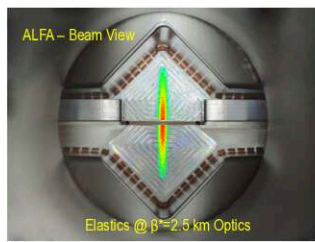
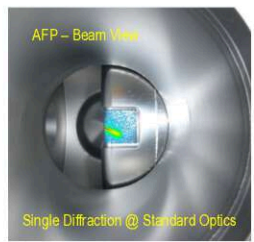
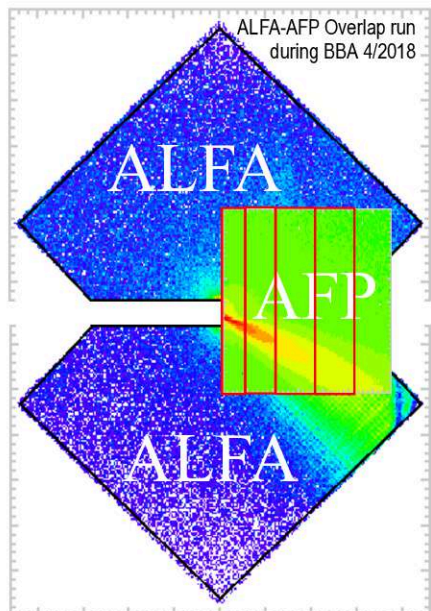


# ARP activities foreseen in LHC tunnel

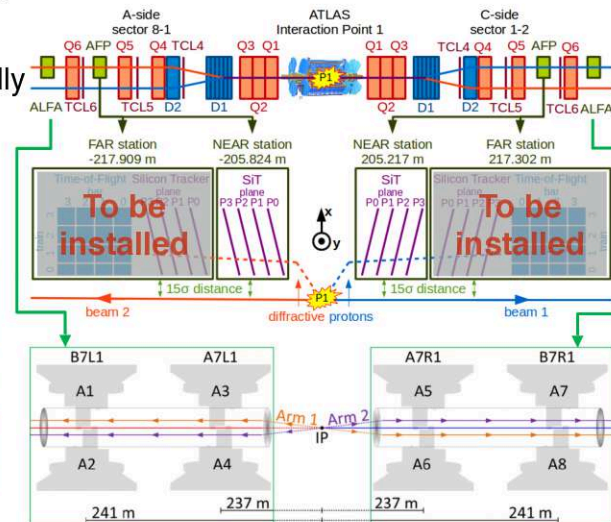
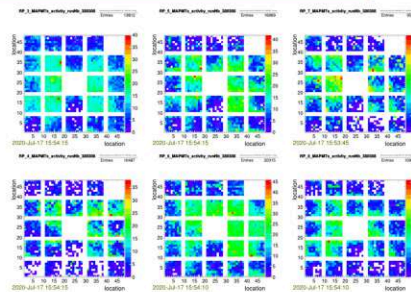
Ivan López Paz  
TERX Meeting  
3rd March 2021



# ARP status

## ALFA detector

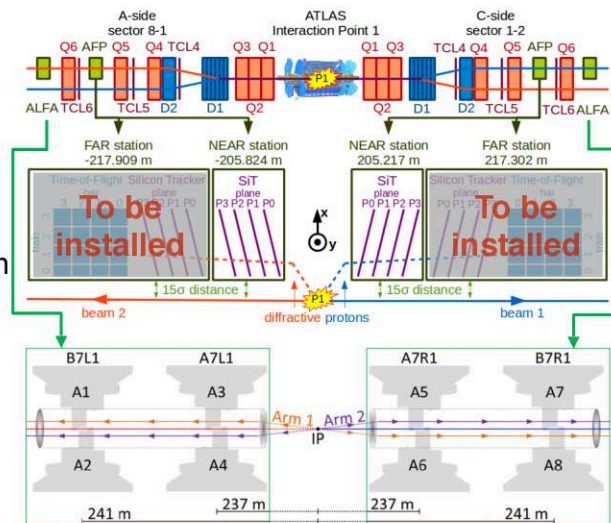
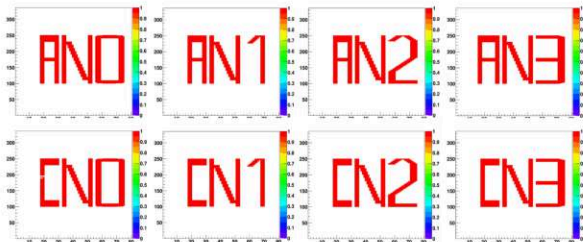
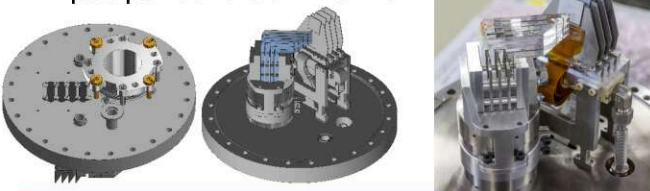
- All cooling turbines refurbished/replaced and commissioned
- 5 new motherboards arrived to replace 4 the most radiation-damaged ones
  - lab testing, installation and commissioning postponed due to travel restrictions
  - Still, all irradiated motherboards are fully operational
- New shielding blocks were delivered and installed.



