Status injection studies at PS injection

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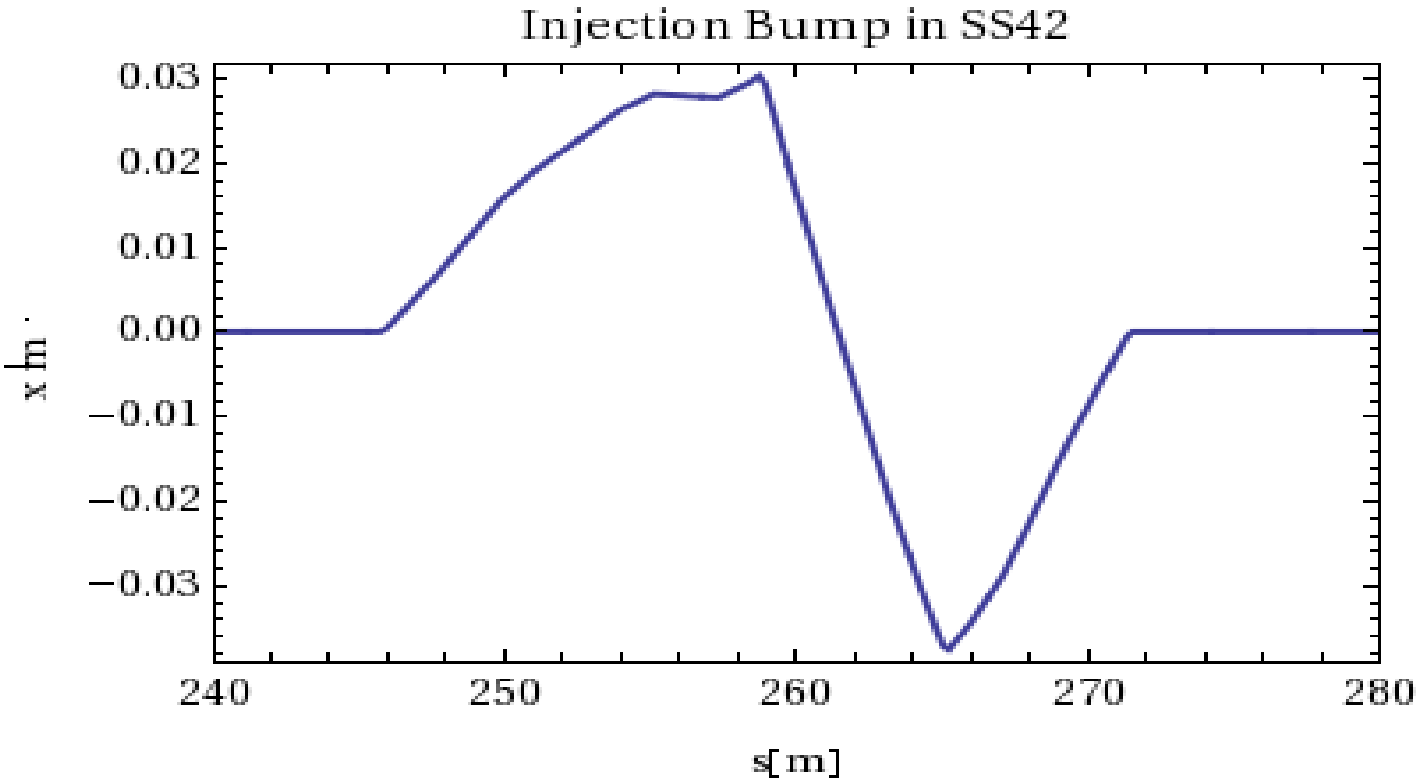
Injection in the PS

