

LS2 update – TOTEM/PPS

TOTEM & PPS activities in LHC tunnel

- Present situation TOTEM & PPS
- Update on work packages
- Overview on upcoming LS2 activities
- Summary and conclusions

PPS & TOTEM Status of LS2 (2020)

- COVID-19 restart follow up:
 - 'TOTEM new T2 ' work package was approved and started on 2. 6.2020 (Meyrin)
 - > since than 5 to 7 colleagues are working for new T2:
Telework in combination with lab work at Meyrin (bat226, bat 506), office work in bat 585 and IP5 workshop

-> component test completed

- 'TOTEM Motion Control System - Electronics Upgrade ' was approved. (ip5 CMS) -> start 8.6.2020
- > good progress the final movement test was scheduled for week 36 (start 2.9.2020) -> completed
- Laser calibration of all RPs -> completed
- LSS5-R : week43 (2020)
- LSS5-L : week45 (2020)

all measurements were completed in week 50

- 'PPS RP pixel test' under preparation (Meyrin and H8) impacted by COVID- 19

PPS & TOTEM Status of LS2 -> RP Movement System

- Laser measurements in cooperation with Alban Vieille (EN-SMM-ASG):
done in November-December:

2020

Principle:

Calibrate the internal XRP position measurement systems
with LASER measurements of the pot positions relative to the beam centre

Internal systems:

- Motor axis resolver: measures the turns (angular position) of the motor's precision screw
- LVDT: transformer with two coils, one fixed, one moving with the pot
(distance measurement via induction)

- Completion of the analysis of the Laser metrology
→ curves: LVDT vs. distance to the beam,
resolver vs. distance to the beam
to be programmed into the low-level motor-control and interlock system

March 2021

→ Report at MPP

upcoming MPP in April 2021

- Commissioning of movement from CCC
 - settings, limits into beam processes
 - operational sequences, possibly with movement steps during the fill
 - depends partly on progress with collimation scheme

tbc April or June 2021
2 days

- Test of the interlock logic (TOTEM inputs to the BIS):
 - Any RP outside its garage position (i.e. far from the beam) must remove TOTEM injection permit
 - Any RP in an illegal position must remove TOTEM User Permit (i.e. trigger a beam dump)
 - to be tested in the "Machine Checkout" phase shortly before first beams,
needs a special dry run with manipulation of the beam mode from the CCC (few hours)

tbc 2021/22

Service work on Roman Pots and infrastructure in LHC tunnel

- Preparation for detector package installation in October 2021
- request for access to LHC tunnel (2 weeks in sector 4-5 and 5-6)

August 2021

Installation of Roman Pots in LHC tunnel (Si-strips, Si-pixel)

after LHC pilot beam week 41

- request for access to LHC tunnel (3-4 weeks in sector 5-4 and 5-6)

