

PS Report W21 – “Beam Commissioning”



Many thanks to: Fernando, Marc, Patrick, Mike, Antoine, Thierry, Pieter, Alvaro, Didier, Thibaut, Denis, Frank, Raul, Vincent, Fabrice, Abdel, Oliver, Stephane, Jeroen, James, Yves, Fulvio, Quentin, Gilles, Jean-Marc, Todor, Carlo, Heiko, Alexander, Alexandre, Matthew, Ana, Olivier, Dominique, Anthony, Hannes, Ben, Bettina, Klaus, Gil, Benoit, Ewen, Gerd, Tom, Anti, ...

Beam commissioning (2021 week 21)

21

24

25

26

27

28

29

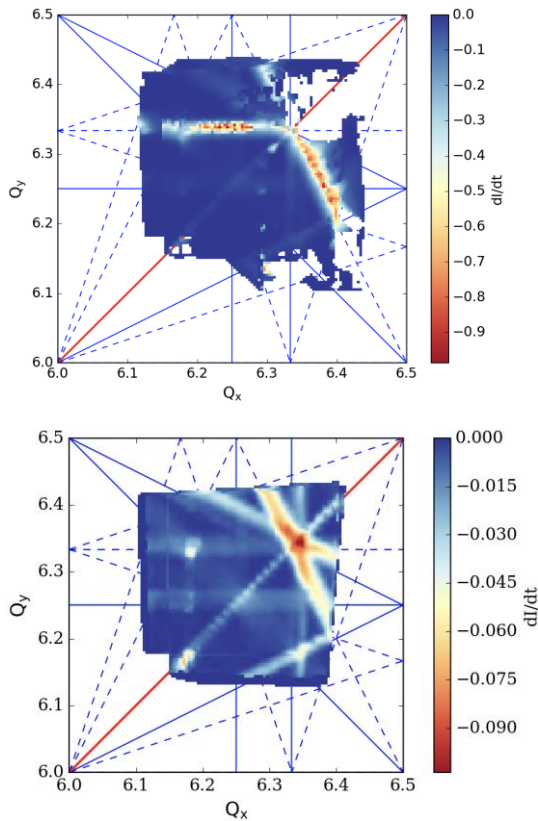
30

Whit Monday

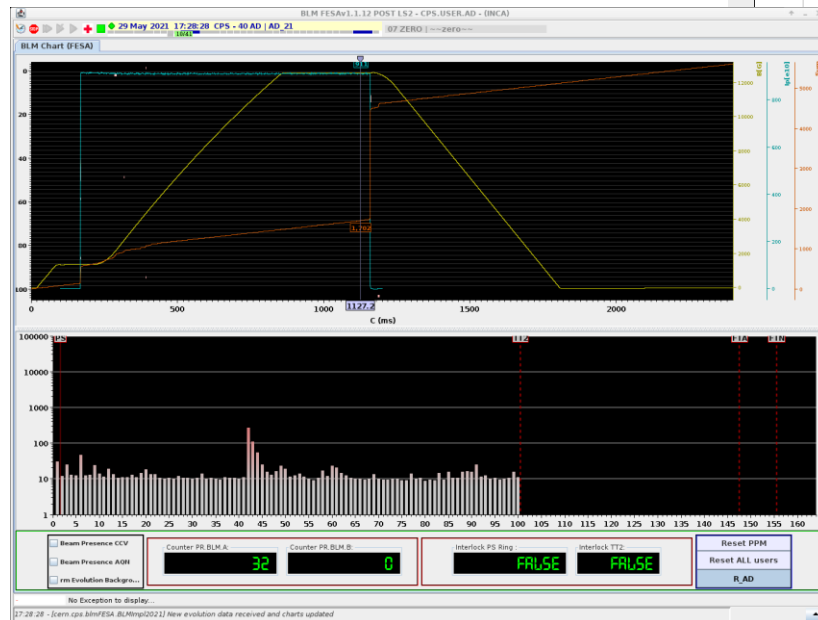
Access

Tuning of LHC25ns

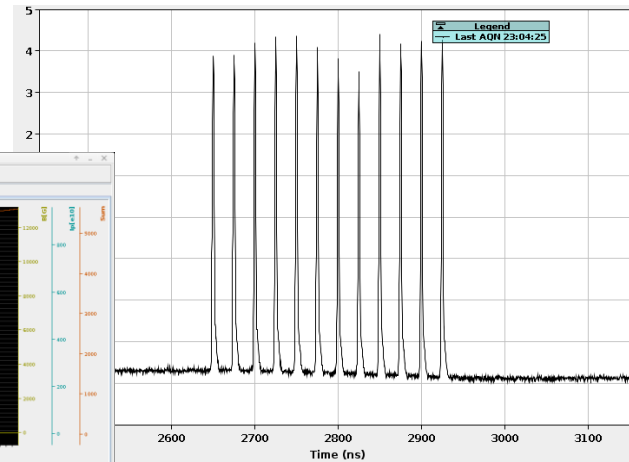
Loss maps with and without magnets of BGI82 and BGI84 with and without compensation
AD setting-up continue