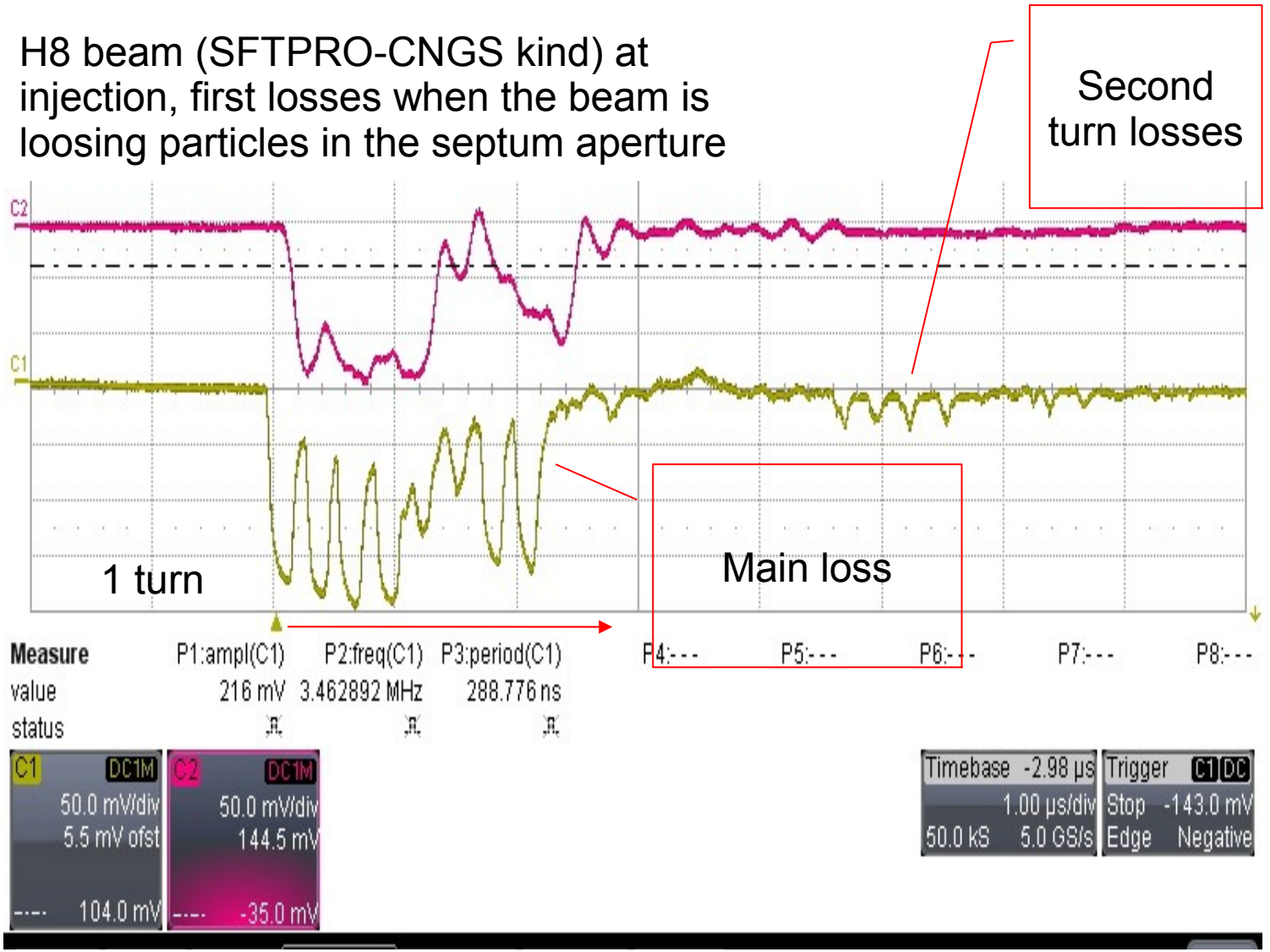


- 4 bumpers in SS-41-42-43-44
- Kicker at pi/2 in SS45

Bump shape chosen in the past to save a bit of kicker strength
since the angle of the injection line with respect to the closed orbit is important.