# ARP status

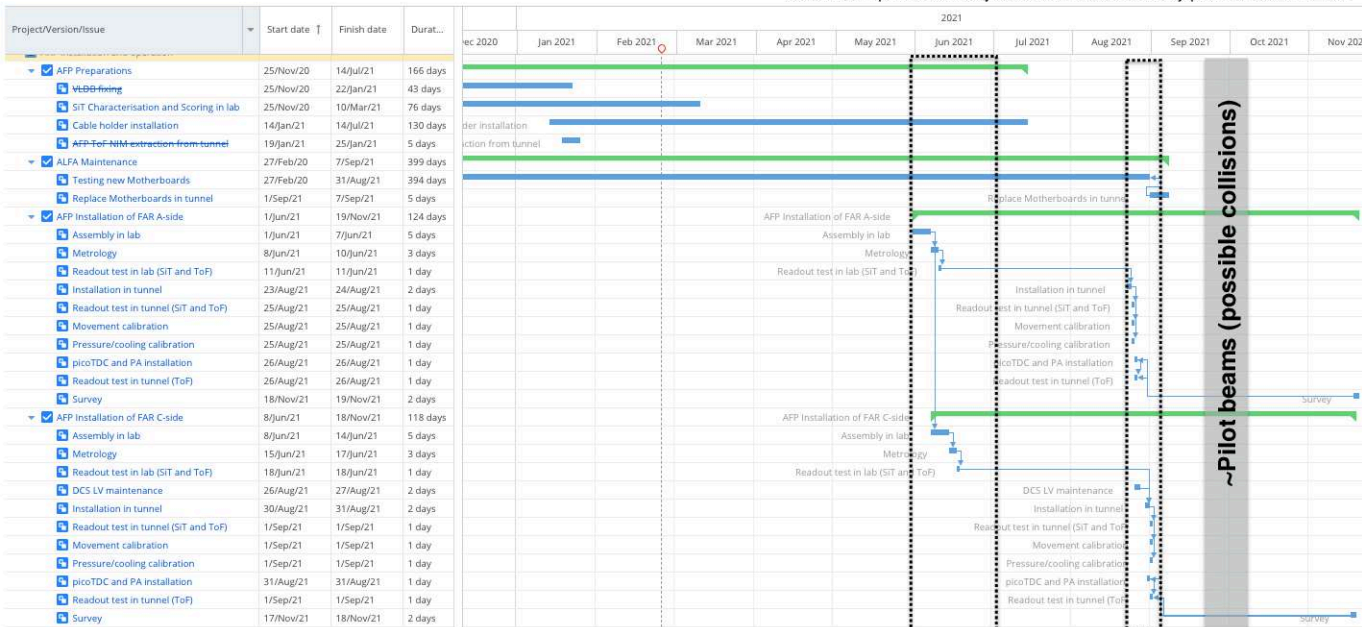
## AFP detector:

- NEAR stations installed just before COVID-19 lock-down (Mar. 2020) and fully functioning
- New AI foam filled heat exchangers arrived → expected some improvements in SiT cooling
- Total of 12 SiT new modules produced and tested
- Out-of-Vacuum: designed, approved by the LMC and produced for tests
- test beam in DESY (Sept. 2020) → tests of OoV solution, trigger module and new PMTs
- Installation of detector package in FAR Roman Pot stations (including ToF detectors) postponed to Summer 2021