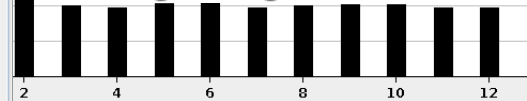
AD Beam around 1e13



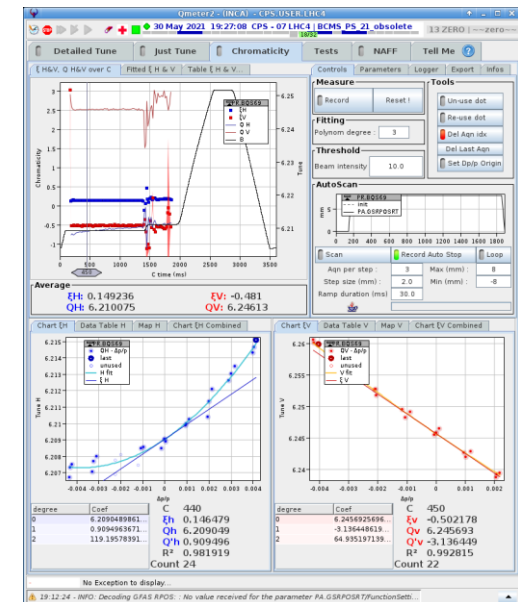
12 bunches LHC25ns for SPS



Average Length: 4.08ns



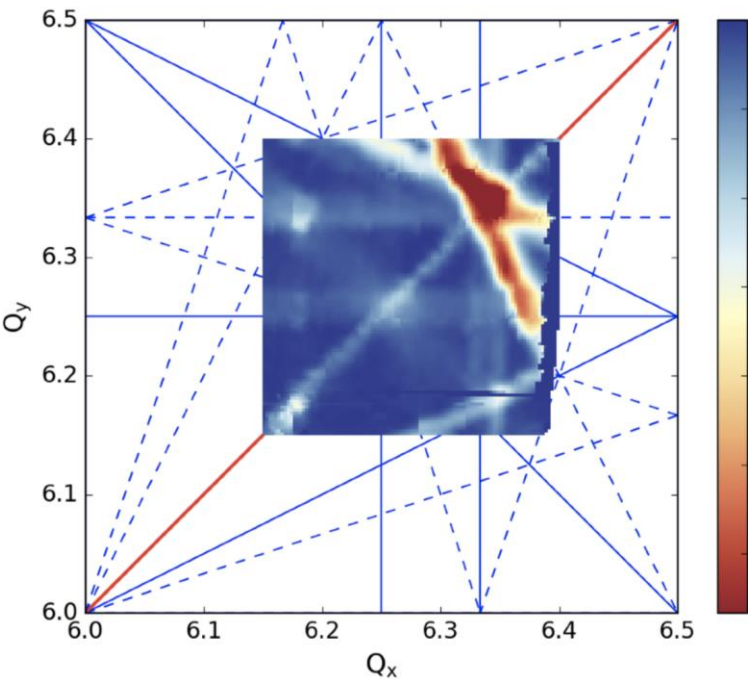
LHC25ns version with low chroma



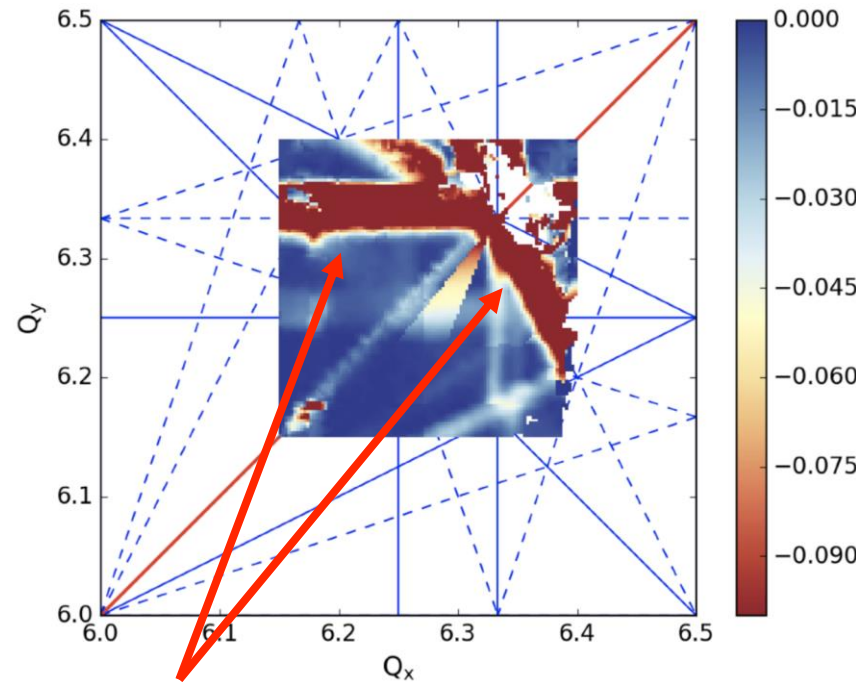
Results of Loss maps

- Loss map studies started to compare resonance excitation to before LS2
- Investigating impact of horizontal and vertical BGI magnets on the resonance excitation
- Vertical BGI84 magnet confirmed to excite skew sextupole resonances $3Q_y=19$ and $2Q_x+Q_y=19$
- Horizontal BGI82 magnet confirmed to excite sextupole resonance $Q_x+2Q_y=19$