Loss measurement on the MU42
LHC-BLM vs ACEM

H8 beam (SFTPRO-CNGS kind) at injection, first losses when the beam is loosing particles in the septum aperture



8 incoming bunches

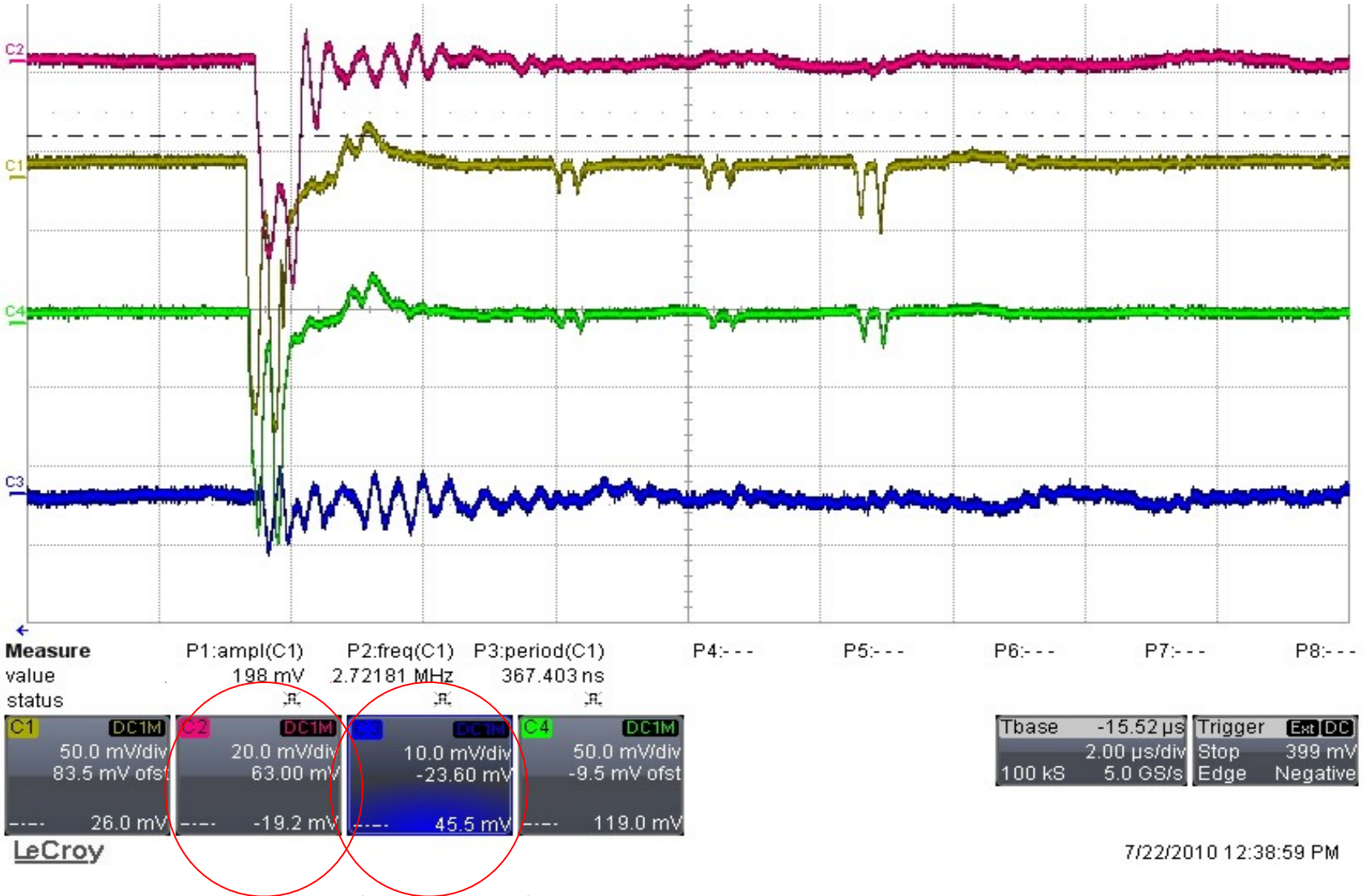
LHC BLM on the MU42

ACEM in SS42

- Difference in time resolution
- Difference in sensitivity

Turn by turn loss measurements
LHC-BLM vs ACEM: an example

H8 beam (SFTPRO-CNGS kind) at PS injection. One ring injected only.