# Installation plan

Schedule: [https://its.cern.ch/jira/secure/WBSGanttMain.jspa?filter=BOARD\\_622](https://its.cern.ch/jira/secure/WBSGanttMain.jspa?filter=BOARD_622)



- Preparations in surface to start assembly on June  
-> reduce as much as possible the time needed
- Possibility for installation before pilot beams:  
end August— beginning September
- Back-up: Anual Maintenance period

Preparations in surface      Possible slot for installation

~Pilot beams (possible collisions)

# Installation plan: tunnel intervention

Installation of FAR detectors inside Roman Pots in 10 days time, preparations in surface starting on June

(Assuming installation can be done during weeks 34-35)

## W34 (23 Aug) Installation in C-side

ToF NIM Crate will be brought to tunnel

Patch Panel to be re-cabled

Detector package to be inserted in Roman Pots

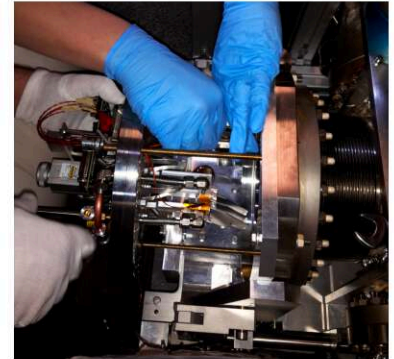
Cooling, Power, Sensors, local TDAQ, DCS, LED tests

## W35 (30 Aug) Installation in A-side

Same procedure as in C-side

Potentially each side could be installed and tested in one working day → 5 days each side should be safe

Note that this is dependent on the expert people-power available on-site!



Detector package insertion in Roman Pot (no ToF) in 2016

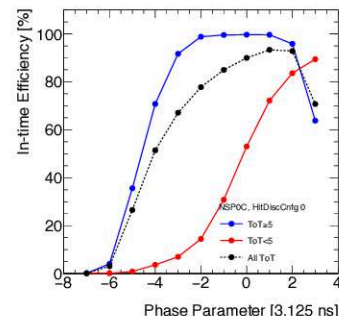
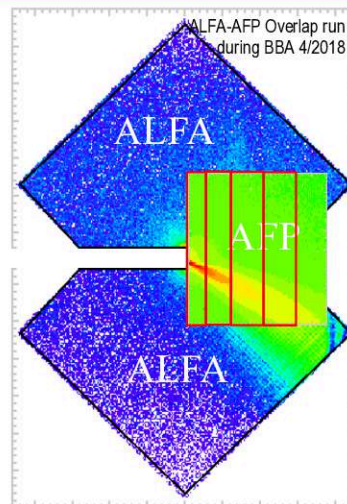
# Commissioning

## Before beams/insertion:

- AFP pressure and temperature calibration during YETS/after installation
- Survey for ALFA and AFP during annual maintenance/YETS (~1 week total)
- BIS Qualification during YETS

## With beam:

- Pilot beams in 2021: exercise detector readout with beam (but no insertion...)
- AFP and ALFA Beam Based alignment at first insertion with beam (2022)
- AFP Readout and trigger timing-in of SiT and ToF: need beam, not necessarily stable beams
- ALFA trigger timing-in



# Conclusions/Outlook

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## ALFA

- Turbines refurbished and installed
- Rad-damaged motherboards to be replaced, but functional

## AFP:

- NEAR stations installed on March 2020 and fully functioning
- Out-of-Vacuum: designed, approved by the LMC and produced for tests
- Installation of detector package in FAR Roman Pot stations (including ToF detectors) postponed to Summer 2021
  - Possibly before pilot beams, preparations in surface starting on June
- Activities in tunnel could be affected by travel restrictions