Bare machine

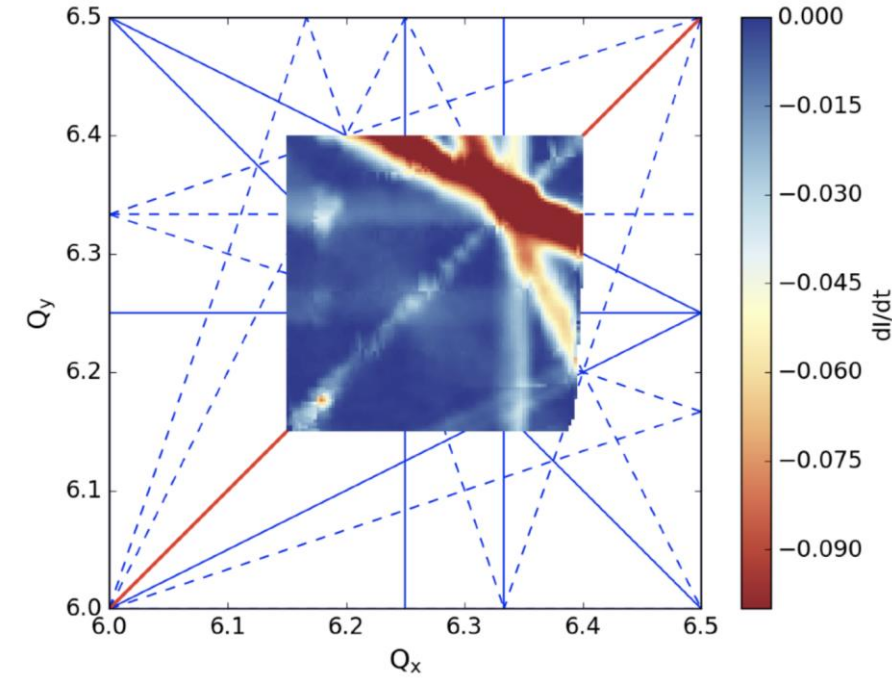


Vertical BGI84 ON



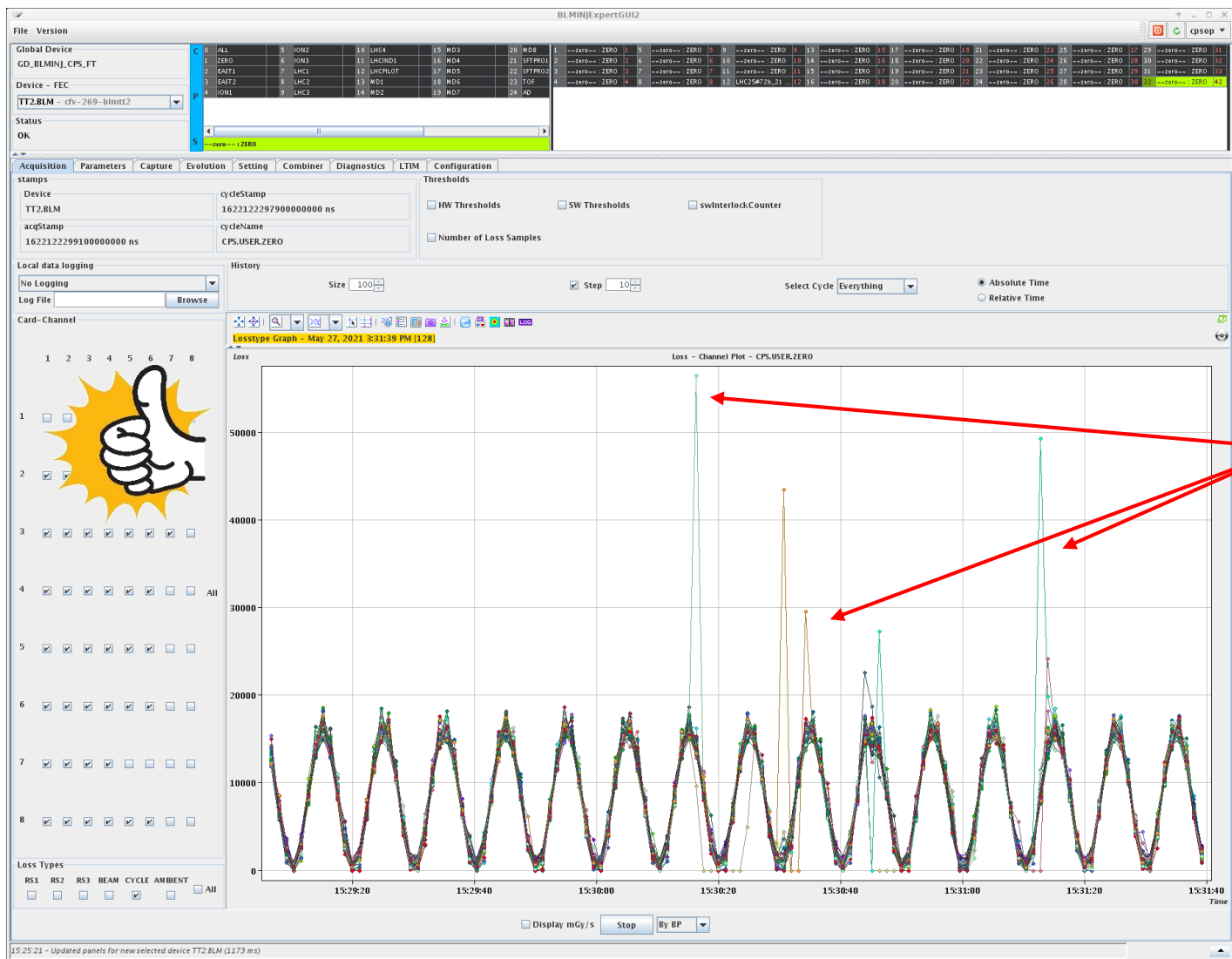
Beam almost completely lost

Horizontal BGI82 ON



A.Huschauer – B.Salvant – S.Joly

