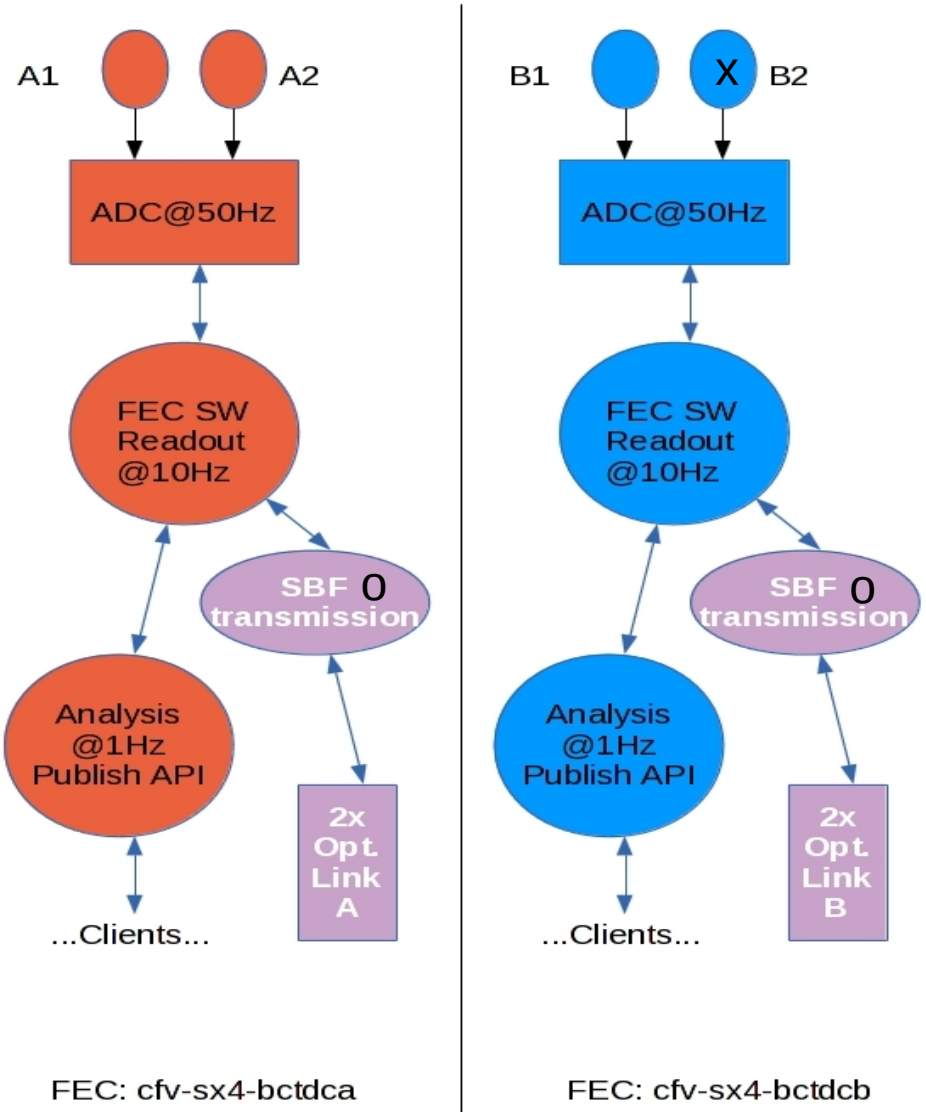
DCBCT and SetupBeamFlag

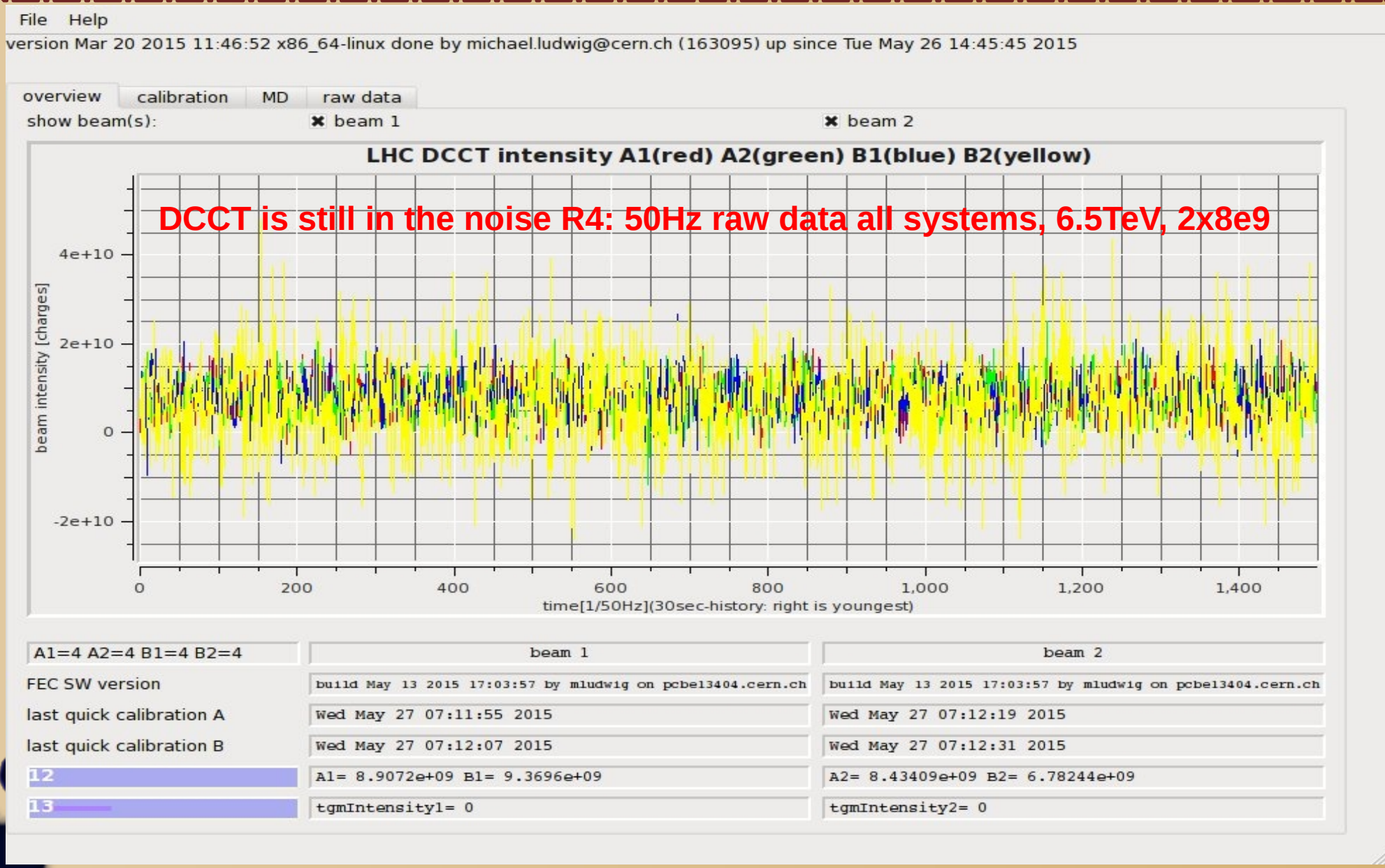
- SMP intensity from DCCT: flowchart
- Situation run1, changes for run2
- Logic change: avg window W=W(E)
- Will it cure “SBF flickering”?
  - Noise levels
  - Flexibility
- Conclusion

SMP intensity from DCCT: flowchart



- System A and B in 2 FECs
- each FEC for both beams
- 50Hz: fundamental readout
- 10Hz: SBF transmission
- SBF logic is independent from other clients
  - “x” indicates the problem
  - “o” indicates it's mitigation

SMP intensity from DCCT: flowchart



Situation run1, changes run2

Run1: SBF transmission averaging window W=1s
Permitted to reduce noise
SBF reacts a bit slower

Run2 changes: SBF initial averaging W=0.1s
Increased to W=1s for all

Observed SBF flickering for system B2

Now: increase W at beginning of the ramp:

W=1s
If (energy > 500GeV) W=16s

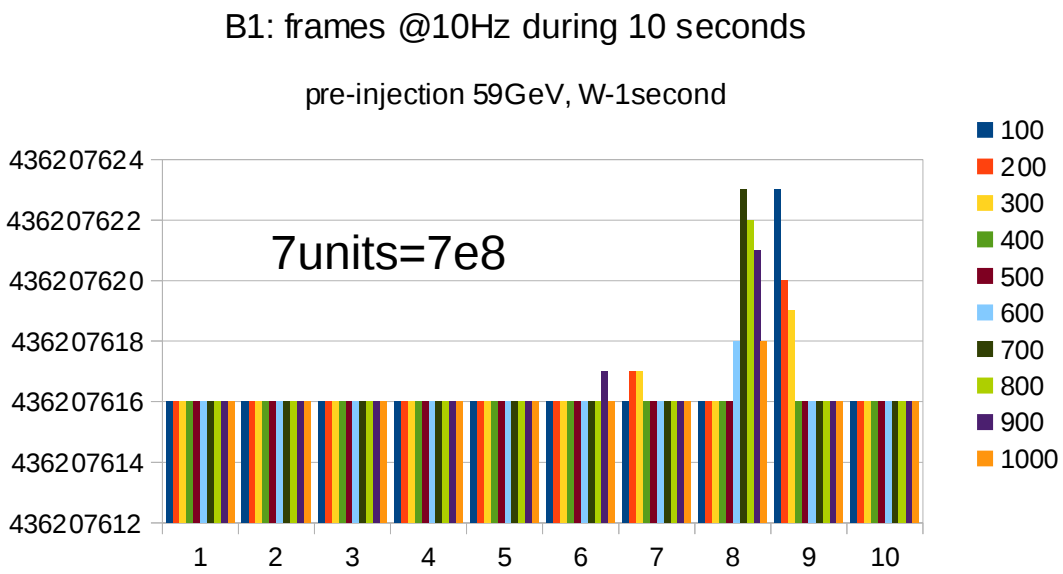
Units:
[nbSamples@50Hz]: 800=16s
[GeV]

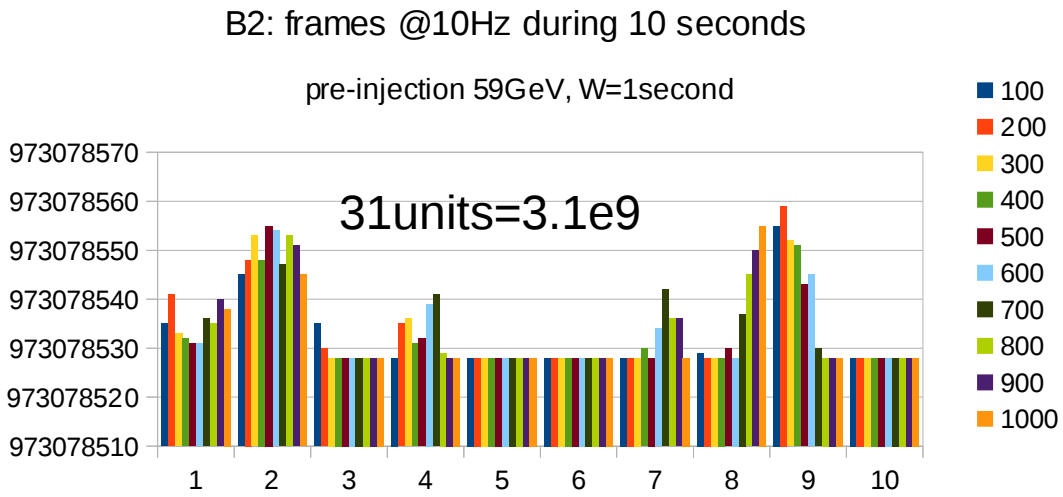
3 Settings:
Bigger W, energy threshold, enable logic
Fesa3 persistent ExpertSettings
Need RBAC role BI-BCT-EXPERT

Logic change: W=W(E)

- The averaging window W is switched depending on beam energy E: W=W(E)
- Beam energy is obtained from telegram @ 1Hz
- If telegram fails or E<500GeV, W=1s
- SMPswitching only enabled for system B2, since B2 has ~4x more noise, electronics or BCT problem
- A1, A2, B1 SMPswitching are disabled: W==1s static
- DCCT range switching, only R4 dominated by white noise

Will it cure “SBF flickering” ?