LHC BLM on the MU42

ACEM in SS42

ACEM in SS43

LHC BLM on the MU43

LHC BLMs vs ACEM: conclusions

- The new BLM monitoring system of the PS should be LHC BLMs, studies are ongoing (Lucas) with Fluka simulations to optimize their positioning in the ring.

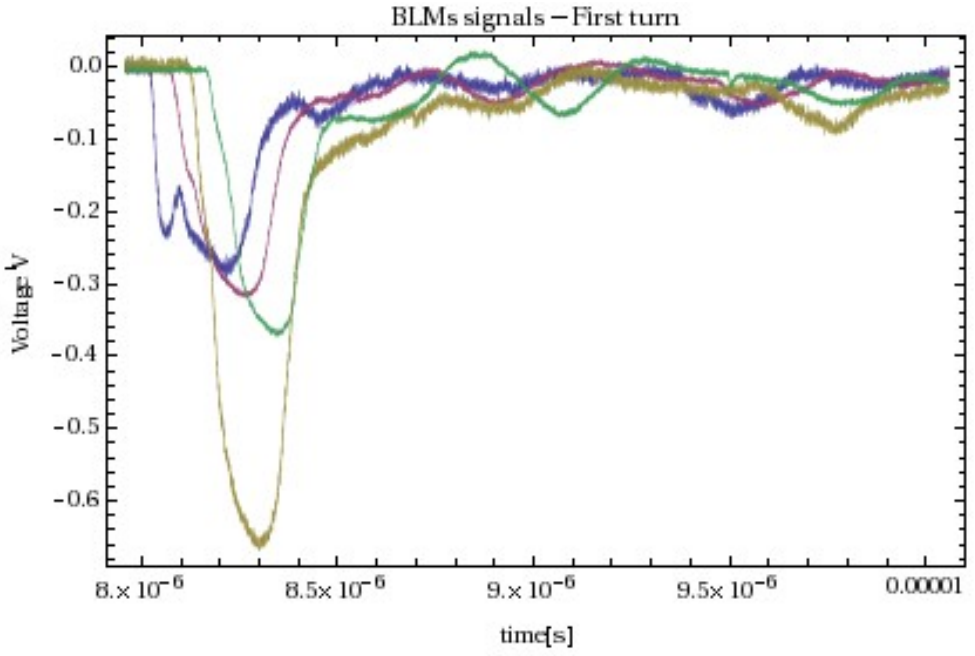
- However with LHC BLMs, observing turn by turn losses such as those occuring at injection might not have been possible.

- Question of replacing completely of ACEM system : a solution could be proposed to keep the ACEM for fine loss measurements.

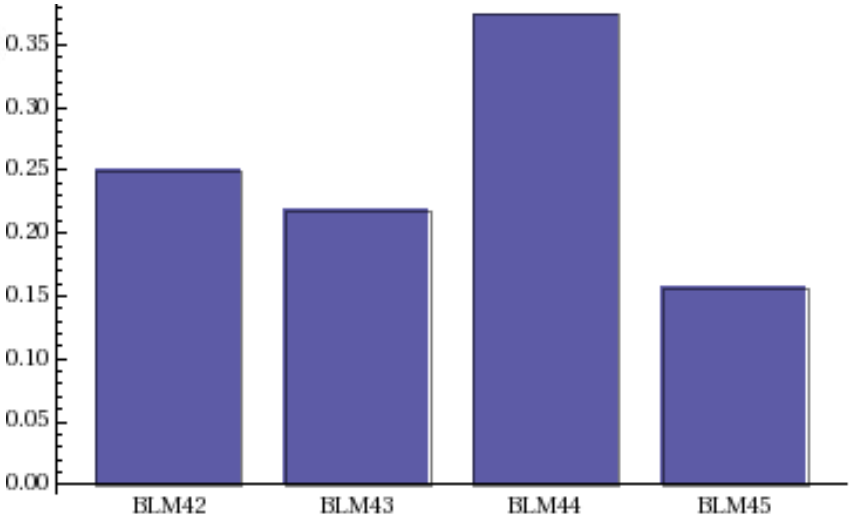
- ACEM, LHC BLMs not the same goal/use.