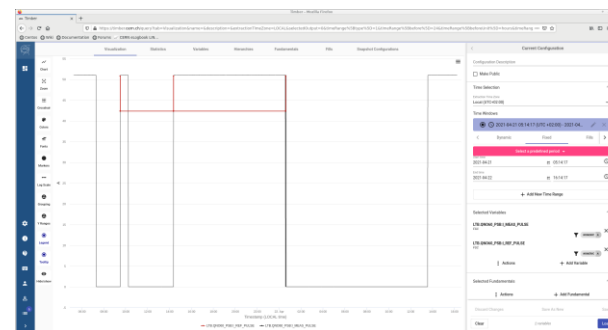
TT2 BLM - test on noise sources during access on Thursday.



- Switching OFF all power converter in TT2 line doesn't help to reduce the noise.
- Switching OFF different lines in PS-SWY :

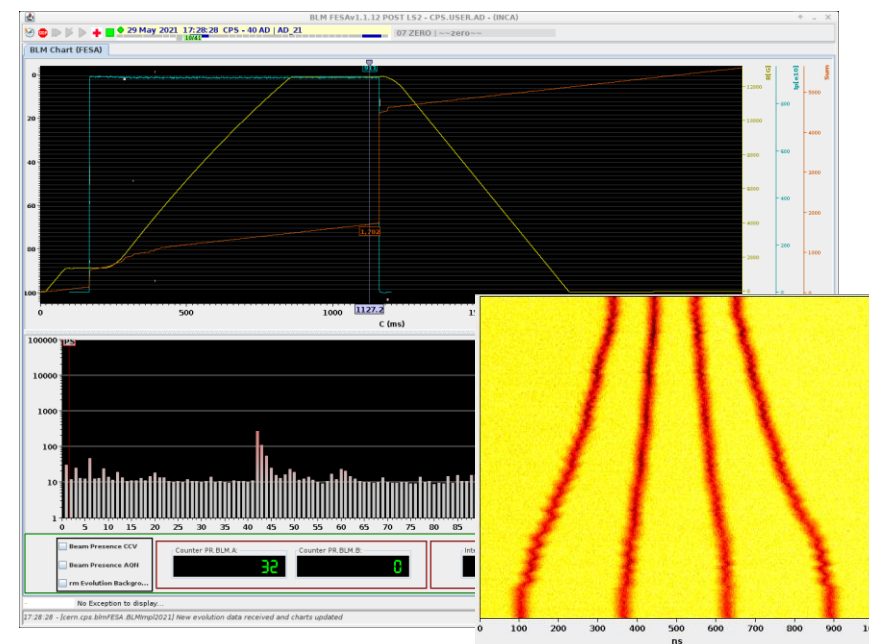
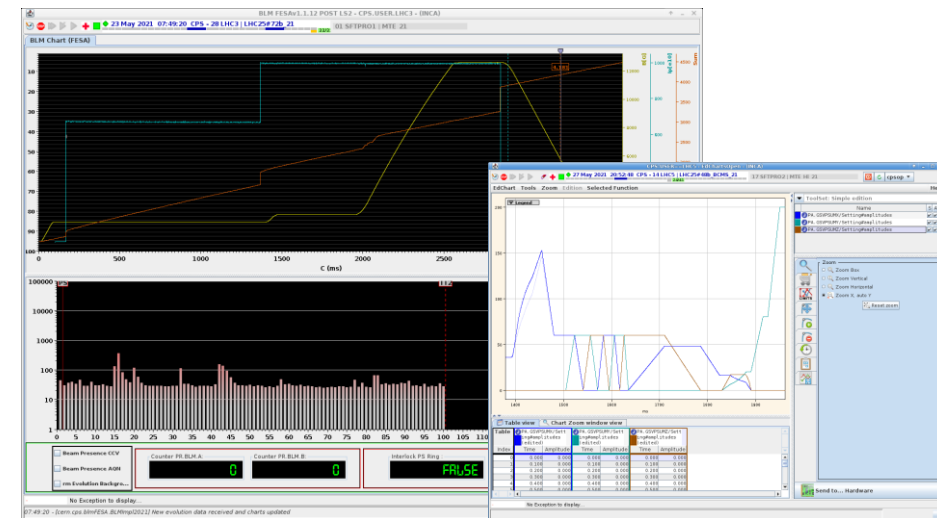
→ Found a correlation with LTB.QNO40 and LTB.QNO60

