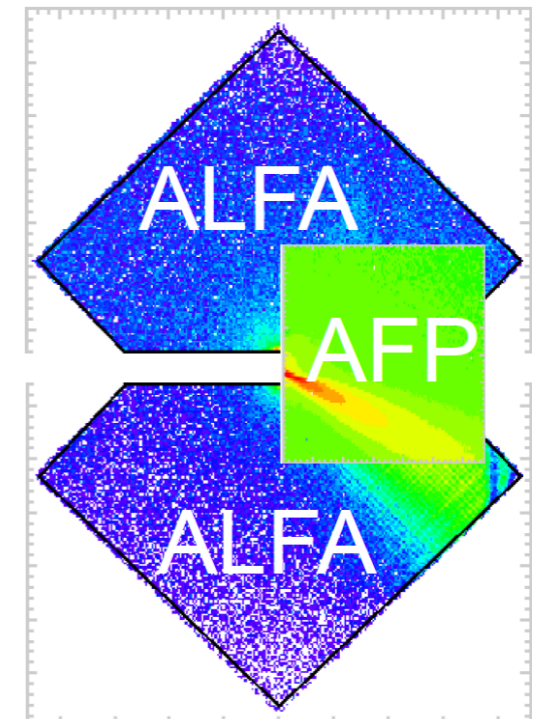
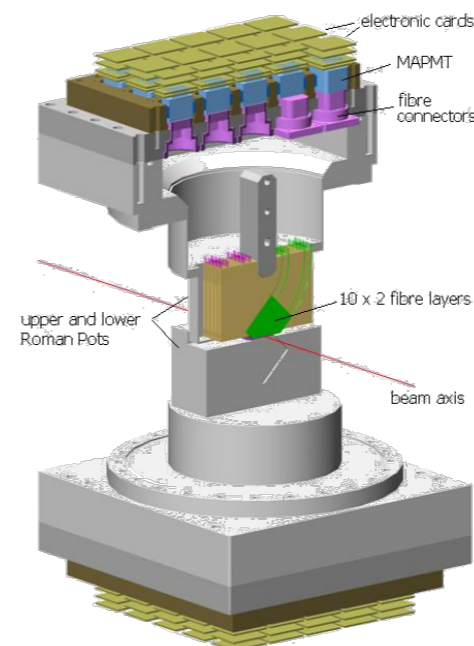