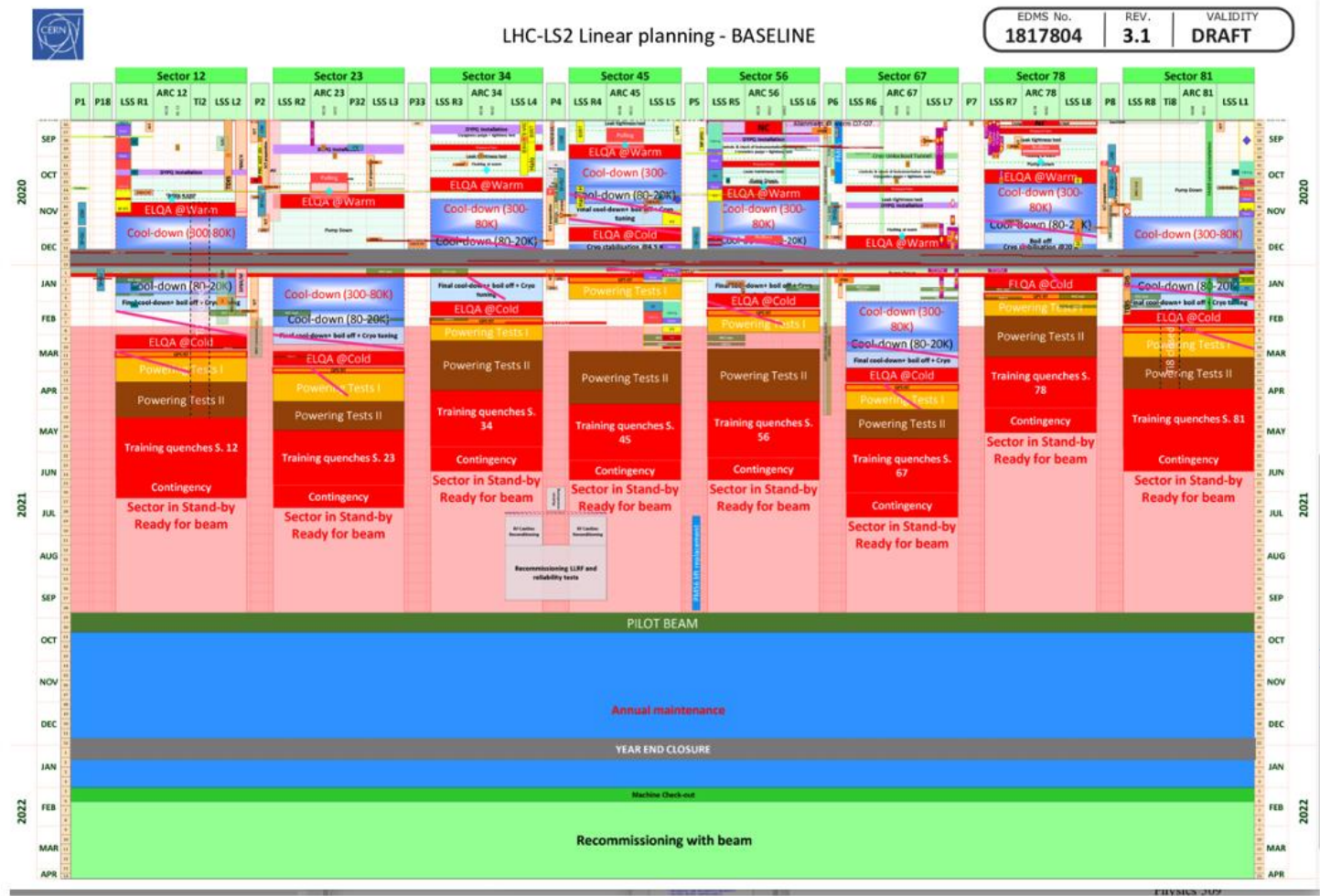
Commissioning and tests in LHC tunnel after detector package installation

Plans:

- Following Detector Packages DP installation and by system (control, readout, trigger) - SiStrips DP, Diamonds DP, Pixels RPIX DP
- DCS/DSS on place and working
- Without cooling ON, no power of the Detectors Packages (DP) !!!
 - For Diamonds – power only the “Readout Units” in the boxes
 - For S-Strips - if possible, power only the control loops
 - Tests of the Si-Strips and Diamonds configurations
 - Tests of Digital Readout Units – configuring and re-programming the FPGA remotely
 - Results
- With cooling ON, power of the Detectors Packages (DP)!
 - Step by step to the complete system commissioning (hardware and software)
 - Tests and results

About 4 weeks
October/ November 2021

LHC schedule 2021



TOTEM-PPS Upgrade Workshop 8.2.2021 and 10.2.2021

Test beams

TOTEM Total Cross Section, Elastic Scattering and Diffraction Dissociation at the LHC

SPS SCHEDULE for 2021

Responsible person (spokesperson)

Name: Francisco Garcia
 Home Institute: Helsinki Institute of Physics
 Address: Gustaf Hällströmin katu 2a
 Phone: +358505599570
 other info or comment: Francisco.Garcia@helsinki.fi

Person responsible during the run (if different of a coordinator)

Name:
 Home Institute:
 Address:
 Phone:
 other info or comment:

Contact person at CERN (if different from responsible person, if the responsible person is usually not at CERN, please resident at CERN, if possible).

Name: Dmitry Druzhkin
 Home Institute: CERN - EP/UCM
 Address:
 Phone: +41754118663
 other info or comment:

Requested beam time (e.g. 1 week, 1 month)

PS: 1 week (08 - 14.11.21)
 SPS: 3 weeks (13 - 19.09.21, 15 - 21.10.21 and 6 - 12.12.21)

Requested beam time at the PS East Hall of more than 14 days per year and at the SPS of more than 14 days per year needs to be recommended and approved by the relevant CERN scientific committee (e.g. SPSC, LHCC and Research Board).