→ Also correlated with noise reduction during TS1 (22/04/2021 at 00h40)



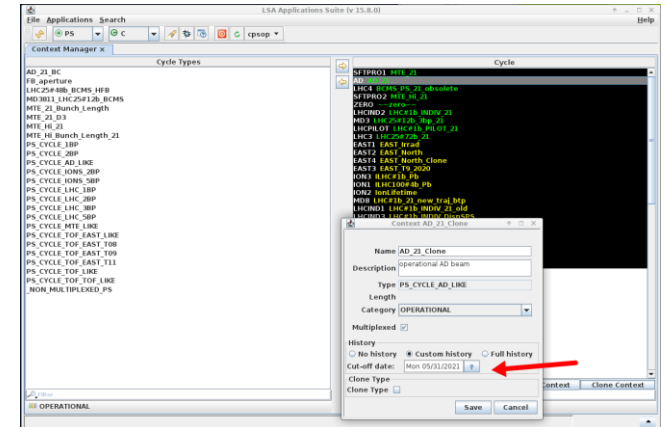
Further optimization and beam preparation

- LHC Multi-bunches
 - Constant bucket area from injection2 to C1435 (3.3Gev/c)
 - Emittance measurements to be done
- AD
 - PSB-PS transfer for AD user in PSB
 - Acceleration and batch compression
 - RF works needed in order to optimize injection and transition crossing.
 - Extraction to be optimized



Following some control issues :

- By default, custom history time is now set to “current day” when cloning LSA Cycle.
 - We experienced some problem cloning LSA cycle with too long settings history.



- Some inconsistent settings when trimming ejection timing:

- <https://issues.cern.ch/browse/APS-8964>

the trim was not persistent in LSA db (meaning no trim history)

the drive on the 34 Hw parameters supporting transactions was rollbacked, meaning those parameters are still having the value from before the request.

for the non-transactional parameters, the values are not rollbacked.

As a result, PEX.MC-CTML/ControlValue has the new (830) value since it was accepted by hardware, while PE.KFA13/BatchSettings still holds the old one (since hardware rejected the new value).-> Trim history not

updated.

