPC |
| 10 | BE-BI 1 day dry run for BI systems | 1 day | Mon 4/7/14 | Mon 4/7/14 | 9SS | BE-CO |
| 11 | Hardware tests Septa | 9 days | Mon 4/7/14 | Thu 4/17/14 | 3 | TE-ABT |
| 12 | EC test & recommissioning Kickers & BI.DIS | 5 days | Mon 4/7/14 | Fri 4/11/14 | | TE-ABT |
| 13 | Comissioning multipoles BAT A | 4 days | Wed 4/9/14 | Mon 4/14/14 | 9 | TE-EPC |
| 14 | No access to the machine authorised | 5 days | Wed 4/9/14 | Tue 4/15/14 | 4 | |
| 15 | HV test main units (No access) | 2 days | Wed 4/9/14 | Thu 4/10/14 | | TE-MSC |
| 16 | 24DI Connection to normal patches after HV test | 1 day | Fri 4/11/14 | Fri 4/11/14 | | TE-MPE |
| 17 | Test 1 CBMIA device per loop from BOR | 3 days | Wed 4/9/14 | Fri 4/11/14 | | BE-CO |
| 18 | Oasis operational | 6 days | Thu 4/10/14 | Mon 4/21/14 | | BE-CO |
| 19 | Audio/Visual Main units (No access) | 1 day | Mon 4/14/14 | Mon 4/14/14 | 15 | TE-MSC |
| 20 | Spare slot for CBMIA retests | 4 days | Mon 4/14/14 | Fri 4/18/14 | | BE-CO |
| 21 | CBMIA: All MIL1553 equip with Oasis, Timing | 4 days | Mon 4/14/14 | Fri 4/18/14 | | BE-CO |
| 22 | Hardware tests Kickers & BI.DIS | 8 days | Mon 4/14/14 | Fri 4/25/14 | 12 | TE-ABT |
| 23 | Replacement of covers main units (No Access) | 1 day | Tue 4/15/14 | Tue 4/15/14 | | TE-MSC |
| 24 | Restricted access | 11 days | Wed 4/16/14 | Fri 5/2/14 | 14 | |
| 25 | Comissioning multipoles BAT B | 3 days | Tue 4/15/14 | Thu 4/17/14 | 13 | TE-EPC |
| 26 | RPL installation | 0.5 days | Wed 4/23/14 | Wed 4/23/14 | 23 | DGS-RP |
| 27 | Comissioning multipoles BCER | 4 days | Tue 4/22/14 | Fri 4/25/14 | 25 | TE-EPC |
| 28 | Test FGC interfaces (TBD) | 4 days | Tue 4/22/14 | Fri 4/25/14 | | BE-CO |
| 29 | Dry run Septa | 4 days | Tue 4/22/14 | Fri 4/25/14 | 11 | BE-CO |
| 30 | Audio/Visual remaining BR, BI, BT,BTP & BTY | 1 day | Mon 4/28/14 | Mon 4/28/14 | | TE-MSC |
| 31 | General converter tests BR, BI, BT, BTP and BTY | 5 days | Mon 4/28/14 | Fri 5/2/14 | 27 | TE-EPC |
| 32 | Spare FGC interface retests | 5 days | Mon 4/28/14 | Fri 5/2/14 | | BE-CO |
| 33 | Test all FGC interfaces (TBD) | 5 days | Mon 4/28/14 | Fri 5/2/14 | | BE-CO |
| 34 | Dry run Kicker & BI.DIS | 5 days | Mon 4/28/14 | Fri 5/2/14 | 22 | BE-CO |
| 35 | Access and final patrol GS-ASE | 0 days | Fri 5/2/14 | Fri 5/2/14 | | GS-ASE |
| 36 | Machine Handover to BE-OP | 0 days | Fri 5/2/14 | Fri 5/2/14 | | EN-MEF |