Status update on change in ARP during LS2

Ivan López Paz
 LHC MPP Meeting
 6th November 2020



Current Detector Status

ALFA detector FAR station MBs pending replacement

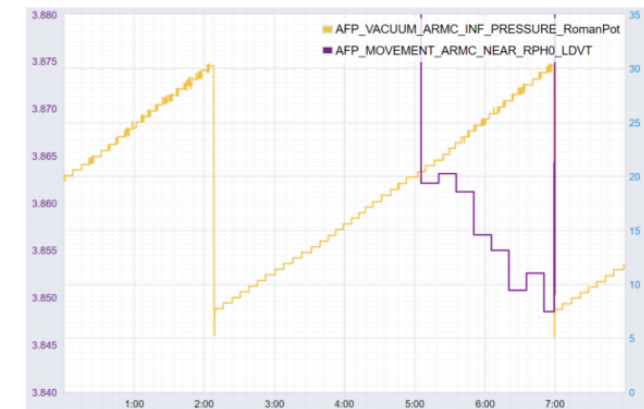
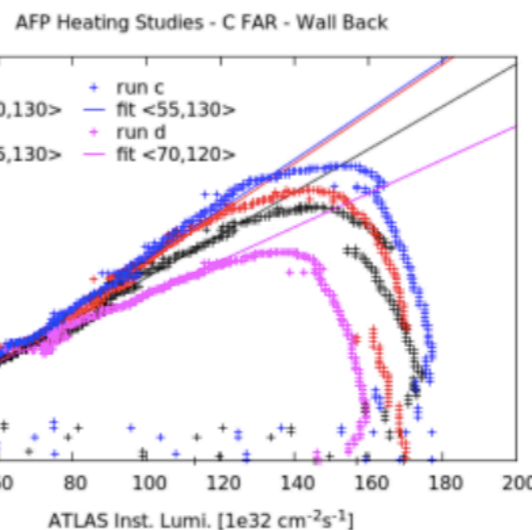
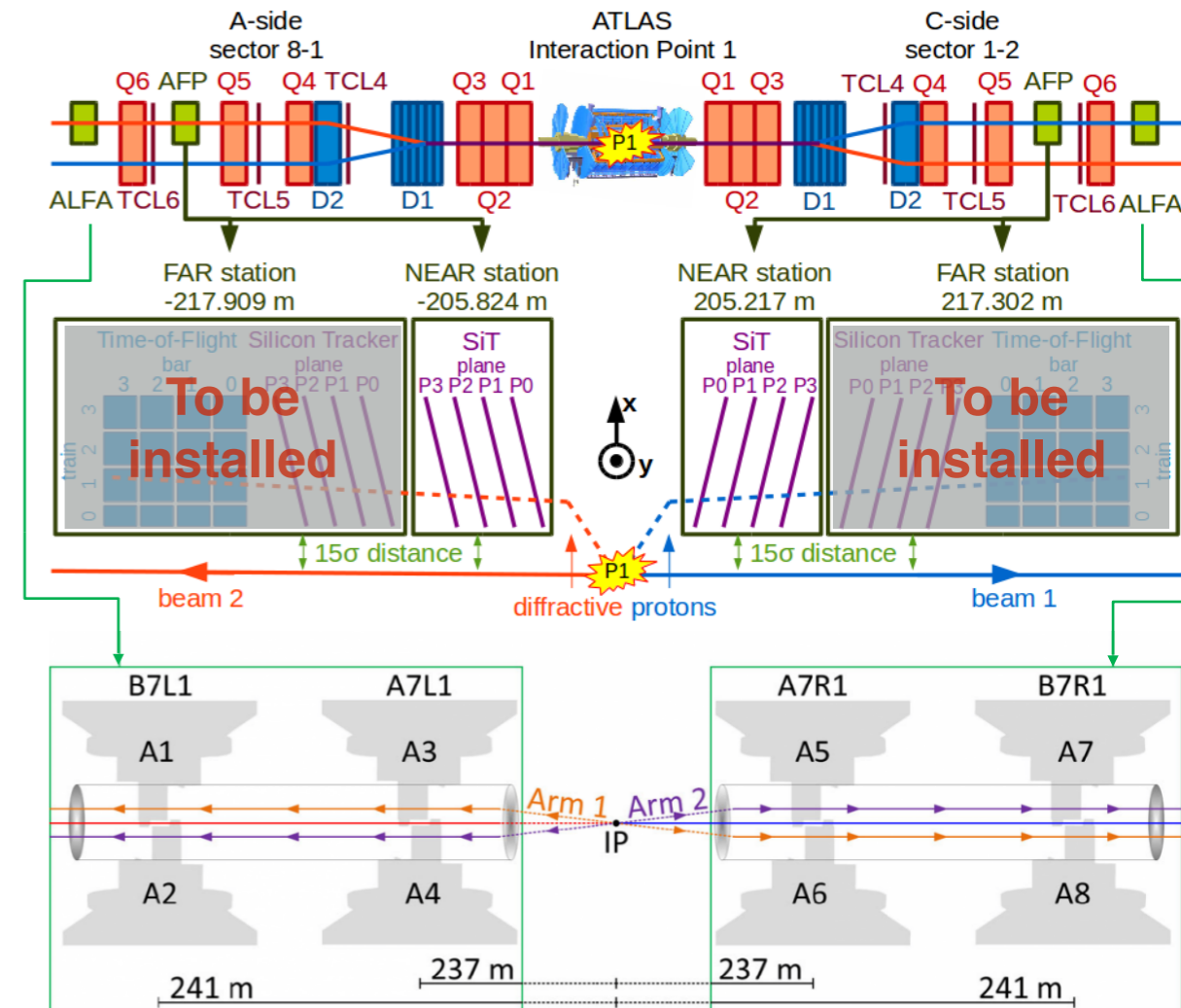
- Otherwise fully operational

