

Today	1st Quarter	3rd Quarter	1st Quarter	3rd Quarter	1st Quarter	3rd Quarter	1st Quarter	3rd Quarter	1st Quarter	3rd Quarter
	YEYS 2015/16 14 Dec '15 - 21	2016	EYETS 2016/17 05 Dec '16 - 09 Apr '17	2017	YEYS 2018/19 11 Dec '17 - 18	2018	LS2 (ACCESS) 01 Feb '19 - 31 Aug '20	2019		2020

# BE-RF Activities

Erk JENSEN, BE-RF

Thanks: Andy, Carlo, Elena, Eric, Frank, Heiko, Karl, Mauro, Olivier, Rama, Steffen, Walter, Walter, Wolfgang and their teams!



**LS2** DAYS  
29-30 SEPTEMBER 2015

<http://indico.cern.ch/event/436424/>

# Assumptions

- HIE-ISOLDE starts operation in 2015 (now!)
- ELENA starts operation in 2016
- Linac4 starts “operation” in 2016 (reliability run – half sector test...)
- Linac2 stops operation end 2018 for good.
- CTF3 stops operation end 2016 – this will release some urgently needed manpower resources.
- CLIC and FCC studies will be merged to “Future High Energy Frontier” in 2019.

# General remarks

- During all YETS/EYETS and LS2, we need for extended periods: water, electricity, transport, HVAC, vacuum, survey and for some (LHC, CC, HIE) also cryogenics! Details and exact schedules are subject of specific requests.
- Manpower resources: The size of the teams by design fits the needs of operation/maintenance of existing operational machines – our manpower plan has addressed the additional needs, but not all is secured yet. Tight: AWAKE, AD/ELENA, LLRF upgrade to digital, double size TWC200 from LS2.
- For LS2, we have to hire additional FSU in 2018 (training) for the major TWC200 upgrade!

# Linac2

- YETS15/EYETS16/YETS17: regular maintenance of RF chains, ~8 weeks of work, included in operations budget.
- LS2: start of dismantling/decommissioning of RF amplifiers. Schedule, storage, manpower needs not yet defined.

# Linac3

- YETS15/EYETS16/YETS17: regular maintenance of RF chains, ~8 weeks of work, included in operations budget.
- LS2:
  - Consolidation/partial replacement of Linac3 RF system. A detailed analysis of the replacement needs still has to be done. Consolidation of the Bertronix amplifiers together with a replacement of the Frank James driver amplifiers for the buncher/debuncher/ramping cavities requested (DRAFT3).
  - Replacement of the Linac3 LLRF with a modern system (Linac4 type) requested as consolidation (DRAFT3).

# Linac4

- LS2:

- 3 months of beam tests are planned (Aug – Oct/2019) after the connection of Linac4 to PSB. During this time the Linac4 RF system has to operate 24/7.
- This is followed by 5 months of shutdown, which will be used to repair/consolidate any parts of the RF chains (from LLRF to the cavities), which did not work reliably during the preceding beam tests.
- Beam start-up of Linac4 is foreseen from April/2020.
- Operational beam to PSB is foreseen from Sept/2020.
- Preparation of spare klystrons and ancillaries

# LEIR

- YETS15/EYETS16/YETS17: regular maintenance of RF systems (2)
- YETS15: Activate screen pulser
- LLRF Renovation: New LLRF based on PSB digital system:
  - SW development & commissioning during 2015-16
  - EYETS16: definitive change over to new system
  - EYETS16 or LS2: Back-port of LEIR FESA3 software to PSB

# AD/ELENA

- YETS15/EYETS16/YETS17: regular maintenance of RF systems (C02, C10, Schottky, later also ELENA)
- YETS15:
  - C02 driver plug in unit implementation
  - C10 interlock renovation
- LLRF & Schottky renovation
  - SW development for ELENA during 2015/6 in parallel with LEIR
  - LS2: Installation and commissioning of new LLRF HW & SW for RF & Schottky based on ELENA development
- ELENA installation: March 16 – decoupled from TSs operation from mid 2016



# ISOLDE/Rex/HIE-ISOLDE

- HIE-ISOLDE: activities depend less on the YETS/EYETS rythm! CM2 installation during YETS15, CM3&4 during 2016.
- With HIE-ISOLDE phase3 not in the pipeline, Rex will require major consolidation – but this is not yet fully defined. (cf. Richard C's talk).