# PS PPS Commissioning Plan

| EDMS 1346246 v.1.1 | 22/01/2014 | PS PPS Commissioning Tests Planning 2014 | | |
|---|---|---|---|---|
| E. Sanchez-Corral | | | | |
| | **ZONE** | **Zone Tests date (1)** | **System Tests I date (2)** | **System Tests II date (2)** |
| | **Linac 4** | t.b.d. (LN4 HwC planning) | | |
| | **Linac2** | w7: 11-12 Feb | w11: 10-14 March Cancelled | w14: 31 March-4 April |
| | **Booster** | w7: 13-14 Feb | | |
| | **LEIR** | w8: 17/02/2014 | | |
| | **SWY** | w8: 18-21 Feb | | |
| | **PS** | | | |
| | **TT2** | w9: 24-25 Feb | | |
| | **TFP** | w9: 24-25 Feb | | |
| | **TFT** | w9: 26-27 Feb | | |
| | **EA** | w9: 28-Feb | | |
| | **ADT** | w10: 03-05 Mar | | |
| | **ADR** | | | |
| | **ISOLDE** | w10: 06-07 Mar | | |
| | **IRRAD** | May w19 - t.b.d | t.b.d | |
| | **TFT + EAR1 & EAR2** | June/July t.b.d. | t.b.d | |

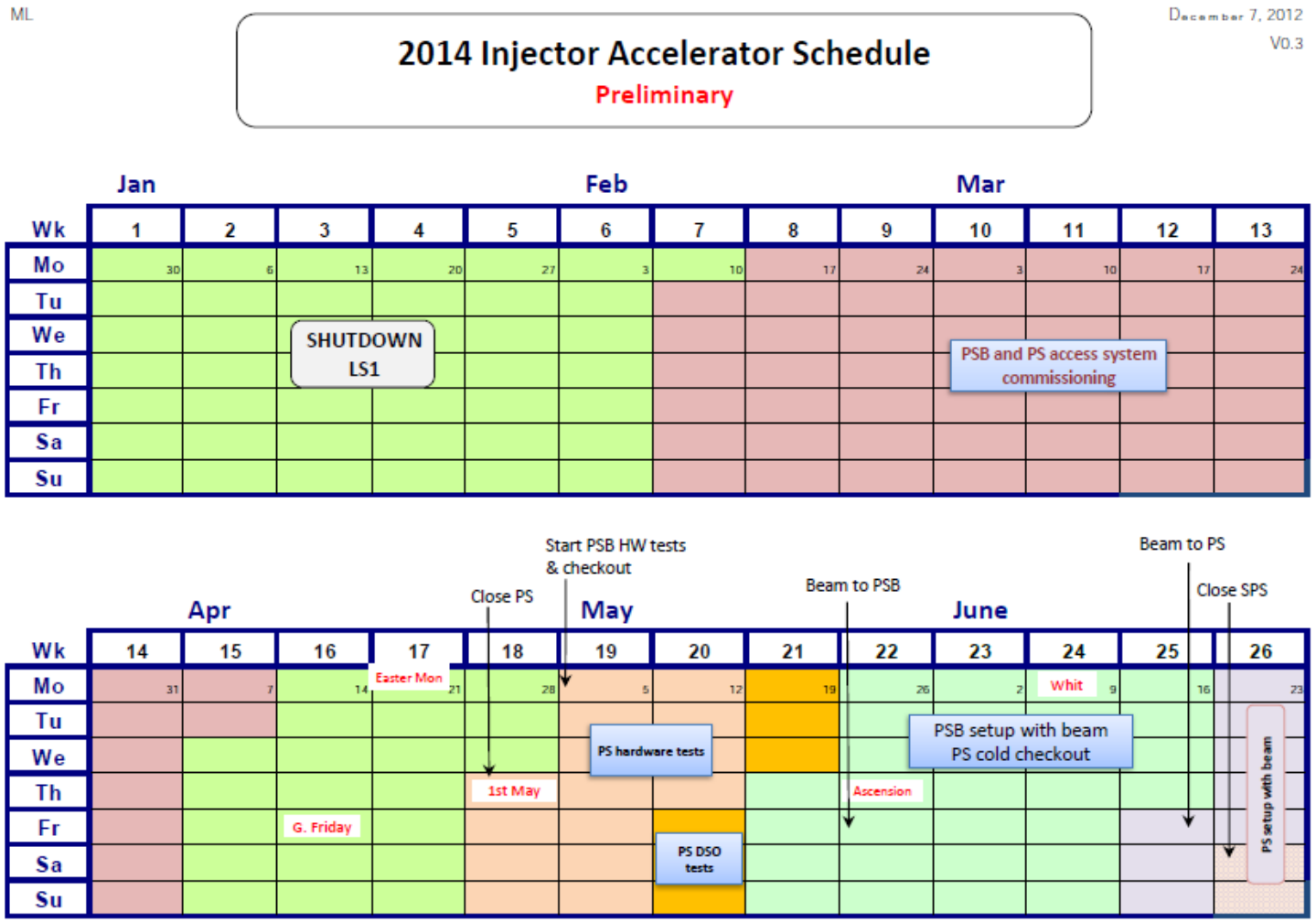
**w7-w10: Access not possible only to the zone being tested.**