AFP Near Roman Pots in both sides are populated with detectors:

- Detectors of Far stations planned to be installed next year: Jan21 (unlikely), fallback in ~Jul21

Issues covered:

- Station not reaching home position when self-retracting in very few occasions
- Spikes observed on LVDTs (reminder)
- Concern of Roman Pots heating at larger intensities (Run3)



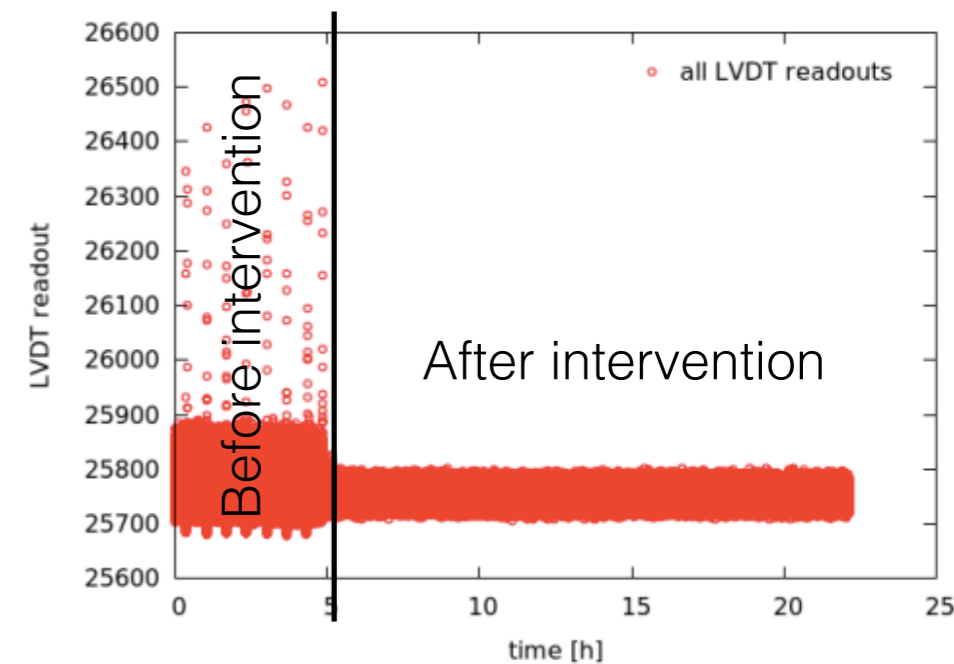
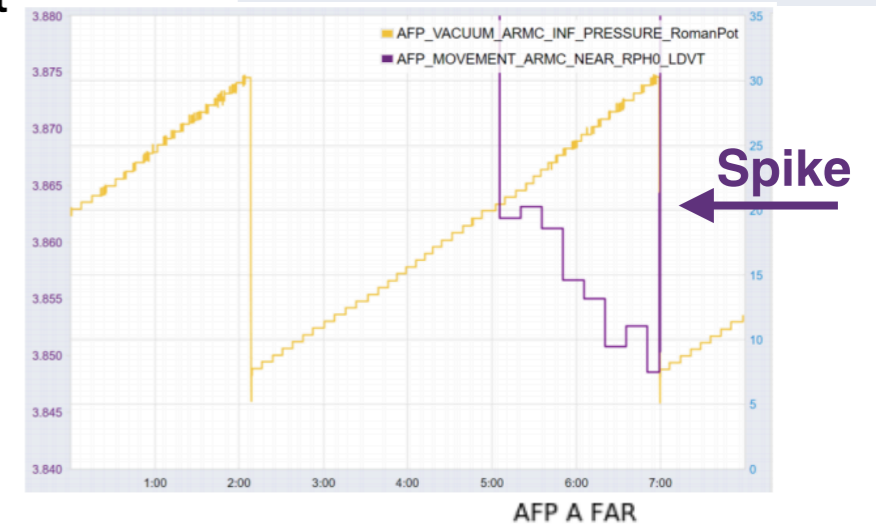
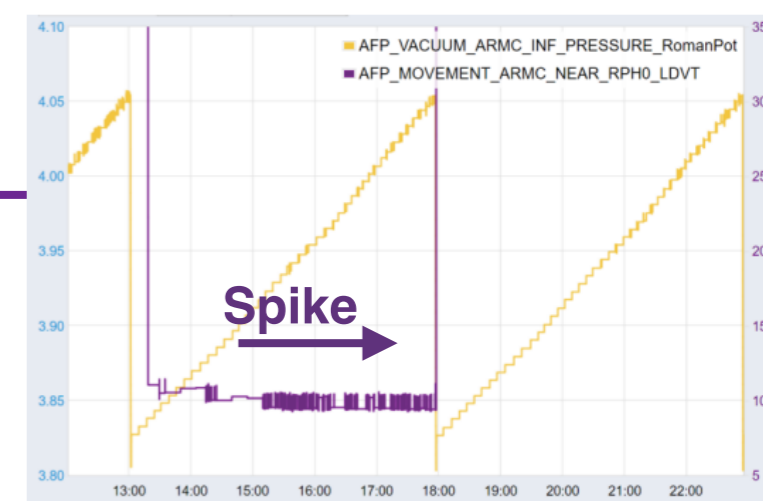
Roman Pot Movement

