

# SPS RESTARTING AFTER LS1

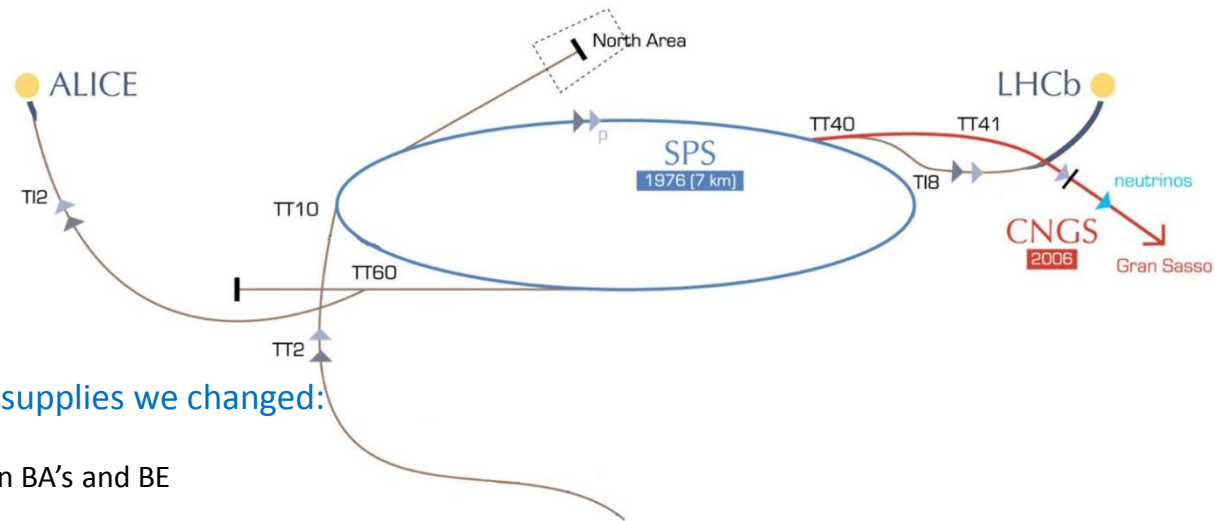
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Stéphane Cettour Cavé

# OUTLINE

- 1) Main modifications in the SPS during LS1
- 2) SPS commissioning, check out
- 3) Summary

# Main modifications in the SPS during LS1



## 1) SPS Ring

### a) On the Main power supplies we changed:

- 18 kV transformers
- 18 kV cables between BA's and BE
- firing cards
- thyristor racks

### b) On all power supplies we changed:

- the function generator (ROCS replaced by FGC)
- removed the legacy timing, pulse start, pulse stop
- with the FGC we implemented a new coast, a new trim in the coast, a new economy system

### c) New RF power control

### d) New RF low level control

### e) BA6 vertical realignment (+~4mm)

### f) LSS1 completely uninstalled for recabling

### g) Etc..

## 2) Transfer line

### a) TT10 uninstalled to consolidate the tunnel structure

### b) TDC2 uninstalled splitters and collimators for recabling

### c) Etc..

# SPS commissioning, check out

	Jan					Feb			Mar				
Wk	1	2	3	4	5	6	7	8	9	10	11	12	13
Mo	30	6	13	20	27	3	10	17	24	3	10	17	24
Tu													
We			SHUTDOWN LS1										
Th										PSB and PS access system commissioning (plus HW testing as appropriate)			
Fr													
Sa													
Su													

Start Linac2 HW commissioning (pointing to Mar 9)

Close PS for HW tests (pointing to Mar 12)

## In March

- a) Test of the new timing system for SPS
  - check all events
  - check if the machine mode works
  - check the if the events are dependent on the machine mode
- b) Cleaning of old settings from the data base
- c) Generation of new cycles to see if all the functions were correctly generated
- d) Initial application testing and debugging



# SPS commissioning, check out

## In April, May

- a) **FGC in simulation mode**
  - test all the power converters with a new cycle generated in simulation
  - test dynamic economy, full economy, ddest economy in simulation
- b) **Test of the new timing for COAST**
  - check if all the power converters start in coast prepare
  - check coast mode
  - check coast recover
  - check return to cycling mode
- c) **Creation of additional applications to have more diagnostics on the FGC**
- d) **Increased the speed of the signal to trigger the dynamic economy**

## In June

- a) **Power converter AUX (BA2, BA4, BA5, BA6) ready for test**
  - checking if PCs working correctly
  - polarity check available power converters
- b) **Patrol and close SPS complex**
- c) **Follow up of the RF low level, control and RF power recommissioning**
- d) **Modification and verification that SIS (software interlock system) takes into account the new philosophy with the FGC and timing**
- e) **Checking in normal mode (PCs ON) dynamic economy, full economy, ddest economy, mode coast**



# SPS commissioning, check out

## In July, August

- a) **Beginning of the daily morning meeting at 8h30 in CCC with an expert for each system**
  - with this meeting we manage the activity in the SPS because now the ring is closed.
  - activities are prioritized
  - we manage the necessary access such that they take place either before 8H30, between 12h00 and 14h00, after 17h30, or in the case of multiple access requests we can organise a dedicated period for access
  - this meeting is very important to know the progress of all the systems
- b) **Power converter AUX (BA1, TT10, BA3, BB3, TT20, TI2, TI8)**
  - checking if PCs working correctly
  - polarity checks for these power converters
- c) **Control**
  - verification of the new applications allowing greater diagnostics on the FGC
  - verification of all applications to control the accelerators
- d) **Instrumentation**
  - checking stepping motors and if the software values correspond with the hardware in the tunnel
  - outin system, camera, screen, sem grid, miniscan
- e) **8h30 meeting checking the progress of the septas, kickers conditioning, RF low level, RF control power**
- f) **Interlocked machine protection**
  - test all BIC inputs (BLM, PCs state, vaccum valve interlock, etc..)
  - test all the SIS functionality
  - test the time to fire the beam dump by the BIC if the MPS tripped
  - check if all the interlock system are OK for beam (BIS, SIS)
- g) **Main power supplies**
  - checking the repetability of the MPS, the ripple, application of hardware compensation
  - checking if it can pulse for extended periods without issue
  - checking the cooling temp
- h) **DSO test preparation**
  - checking if all EIS work correctly



# Summary

## Starting SPS

### a) Polarity checks

- check the polarity with a portable hall probe inside the magnet
- polarity faults identified before injecting beam to avoid any doubt during the beam steering

### b) Op involved in the working group to implement the FGC and timing system

- OP can follow the evolution of the system
- OP involved in commissioning to identify earliest possible opportunities to start partial testing
- OP began the timing tests step by step as and when the various elements became available

### c) Op crew

- OP must be involved in all modifications to keep control of all systems
- it is very useful to know the systems and rewarding for op
- op started testing often even before the system was fully available to reduce overall commissioning time

### d) Very useful diagnostic tools

- SIS
- BIS

**The first BEAM injected in the SPS without major problem**

**Thanks for your attention**