**Access possible to zones not being tested for planned LS1 activities (IMPACT).**

**w11 & w14: All zones concerned by the tests -> All zones inaccessible**

***Note: Preparation required of EIS-b/m by equipment supervisors 1-2 days before each test***

# PSB & Access system commissioning



# Accesses managed with IMPACT

EDMS NO. 1371388 | REV. 1.0 | VALIDITY RELEASED

REFERENCE
**CPS-Y-PRD-0001**

Date: 2015-09-17

SAFETY PROCEDURE

## Access to LINAC2, PSB, PS and TT2 during Hardware Commissioning and Tests


ABSTRACT:

During the hardware commissioning and test period in the LHC injectors (LINAC2, PSB, PS and TT2), the power supplies are no longer electrically "locked-out". The majority of the magnets will be powered, tested and validated before declaring them operational.

This procedure describes how access will be granted for personnel not part of the tests.


| PREPARED BY: | CHECKED BY: | APPROVED BY: |
|---|---|---|
| K. Foraz EN/MEF<br>R. Steerenberg BE/OP | D. Bodart TE/MSC<br>D. Cotte BE/OP<br>G. Dumont DGS/RP<br>R. Froeschl DGS/RP<br>C. Gaignant BE/ASR<br>Y. Gaillard TE/EPC<br>K. Hanke BE/OP<br>D. Hay EN/MEF<br>S. Hutchins BE/ASR<br>G. Le Godec TE/EPC<br>C. Mastrostefano BE/ABP<br>S. Mataguez EN/MEF<br>B. Mikulec BE/OP<br>A. Newborough TE/MSC<br>P. Ninin GS/ASE<br>T. Otto TE/HDO<br>J. Pedersen EN/HDO<br>S. Pittet TE/EPC<br>P. Sollander BE/OP<br>M. Tavlet BE/HDO<br>D. Tommasini TE/MSC<br>J. Vollaire DGS/RP | R. Saban |

DISTRIBUTION LIST:

IEFC members

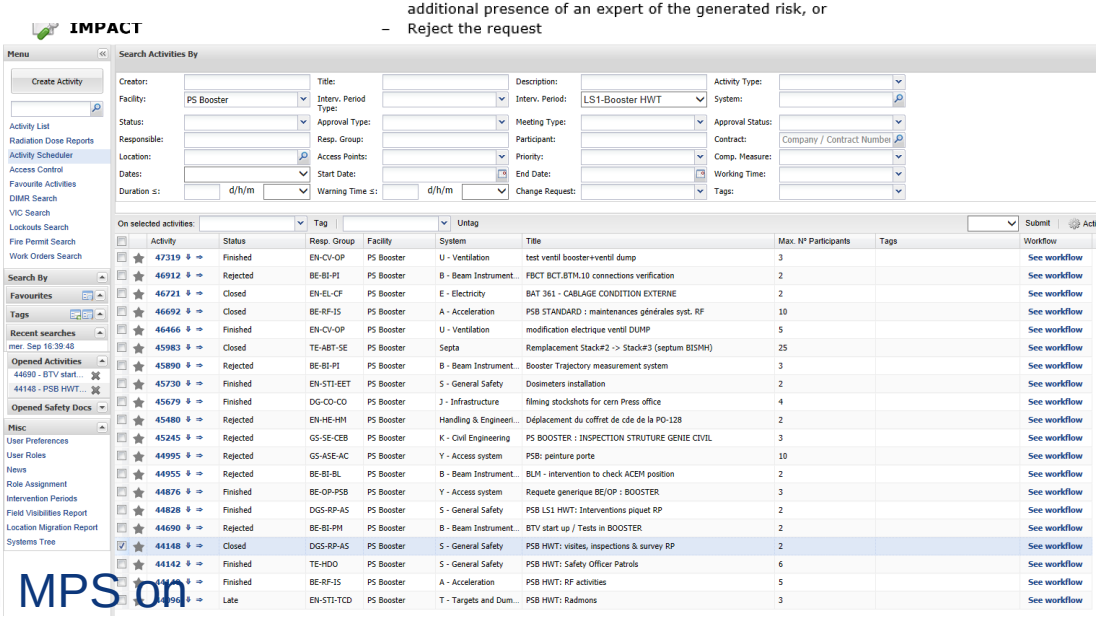
2.1 ACCESS FOR FORESEEN ACTIVITIES

As a general rule, during hardware testing (HWT), access to an injector is forbidden. Two categories of foreseen activities for which a justified exception is possible, are defined:

- Access by hardware experts of equipment under test. For example, BE-RF accessing a cavity for tuning.
- Other planned access. For example, EN-CV accessing a ventilation substation for controls and measurements.

The access is authorised following this procedure:

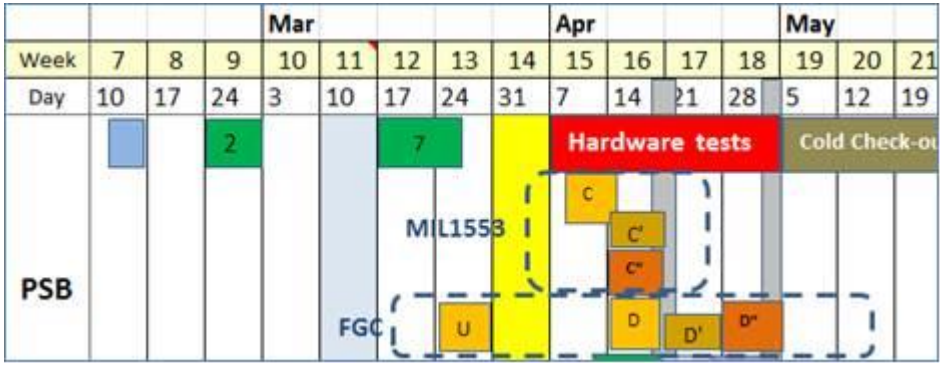
1. The machine coordinator chairs a daily HWT coordination meeting at 8h15.
2. The technical responsible person of the intervention announces and presents his intervention in the 8h15 meeting, describing what is to be done, and the area of the works.
3. The technical responsible person creates an impact request. The impact request MUST include the "mode opératoire": what has to be done and how (fiche de tache), and the access path to the work site.
4. Depending on the risk present in the machine (electrical or radiation), the "mode opératoire" and the schedule, the machine coordinator will either:
   - Accept the request in planned and dedicated time slots, or
   - Accept the request in planned and dedicated time slots, with the additional presence of an expert of the generated risk, or
   - Reject the request