Losses measurements in injection area (ACEM BLMs)

- TOF beam nominal intensity
- Losses measurements with the BLMs in ss42-43-44-45



The gain of the BLM44 has to checked

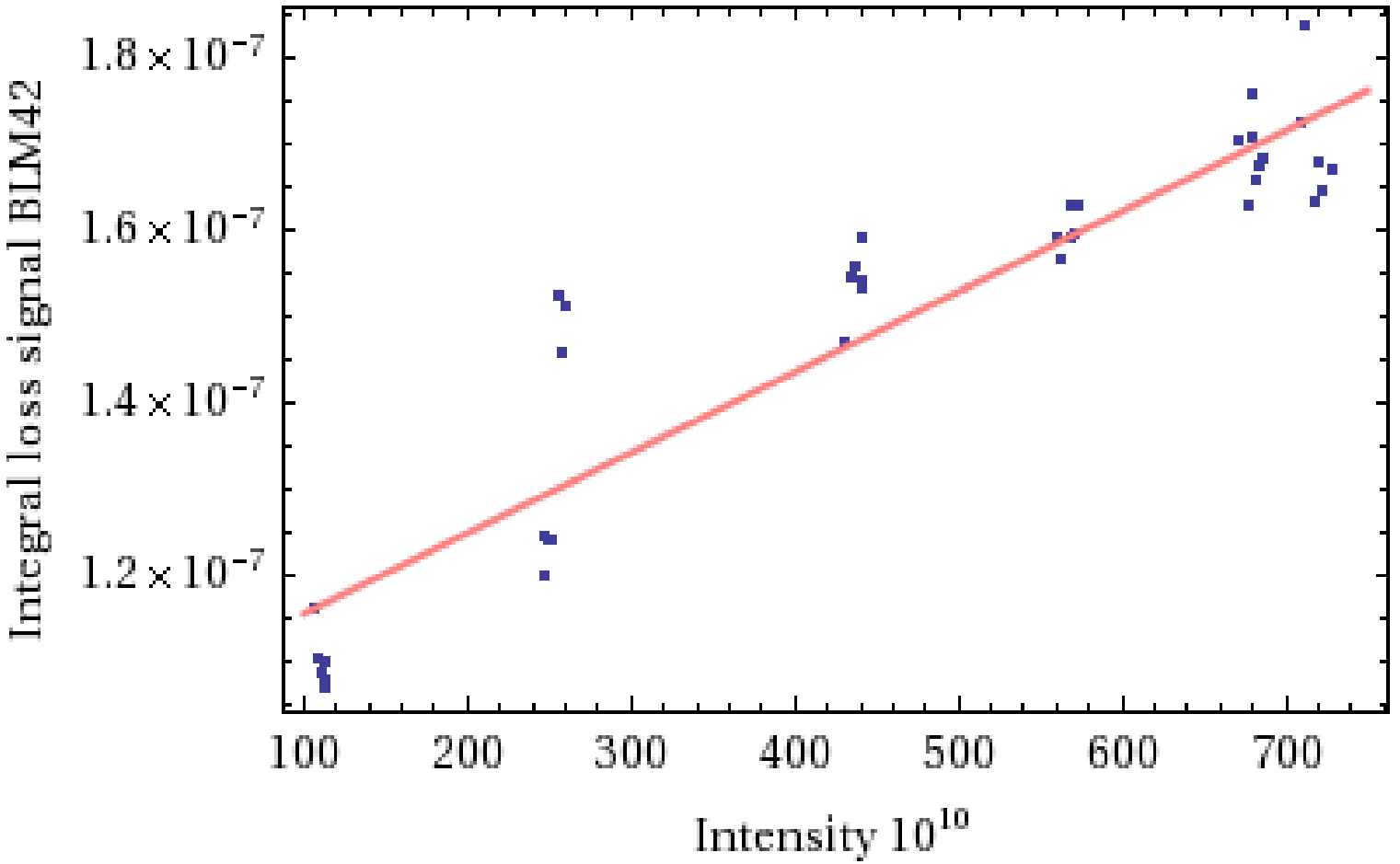