Transition from PXI/FESA to FESA:

- Hardware: crate and controller upgraded
- Software: not done due to issues with linux driver support with PXI, decision to keep as it is. No change in DCS

(Reminder) LVDT spikes causing self-extraction of pots in few occasions:

- Found to be correlated with vacuum cycle (vacuum switching off) → Crosstalk in common cable
- **Solution (2018):**
 - Using a separate cable for LVDT readout from vacuum signal cable
 - Already existing cable from patch panel to USA15
 - Intervention fixed the issue
- ALFA does not have an existing cable to separate the LVDT readout
 - Decision to keep the vacuum pumps on at all times during special runs.



AFP is safe for insertion!

Self-retraction

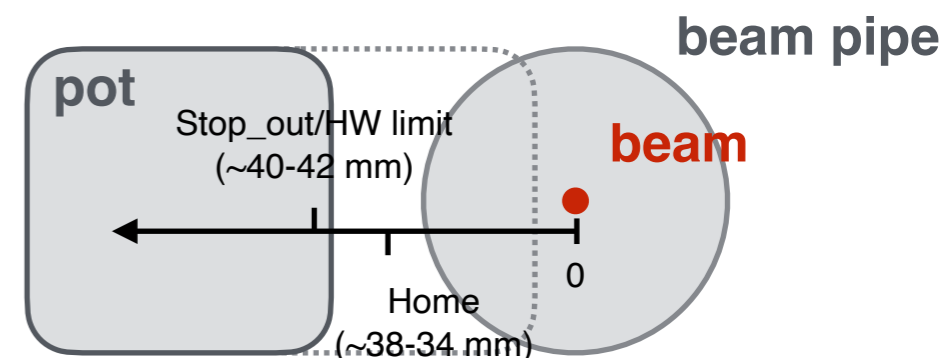
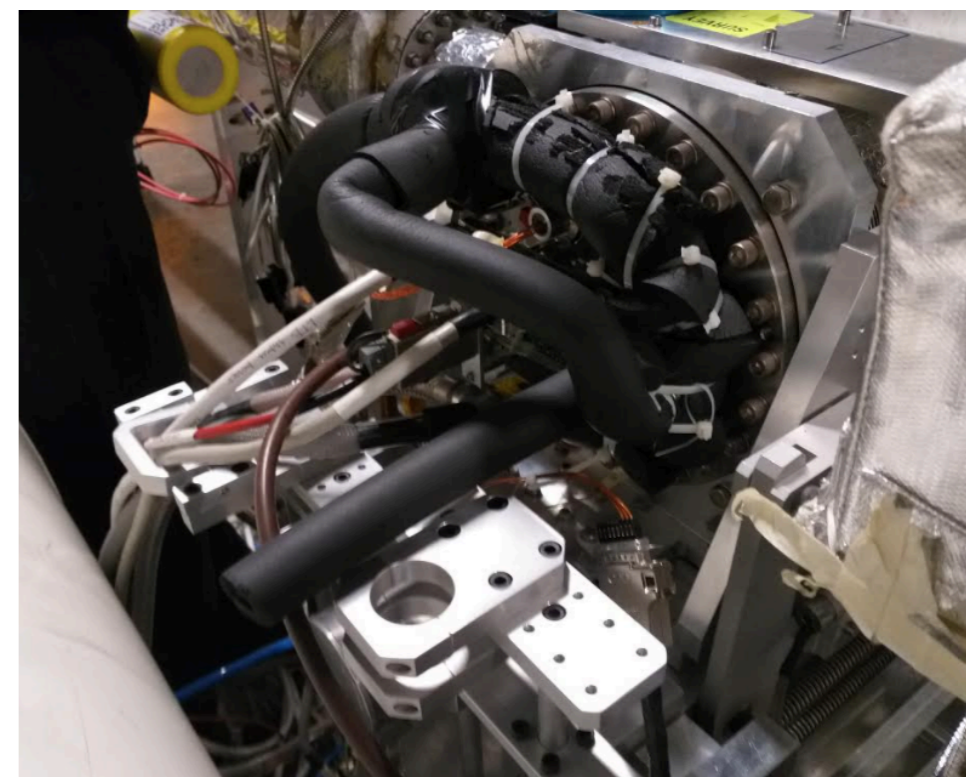
AFP C-Near Pot NOT reaching HOME position when self-retracting in some instances

1) Installed soft springs to aid the retraction:

- Removed them for a new solution

2) Installed Cable Holder to relieve stress from the weight of the cables

- So far only one available and installed in C-Near
- Preliminary self-retraction tests in the tunnel after holder installation:
 - On retraction, Pot reaches hardware limit closer than a populated pot without cable holder (A-Near)
- Final test when FAR stations are fully populated, as they also contain ToF detectors



Promising, but final test will be done with ToF detectors installed

A-Near		LVDT position	C-Near		LVDT
Stop_out		40.644 mm	Stop_out		42.392 mm
Home (approx)		34.613 mm	Home (approx)		38.253 mm
Before extraction	After Extraction		Before extraction	After Extraction	
LVDT pos	LVDT pos		LVDT pos	LVDT pos	
35,803 mm	40,049 mm		37,577 mm	42.475 mm	
1,736 mm	40,055 mm		3,695 mm	42.344 mm	
Detectors, no cable holder			Detectors, with cable holder		

