

ATLAS Forward Proton

Tentative List of TS2 Interventions

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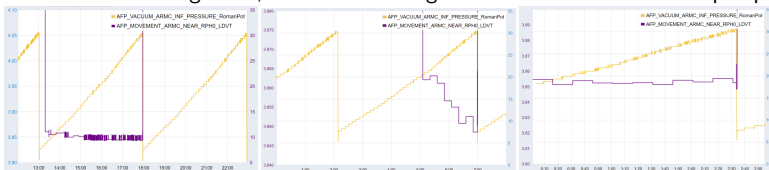


MPP Meeting

CERN, 31st August 2018

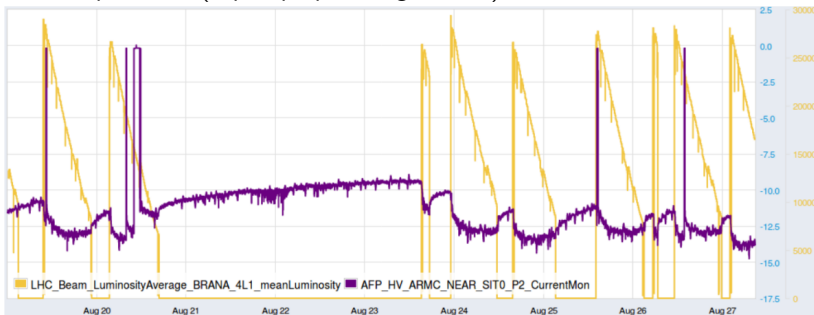
- 1 Investigate the cause of C NEAR self-extraction – minor intervention.
- 2 Investigate the cause of C NEAR high voltage trips – minor intervention.
- 3 Adjust the cooling system (pressure increase) – minor intervention.
- 4 (TBC – ATLAS review at Sep. 13th) Install ToF detector in FAR stations – major intervention.

- We observed that C NEAR suddenly got extracted during the run. Up to now this happened 5 times: 1/05, 1/06, 2/06, 19/07 and 8/08.
- Initially, we thought that this is due to the LVDT glitch → LVDT was changed during TS1.
- After further investigations, we found a strong correlation with the vacuum pump:



- Rather NOT electrical glitch:
 - power circuit of the vacuum pump belongs to the LHC tunnel while the control circuit belongs to ATLAS → two independent network,
 - it happens only in C NEAR, whereas C FAR is not affected.
- Hypothesis: (weak?) mechanical shock-wave caused by the on/off valve transmitted to LVDT.
- To be investigated during TS2 (X. Pons).
- Since this correlation is of rather strange nature and of low frequency, it is not guaranteed that it will be successfully solved during TS2.
- **Question to MPP: can we have a procedure which allows re-insertion during the fill?**
- Up to now, once station is extracted it remains in garage until the end of the fill (= data not useful for most of the two-proton high- μ analyses).

- Keeping adequate high voltage is needed in order to assure high efficiency of silicon detectors.
- Recently, we observed intensification of HV trips in the C NEAR station, see example below (trip = purple line goes to 0):



- There may be several causes: radiation damage, SEU, broken connectors, ...
- During TS2 we will inspect if there are no problems with connections on the outer side of the flange.
- Detector package will not be dismantled → no need to re-align.

- High Voltage leakage current increases with the radiation damage.
- It also depends on the temperature, *i.e.* doubles every 8°C .
- LHC produces significant amount of heat during the fills.
- In order to keep HV on the adequately high level (*i.e.* assure high efficiency), we have to gradually increase the pressure (=lower the temperature) in our cooling system.
- Such adjustment was done during TS1. Now we have to go further down (to maximum).
- Requires visit in the tunnel (manual valve).

Note: it is not yet officially decided that ToF will be installed during TS2. We will have an internal (ATLAS) review on Sept.13th. Tasks listed below apply only if the decision will be positive.

- Installation:
 - new detector packages (1 day / side),
 - ToF crate (0.5 day / side; can be done in parallel with detector installation),
 - Tests of ToF system (connections, readout, etc.; min. 1 day).
- Commissioning:
 - BBA:
 - we do not plan to (significantly) touch the NEAR stations; the exception is if we conclude that fixing the problem of self-extraction of C NEAR requires that → in principle there is no need for new BBA,
 - however, an additional BBA of NEAR stations is quite fast (additional 10-15 min. / station) once conditions for alignment of FAR stations are set → may be worth cross-checking (it can be done in shadow of other activities (TOTEM alignment(?))).
 - loss maps.
- Please note that if ToF is installed, TCL6 will have to be closed to reduce the radiation (dose) in ALFA.