Accelerator Fault Tracking (AFT)

Availability

96.5%

Blocking Faults

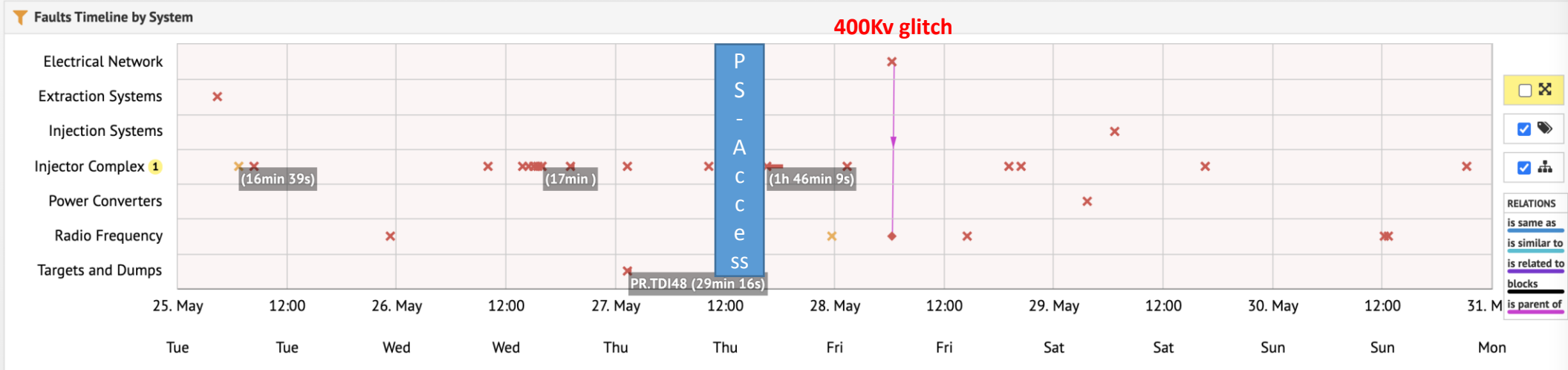
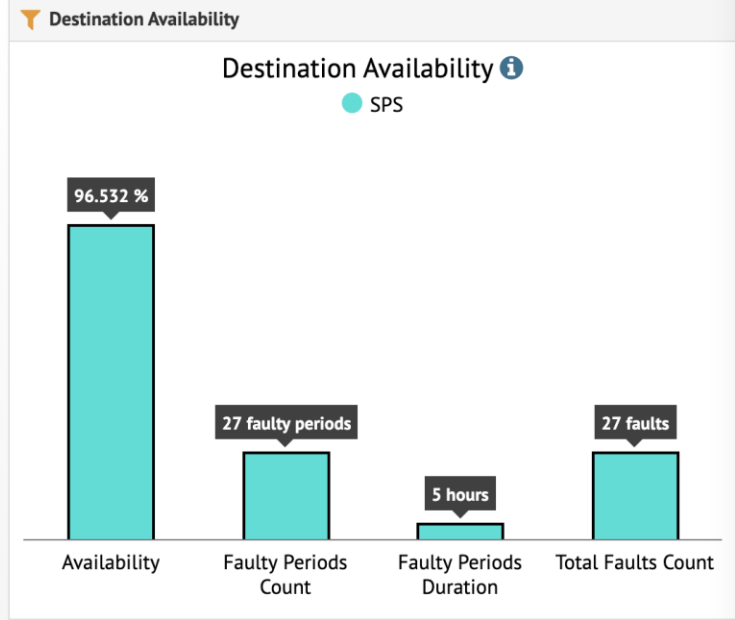
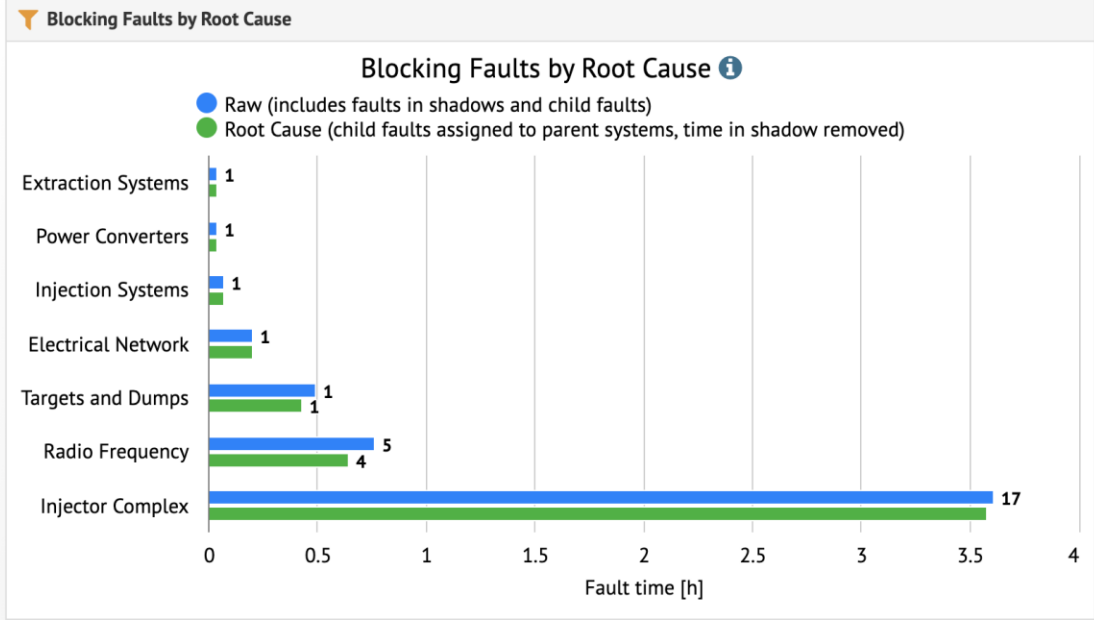
27