# PSB

- YETS15/EYETS16/YETS17: regular maintenance of RF systems C02, C04, C16
- YETS15:
  - Displacement of C16 HV power converters
  - Removal of BT.KRF
- EYETS16 & YETS17:
  - Preparing Finemet systems for LS2:
  - Series tests of 180 power supplies, 150 amplifiers and associated controls
- LS2:
  - Preparation for Finemet (water, cabling, general services), evacuation of old C02 and C04 (8 cavities, PCs, ancillaries – storage required!)
  - Installation Finemet system (4 rings × 3 SS × 12 cavities!)
  - Commissioning of Finemet system
  - Commissioning combined Linac4-PSB controls & interlocks

# PS (1/2)

- YETS15/EYETS16/YETS17: regular maintenance of RF systems C10, C20, C40, C80, C200
- YETS15:
  - Installation of 1<sup>st</sup> prototype upgraded C10 amplifier (SS11)
  - Installation of soft-start system on Autola1
  - Replacement of C80-08 FPC
  - Consolidation of C80 movable tuners
  - C40 & C80 upgrade to PLC-based interlocks (5 systems)
  - Upgrade of longitudinal damper: cabling modification
  - Investigation/fix on C204

# PS (2/2)

- EYETS16:
  - Installation of upgraded C10 amplifier in SS81
  - Installation of soft-start system on all Autola PCs
  - Replace mercury ignitrons with SS crowbars on C10 HV PCs
  - Consolidation of all C40 & C80 movable tuners – upgrade to new standard
  - Longitudinal damper upgrade to new amplifiers, implementation of coupled-bunch FB LLRF
  - Installation of 1-turn delay FB on C20, C40, C80
  - C200 upgrade to PLC-based interlocks (6 systems)
  - Preparation of digital beam control installation
- LS2:
  - Installation & commissioning of all upgraded C10 amplifiers
  - C10 upgrade to PLC-based interlocks (11 systems)
  - Longitudinal damper final installation and commissioning
  - Digital beam control installation on all systems

# SPS (1/2)

- YETS15/EYETS16/YETS17: regular maintenance of RF systems (TWC200 Philips & Siemens, TWC800 Electrosys)
- YETS15:
  - CC: move 2K pumps from LSS4 to LSS6
- EYETS16:
  - Philips: install new drivers
  - TWC200 power ug: insert coaxial lines in shafts
  - CC: Install RF, cryo lines, movable table, cabling Y-chamber

# SPS (2/2)

- YETS17:

- Cavity controller upgrade (4+2 cavities!)
- Prepare for AWAKE initial test (bunch rotation? e-beam tests?)
- CC: Install CM1 in LSS6, cryo tests commissioning

- LS2:

- Siemens: Install new drivers
- Siemens & Philips: upgrade to  $4 \times 1.1$  MW
- TWC200 power ug: swap cavities in LSS3, re-cabling, commissioning
- SPS Transverse damper renovation
- Installation & commissioning of new PLC controls for Siemens & Philips

# LHC

- YETS15/EYETS16/YETS17: regular maintenance of RF system (klystron replacement, oil re-conditioning, HV system maintenance, ...)
- Development of new circulator control system
- Upgrade of HV system (tetrode replacement, implementation of new current & voltage measurement)
- LS2:
  - completion of ADT upgrades
  - Prepare CC regions around P1 and P5 for CC installation in LS3

# LHC controls renovation

- LS2: Replacement of obsolescent equipment
  - LHC tuner/coupler control electronics modules
  - LHC interlock system electronics modules
  - PLC systems for LHC RF power (16 cavity PLCs, 4 cryomodule PLCs)
    - either replace 1 to 1 with new CPUs, or redevelop with more modern PLCs
  - LHC HV bunkers: new bunker electronics and DCCT measurement system



# Front-end computers renovation

- YETS15/EYETS16/YETS17/LS2:
  - FESA3 migration – continuing programme: (128 FESA classes on 164 FECs)
  - Migration to Scientific Linux 6 64-bit in all FECs

# Consolidation (APT P&A):

- LHC
  - 2<sup>nd</sup> spare module & FPC (Material 500k/y, now→2018)
- PS-CONS
  - Linac2&3 (50k, YETS15)
  - PS Gap relay(40k, YETS15)
  - PS Cavities (1M, now→2018)
  - PS re-cabling (100k during LS2)
- SPS-CONS
  - SPS RF beam controls & feedback (100k/y, now→2018)

# Consolidation (APT “Draft3”):

- LHC
- PS-CONS
  - Linac3 Bertronix&FrankJames (300k, LS2)
  - Linac3 LLRF (350k, 2016-17)
  - PS&PSB power controls renov. (700k, 2016-19)
- SPS-CONS
  - SPS 18 kV transformers (500k, LS2)
  - SPS ampli cooling renov. (500k, 2018)
- AD consolidation not yet registered in APT
- REX necessary consolidation not yet in APT



**LS2** DAYS

29-30 SEPTEMBER 2015

Thank you!