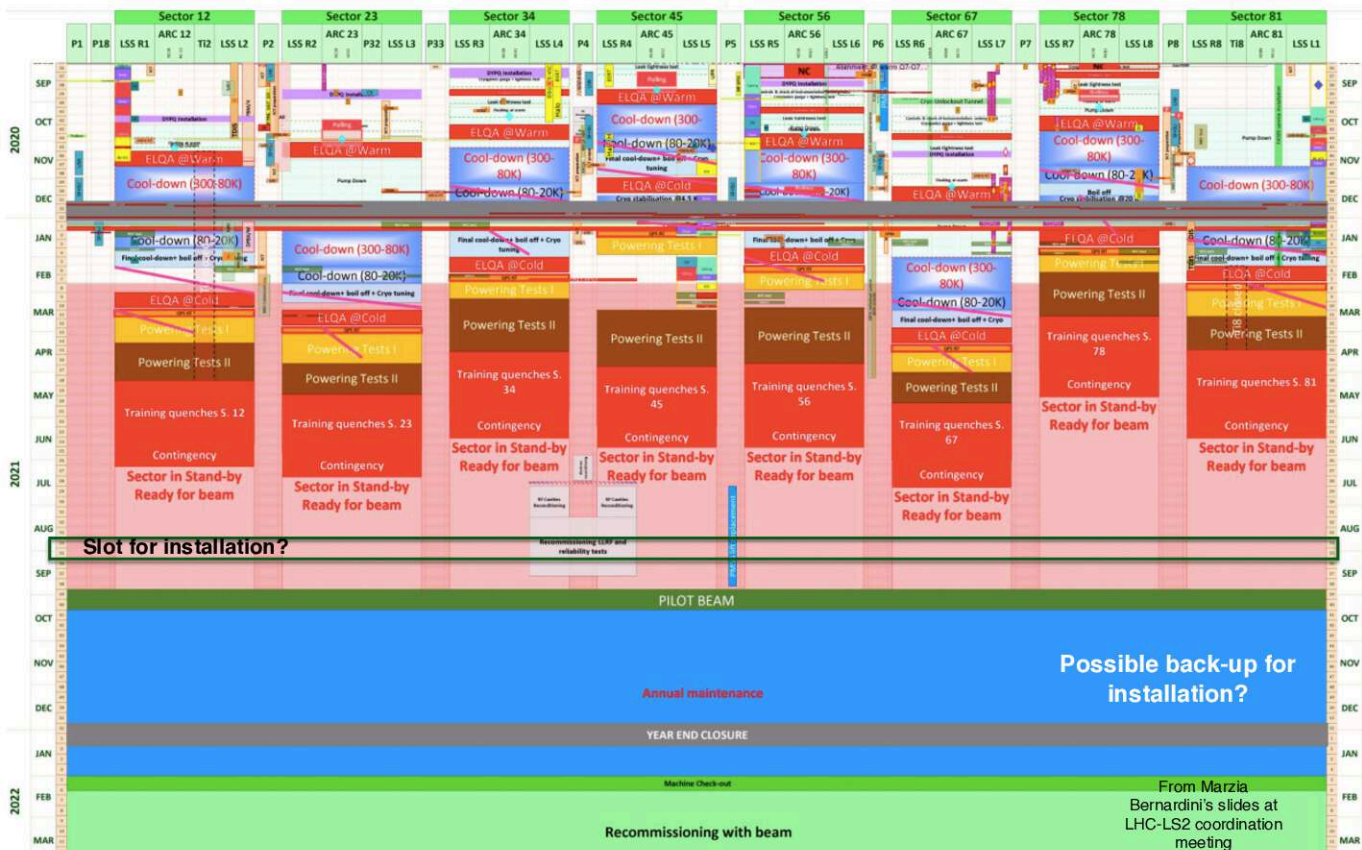
# Back-up

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# LHC-LS2C schedule

## Baseline V4.0 – Released



From Marzia Bernardini's slides at LHC-LS2 coordination meeting

# Installation plan: preparations in surface

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**Goal:** Assemble detectors in Roman Pot flanges and reduce access time

## W22 (1 Jun): Parts Ready at CERN

qualified flange, radiators, MCP-PMTs  
pre-tested electronics: PAA-b, CFD, TriggerModules, (picoTDCs),  
LTBs, Trigger Switches, Clock, LED Pulser  
pre-tested (re-wired) NIM-Bins  
prepare tools, test equipment, sensors, and all mechanical parts,  
glue, grease, tubing, ...

## W23-24 (7 Jun): SiT Assembly

SiT Assembly, Height Calibration, Local single-plane Readout test w  
source (2 packages)

## W25-26 (21 Jun): ToF Assembly

ToF Assembly, Height Calibration, HV test, Local Readout w noise &  
LED pulser (2 packages)

## W27-28 (5 Jul) ToF Crate:

ToF Crate assembly and testing: PAb, CFD, TriggerModule, Trigger  
Switches, picoTDC, Clock, LED Pulser