Access mode special permit with MPS on

# CO: Dry Runs ACCOR

Planning for tests with TE-EPC, BE-OP and BE-CO




- PSB/MIL1553 :
- Wk 15: On Wednesday 9/04/14 , all MIL1553 equipment available for tests.
  - **DryRun_Id = [C]** will start Wednesday 9/04/14, tests with some equipment. Preparation starting at 8:30 AM.
  - DryRun_Id = [C'], only if C fails.
  - **DryRun_Id = [C"]** will start Monday 14/04/14, tests with ALL equipment. Preparation starting at 8:30 AM.
- PSB/FGC:
- Wk 13: FGC in simulation mode.
  - **DryRun_Id = [U]** will start Monday 24/03/14, tests with ALL FGC in simulation mode. Preparation starting at 8:30 AM.
- Wk 15: First batch of FGC equipment available for tests.
  - **DryRun_Id = [D]** will start Wk.16, Monday 14/04/14, tests with some FGC equipment. Preparation starting at 8:30 AM.
- Wk 16: Second batch of FGC equipment available for tests.
  - DryRun_Id = [D'], only if D fails. Could be used to test additional FGC equipment.
- Wk 17: All FGC equipment available for tests
  - **DryRun_Id = [D"]** will start Monday 28/04/14, tests with ALL FGC equipment. Preparation starting at 8:30 AM.



Courtesy C. Dehavay

# START-UP PLANNING FOR PSB

J.L. Sanchez Alvarez (BE/OP/PSB)

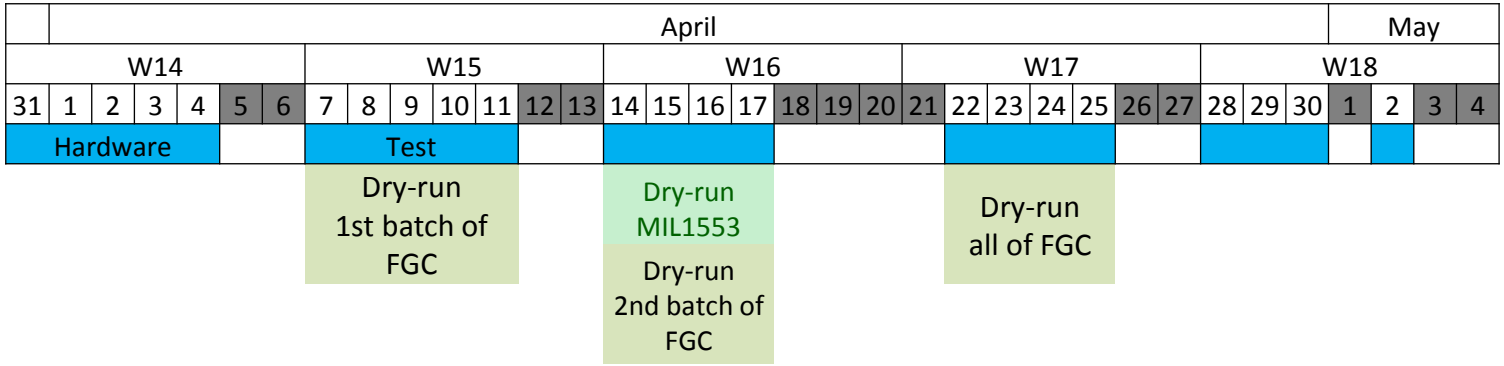
# PSB Schedule

| | April | | | | | | | | | | | | | | | | | | | | | | | | | | | May | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | W14 | | | | | | | W15 | | | | | | | W16 | | | | | | | W17 | | | | | | | W18 | | | |
| | 31 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 1 | 2 | 3 | 4 |
| | Hardware | | | | | | | Tests | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| | May | | | | | | | | | | | | | | | | | | | | | | | | | | | | June | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | W19 | | | | | | | W20 | | | | | | | W21 | | | | | | | W22 | | | | | | | W23 | | | | | | |
| | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| | PSB cold check-out | | | | | | | | | | | | | | | | | | | | | | | | | | | | PSB Set-up with beam | | | | | | |