According to BLMs, we losse the same amount on all the section 42-43-45

Problem with BLM44, or less shielding with respect to the orther section

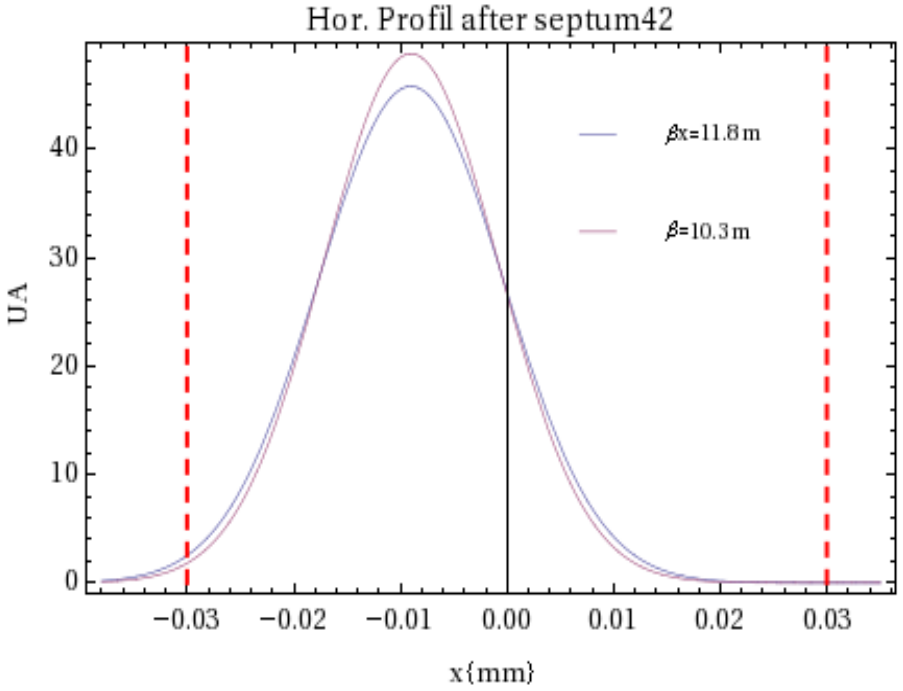
Losses measurements with horizontal constant emittance