Total Faults

29

Fault Duration (overlap excluded)

5.5h



Summary of operational beams

Fixed target beams	Status	Comment
SFTPRO (core only)	Operational	Delivered to SPS at $\sim 6...7 \cdot 10^{11}$ p/p
SFTPRO (5 turn extraction)	Intensity increase	2-5 10^{12} p/p delivered to SPS at $4.5 \cdot 10^{12}$ p/p
AD	Setup	Acceleration + batch compression basics
TOF	Setup	First basics
LHC-type beams	Status	Comment
LHCPROBE, LHCINDIV	Operational	
LHC25 (72b)	Operational	Polished up to $1.3 \cdot 10^{11}$ p/b ϵ_h (arrival flat-top) \approx 1.8 mm mrad ϵ_v (end flat-bottom) \approx 1.6 mm mrad
LHC25 (12b or 24b)	Temporary	3 bp cycle delivered to SPS
LHC25 BCMS (48b)	Operational	Polished up to $1.3 \cdot 10^{11}$ p/b

Priorities for this week

- **Repair C20-92 during today's access**
- **Polishing and intensity increase of SFTPRO**
 - Quantify **benefit of longer bunches** from PSB
 - **Reduce losses** along the cycle
 - **Check** the effect of DFAs on beam (timings for 5 turns)
- **Delivery of 25 ns beam to SPS**
 - **Transverse emittance measurements** with constant bucket area and low chroma settings
- **Continue the setting-up of AD beam.**
 - Intentional mismatch versus larger longitudinal emittance from PSB
 - Fine tuning of transition.
- **Wire scanner control to be improved**
 - **Careful checks** (gates, offset of first bunch, saturation)

Questions and Comments

PS Supervisor of the week 22 – **Frank Tecker**



8:45 Daily Zoom meeting during beam commissioning

Web address: <https://cern.zoom.us/j/9372114100?pwd=L29BcmIHUENCdFBRSyYVcrM1B4Zz09>

Meeting ID : 937 211 4100

Passcode: 525463