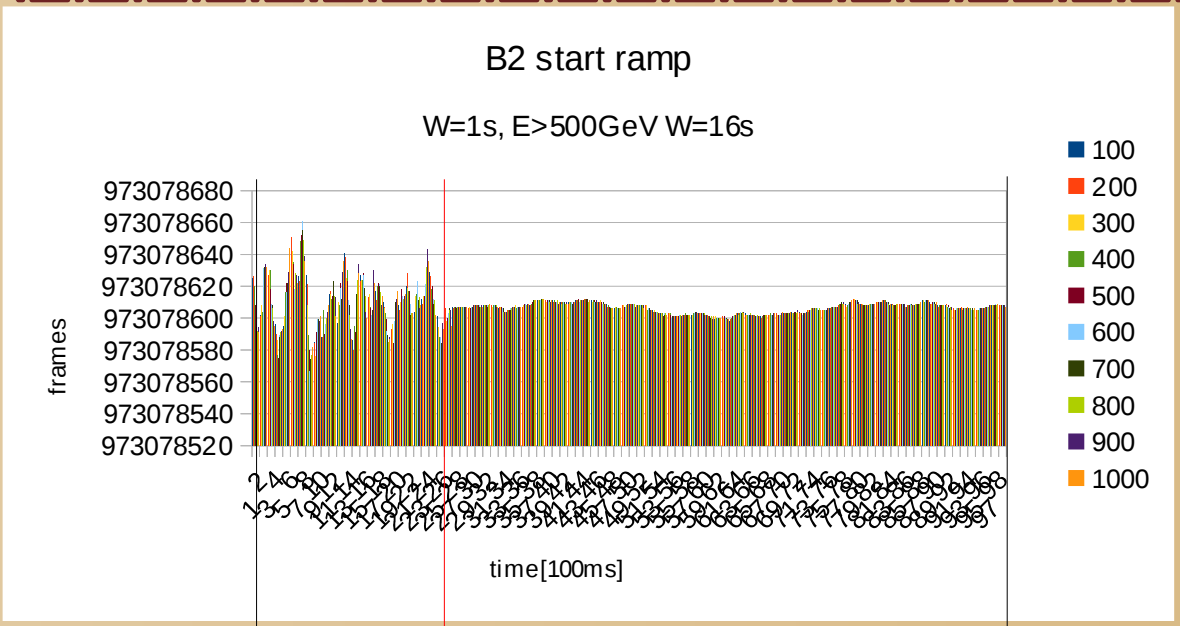


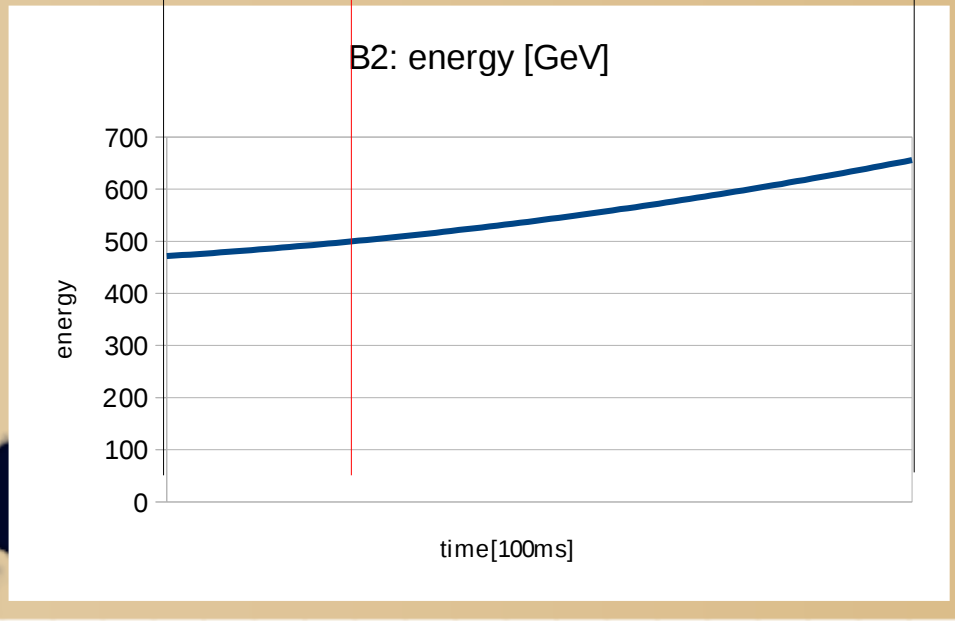
SBF frames
during 10 consecutive seconds
10Hz resolution 100...1000ms
white noise without beam

B1 has noise ~0.7E9
B2 has noise ~3.1E9

Need to reduce B2 noise
by x4 : sqrt(16)

Will it cure “SBF flickering” ?