2. Beam Requirements

2.1 PS (East Hall)

Particle type, momentum, polarity, intensity, beam size etc. (for details see <http://sba.web.cern.ch/sba/BeamsAndAreas/East/East.htm>)

East hall beam characteristics:
 • particle type: electrons (lower momenta), muons, hadrons, both polarities.
 • intensity: typically $10^3 - 10^4$.

particle type	<input type="checkbox"/> electrons	<input type="checkbox"/> muons	<input checked="" type="checkbox"/> hadrons
Polarity	<input checked="" type="checkbox"/> positive	<input type="checkbox"/> negative	<input type="checkbox"/> polarity does not matter
momentum:	4		
intensity:	1e4		
Beam size:	20 x 5 mm ²		
Target (electron rich/hadron rich):			
Other requirements or comments:			

Preferred beam line

If you would like to use a preferred beam line, please indicate beam line and

beam line	Momentum (min. - max.) / GeV/c	your comment
<input type="checkbox"/> T9	0.5 - 15	
<input type="checkbox"/> T10	0.5 - 12	
<input type="checkbox"/> T11	0.4 - 3.5, reserved for CLOUD experiment	

Special requests, other requirements or comments (AIDA telescope, Cerenkov detectors, ...):

2.2 SPS (North Area)

Particle type, momentum, polarity, intensity, beam size etc. (for details see <http://sba.web.cern.ch/sba/Documentations/How2controlNAbeams.htm>)

North area beam characteristics:
 • particle type: electrons (lower momenta), muons, hadrons, both polarities, (Pb or fragmented ions not available in 2021)
 • momentum and intensity: 20 - 250 GeV/c (205 GeV/c in H6), typically 10^4 particles per spill (π^-). Higher momenta need to be discussed with the beam line physicists.

particle type	<input type="checkbox"/> electrons, purity	<input checked="" type="checkbox"/> muons	<input checked="" type="checkbox"/> hadrons	<input type="checkbox"/> Pb ions
Polarity	<input type="checkbox"/> positive	<input type="checkbox"/> negative	<input checked="" type="checkbox"/> polarity does not matter	<input type="checkbox"/> fragmented ions
momentum:	150 GeV			
intensity:	1e4			
beam size:	20 x 5 mm ² / 10x10 cm ²			
other requirements or comments:				

Preferred beam line if you would like to use a preferred beam line, please indicate beam line and reason. In addition, indicate if you need lower or higher momenta (20 GeV/c or below and higher than 250 GeV/c), higher intensities or primary protons/ions!

beam line	your comment
<input type="checkbox"/> H2	
<input type="checkbox"/> H4	
<input type="checkbox"/> H6	
<input checked="" type="checkbox"/> H8	TOTEM experimental area - End of the beam line (Door No.)
<input checked="" type="checkbox"/> M2	
<input type="checkbox"/> K12	

Special requests, other requirements or comments (AIDA telescope, Cerenkov detectors, ...):

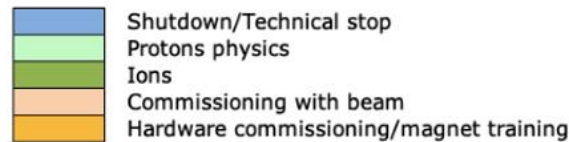
Target intensity. If you know the target intensity you request, (f.l. T6, 3weeks at 70×10^{10} for commissioning, then 150×10^{10} for the physics run.)

Target name (T2, T4 or T6):
 Target intensity:

LHC long term schedule

Longer term LHC schedule

In 2019 the decision was taken to extend Run 3 by a year and for LS3 to start in 2025. Impact of coronavirus pandemic reflected in the extended hardware commissioning and magnet training foreseen for 2021.



TOTEM-PPS Upgrade Workshop 8.2.2021 and 10.2.2021
 Joachim Baechler

TOTEM Referee Meeting 2.3.2021 J. Baechler

Summary

- Report on status of RP movement system in upcoming MPP
- Upcoming access in LHC tunnel (request for April about 2 days) for RP movement system (support groups are available)
- Upcoming access in LHC tunnel (request for June/August tbc) about 2 weeks) preparation for Detector Package installation
- RP Preparation of test beams at H8 started test beams requested
- New T2 is on schedule – integration in CMS followed up
- Detector package installation and commissioning in LHC tunnel scheduled for October/November 2021
- Final RP system checkout from CCC to be scheduled