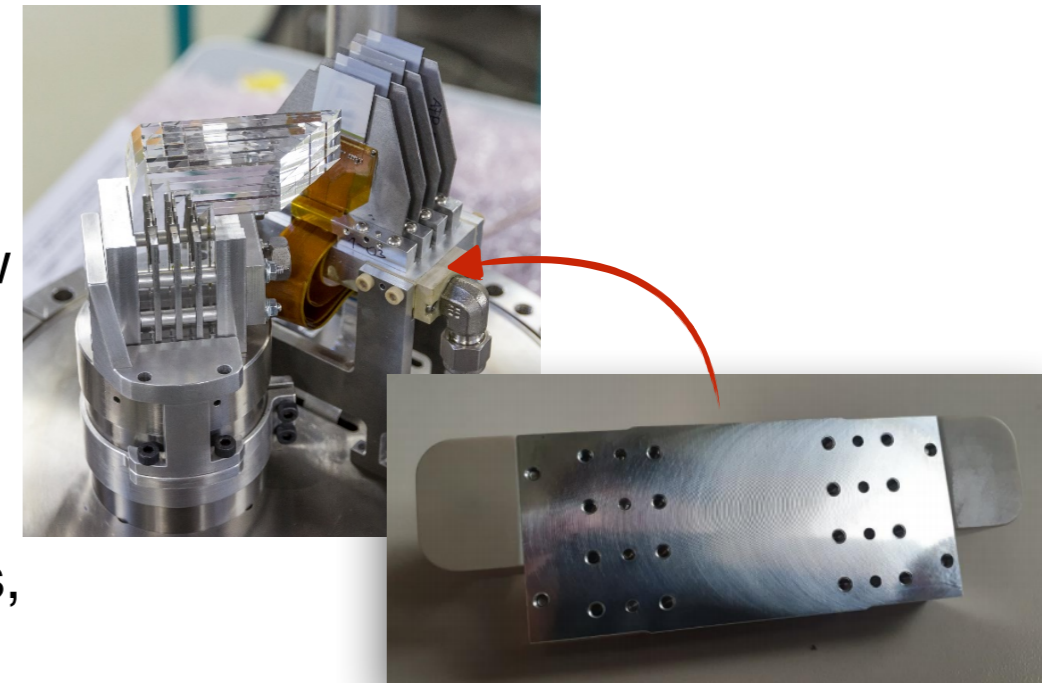
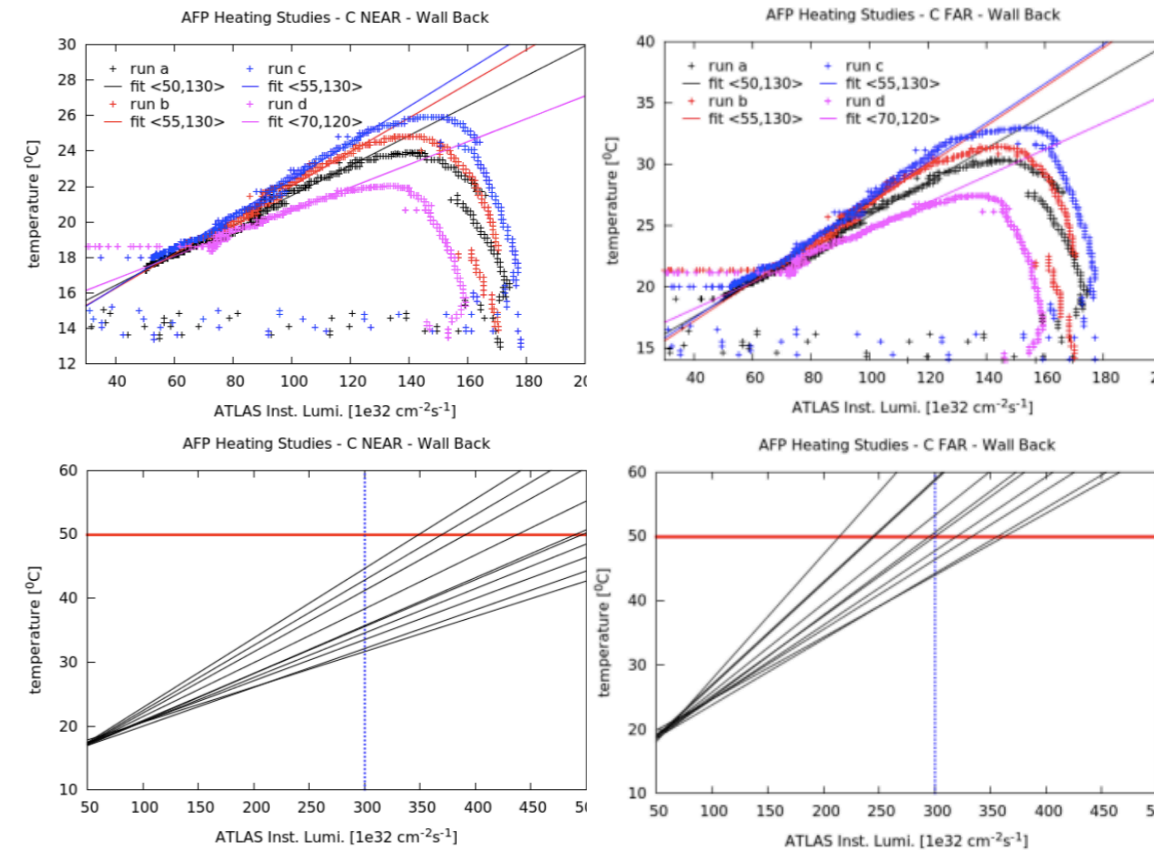
Pot Heating