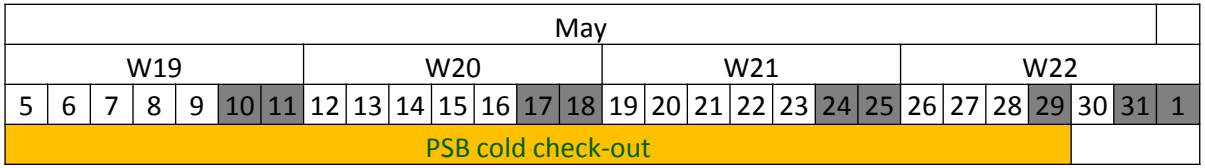
| | June | | | | | | | | | | | | | | | | | | | | | | | | | | | | July | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | W24 | | | | | | | W25 | | | | | | | W26 | | | | | | | W27 | | | | | | | W28 | | | | | | |
| | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| | PSB Setup with beam | | | | | | | | | | | | | | PSB Setup operational beam | | | | | | | | | | | | | | | | | | Isolde Setup | | | |
| | | | | | | | | | | | | | | | PS setup with beam | | | | | | | | | | | | | | | | | | | | | |

# PSB Hardware test



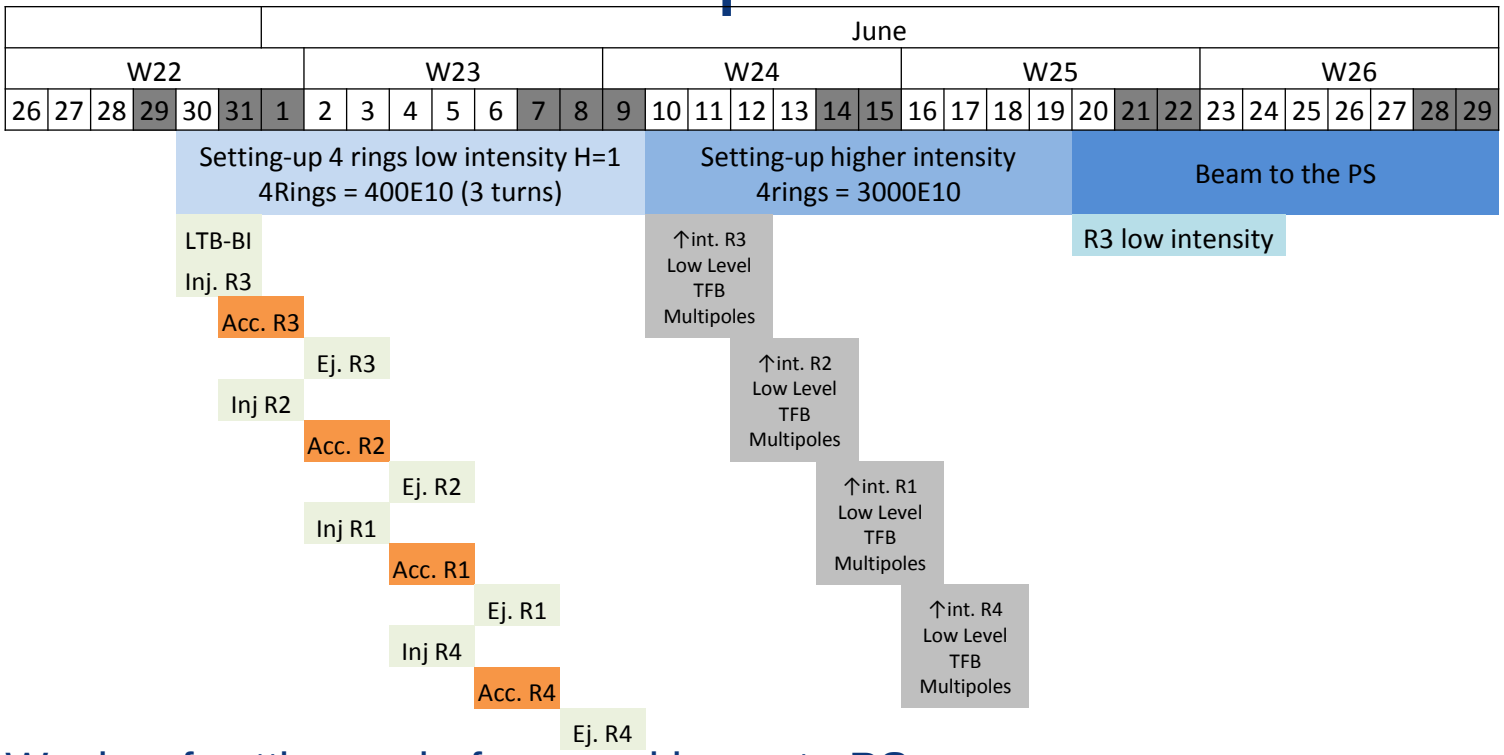

- One PSB operator is available in the CCC from 6h to 21h to ensure support for the hardware test and dry-runs.
- No operator during week-end and night.
- List of equipment to be tested during a dry-run will be defined with TE-EPC and the MCC (Machine Control Coordinator Jochen Betz).
- https://wikis/display/ACCOR/BOOSTER+DRY+RUN

# PSB Cold check-out




- 3 weeks and half for the PSB Cold check-out
- 3 shifts per day including week-end.
- OP will organize the cold check-out (with procedures and check-lists) :
  - 218 Pow. Sup. with MIL1553.
  - 94 Multipoles and 32 dipoles with FGC3.
  - 400 timings (TG8 replaced by CTRV).
  - OASIS renovation (FEC, new Scopes, New Multiplexer) (780 analog signals + 400 DataSet signals).
  - Instrumentations (New BPM injection, new FESA classes).
  - BTM line dismounted to replace the Booster dump.
  - New BIS (BIC and SIS).