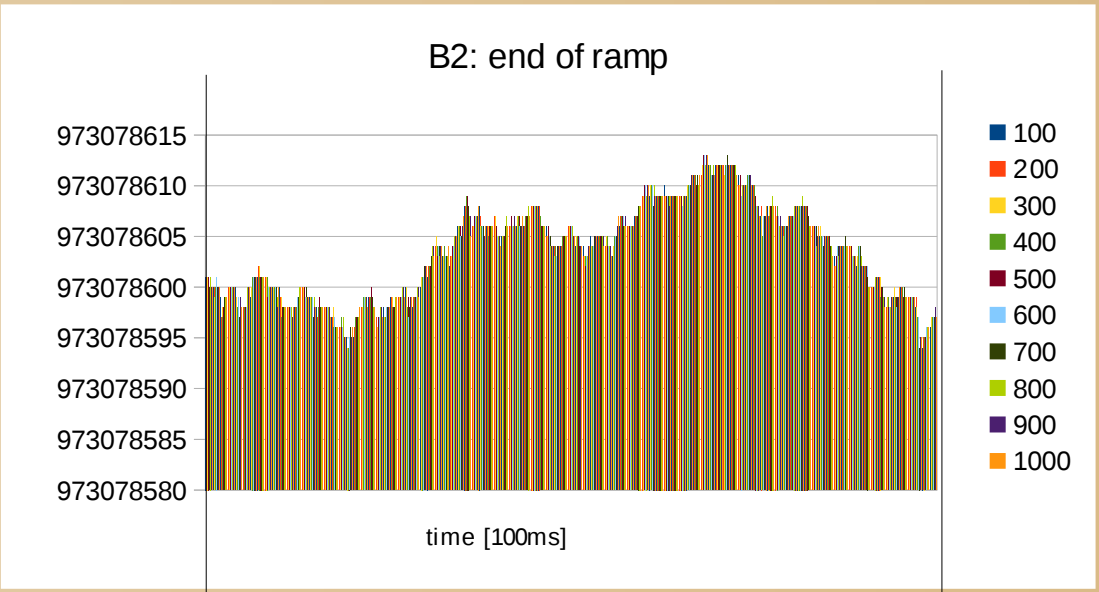


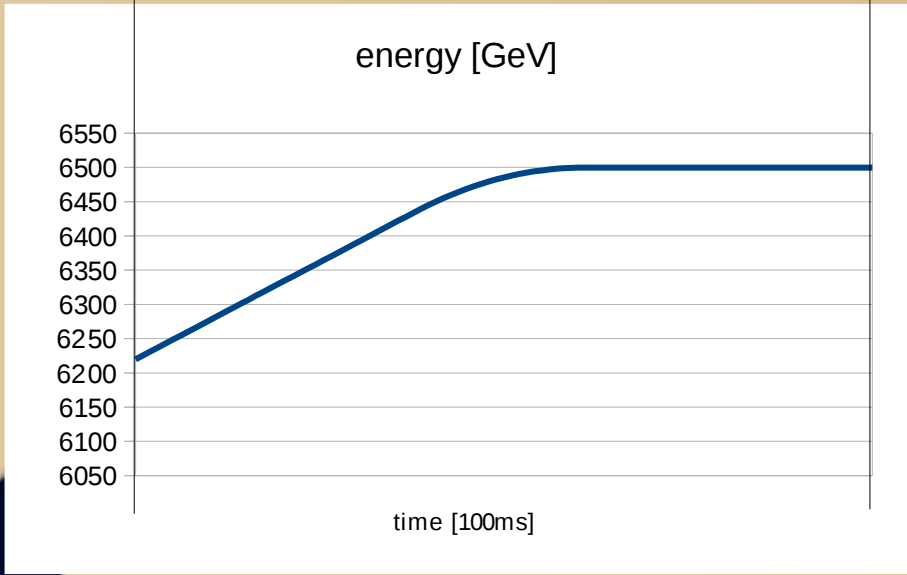
B2: SBF frames with beam

- During start of the ramp
- 471.72GeV to 656.04GeV
- switch at 500GeV from
- W=1 to W=16
- W=1 noise ~8E9
- W=16 noise ~1.8e9
- Reduce noise by factor 4

A2 noise ~4e9 (not shown)

Will it cure “SBF flickering” ?





B2: SBF frames with beam

- During end of the ramp
- 6219GeV to 6500GeV

- W=16 noise ~2e9

A2: noise ~4e9 (not shown)

Conclusion

- W=W(E) is a simple FEC-SW fix by BI
- The real problem is the DCCT B2 noise
- Can't have low noise with big W and fast reaction at same time
- Can be switched off/on, tested and tuned
- This is a SW-only fix with insufficient SIL level
- Telegram failure can provoke SBF flickering when W=1 for safe beams
- W=W(E) hysteresis not needed, since 5GeV/s on ramps
- Is this mitigation even sufficient for run2 ?