Temperature increase in detectors during Run 3 expected:

- Since roman pot temperature increases with ATLAS inst. lumi
- Based on extrapolations, we expect temp.'s of up to ~ 50 °C in AFP FAR stations
- Mock-up set-up prepared in laboratory for heating studies

Solution(s):

- Heat exchangers (HEX) for SiT detectors replaced with new Al-foam-filled HEX in FAR stations
 - More efficient cooling, expect 20% improvement
 - Not clear how much would affect to RP thin window temperature
- Cu+NEG coating during EYETS?
- In case of very high temperatures observed regardless, pot could be slightly extracted to reduce the effect



AFP Installation Schedule

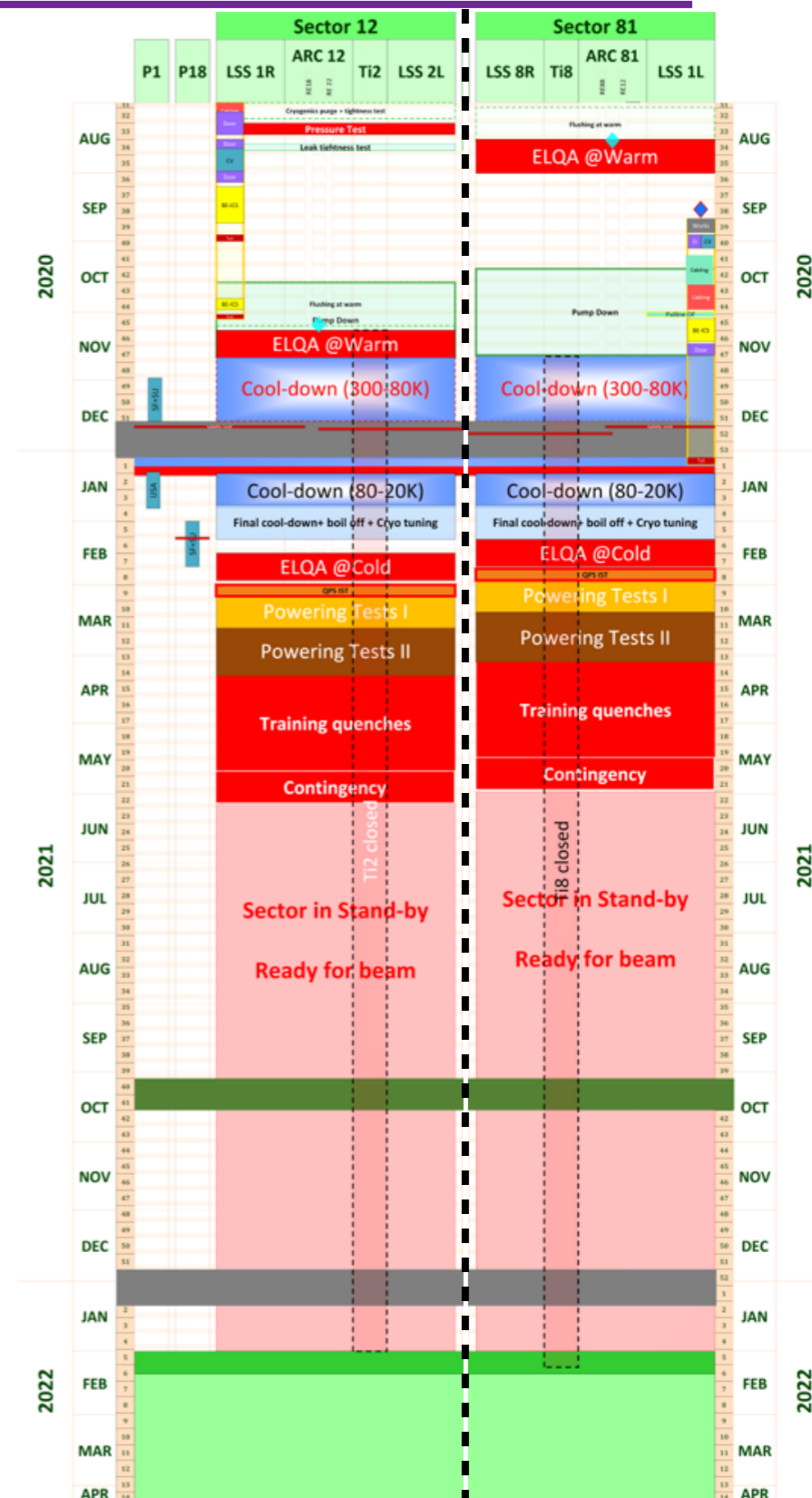
FAR station detector installation:

- Baseline date for installation: January 2021
 - Some off detector electronics will not arrive on time, but can be installed later
 - Due to covid-19, essential people-power on-site is not ensured!
- Fallback solution for installation: ~July 2021

Survey (~2 weeks):

- To be done after full installation
- Require presence of: AFP expert, ALFA expert, LHC survey team and Xavier Pons

NEW V 3.1 - INWORK



Special runs

Det. commissioning runs	Beam?	Comments
Validation of BIS	no	After full installation, in garage position/holiday mode
Pilot run in Fall21	yes	Even if no collisions. BIS validation before
Timing-in AFP SiT R/O	yes (single bunch)	
Timing-in AFP ToF R/O	tbd with ToF experts	
Timing-in AFP Triggers	yes (single bunch)	
Beam-Based Alignment (AFP)	yes (high- β^*)	detectors inserted, before first data taking
Timing-in ALFA R/O+Trigger	yes	may need to partially insert
Beam-Based Alignment (ALFA)	yes (high- β^*)	detectors inserted, before first data taking
Loss Maps	yes	by CCC

Physics runs:

- **ALFA:** request special run with $\beta^* > 3$ km if $\sqrt{s} > 13$ TeV
 - preferably asap due to risk of radiation damage
- **AFP:** request special low- μ run by beam separation during ramp-up
 - Also participate in regular runs

Optics being discussed with collimation group

Summary

AFP Roman Pot movement

- AFP HW upgrade of PXI movement; ALFA remains the same
- LVDT spike issues that caused RP self-extraction and beam dump fixed.

AFP Cable holders:

- Prototype installed in C-Near Roman Pot to improve reaching HOME position after self-retraction
- Preliminary tests show promising results, final tests to be done once full detector is installed

Roman Pot heating:

- Expect ~ 50 °C in Pot from extrapolations:
 - Improved cooling for detectors in FAR stations with new HEX, not clear the final effect on pot temperature...

Installation schedule:

- Planned for early next year (Jan21) with back-up in \sim Jul21
 - People-power may be limited due to travel restrictions...

Back-up