  - renovation of the low-level RF system.
  - New amplifiers for the transverse feedback.
  - …

# PSB Set-up with beam




- 3 Weeks of setting-up before send beam to PS.(2 long week-ends Ascension and White Monday)
- Anymore Piquet control (list of specialist CO).
- New Low Level RF hardware, new amplifiers on the transverse feedback and new power convector for the multipoles (FGC3).
  - Low intensity setting-up 10 days
  - High intensity setting-up 10 days

# Conclusions presented at LHC performance workshop (Chamonix 2014) and LS1 debriefing day 31st March 2015

| | | |
|---|---|---|
| 16:00 | **LHC Injectors Complex Status** — *Chamonix - Les Aiglons* | *Klaus HANKE* — 16:00 - 16:30 |
| | **Questions** — *Chamonix - Les Aiglons* | 16:30 - 16:45 |
| | **SPS Scrubbing 2014** — *Chamonix - Les Aiglons* | *Hannes BARTOSIK* — 16:45 - 17:05 |
| 17:00 | **Questions** — *Chamonix - Les Aiglons* | 17:05 - 17:15 |
| | **Operational Beams for the LHC** — *Chamonix - Les Aiglons* | *Yannis PAPAPHILIPPOU* — 17:15 - 17:45 |
| | **Questions** — *Chamonix - Les Aiglons* | 17:45 - 18:00 |
| 18:00 | **LHC Dry-Runs and Cold Check-out** — *Chamonix - Les Aiglons* | *Delphine JACQUET* — 18:00 - 18:20 |
| | **Questions** — *Chamonix - Les Aiglons* | 18:20 - 18:30 |
| | **LHC Sector Test** — *Chamonix - Les Aiglons* | *Reyes ALEMANY FERNANDEZ* — 18:30 - 18:50 |
| | **Questions** — *Chamonix - Les Aiglons* | 18:50 - 19:00 |
| 19:00 | | |

https://indico.cern.ch/event/373053/. & LS1 debriefing day 31st March 2015