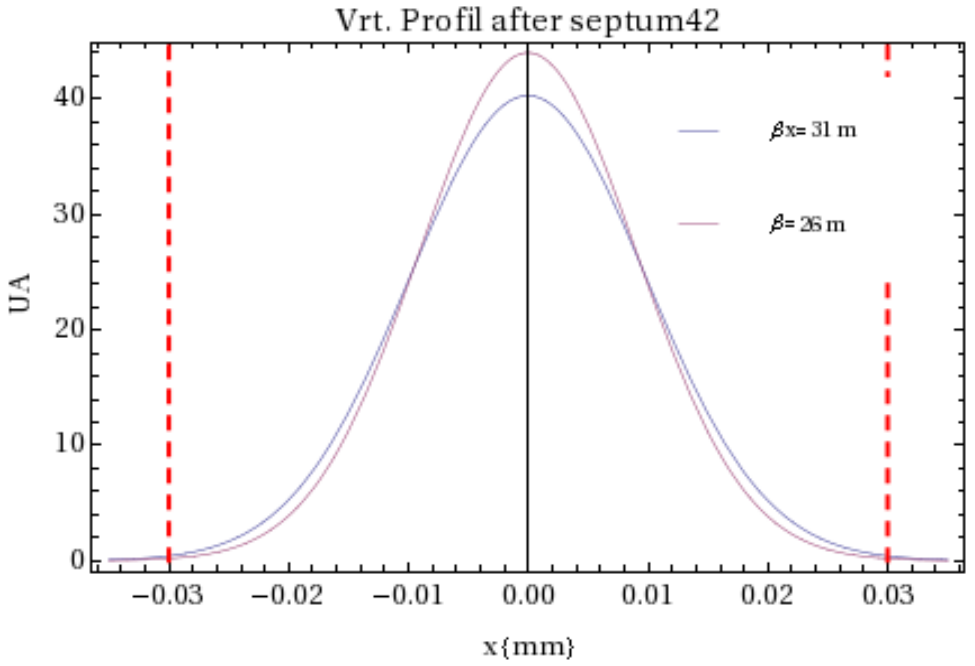
Hor emittance (1sigma) norm=13.4 mm.mrad
Vert. Emittance norm: 3.348 up to 6.88 mm.mrad
Intensity 115E10 up to 715E10 particles, H8 beam MTE-like, 2 bunches.



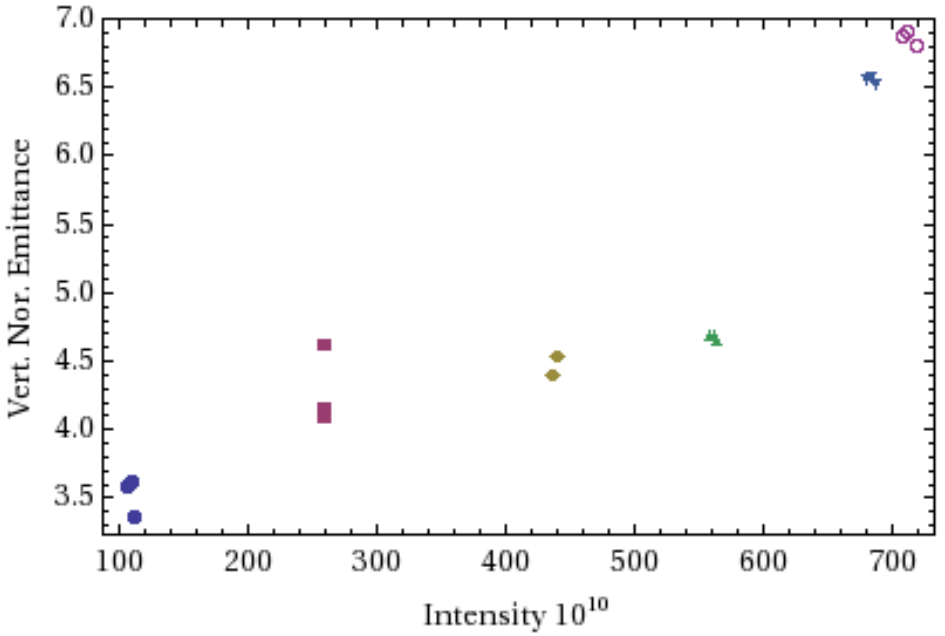
33% of increase

Losses measurements with horizontal constant emittance





Hor.losses from the septum from 0.5% up to 0.8%



Vertical losses maxmimum 0.2% at maximum intensity

Summary Mismatch

Method	β_x [m], α	Mismatch H
SEM42	β_x=10.3	
3-Monitors	β_x=9.33, α_x=-0.33	7.44 %
Periodic values	β_x=11.85, α_x=-0.10	

Method	β_y [m], α	Mismatch H
SEM42	β_y=31	
3-Monitors	β_y=25.96, α_y=0.16	3.3 %
Periodic values	β_y=22.35, α_y=-0.054	

Table 1: Measured betatronic parameters at PS injection.

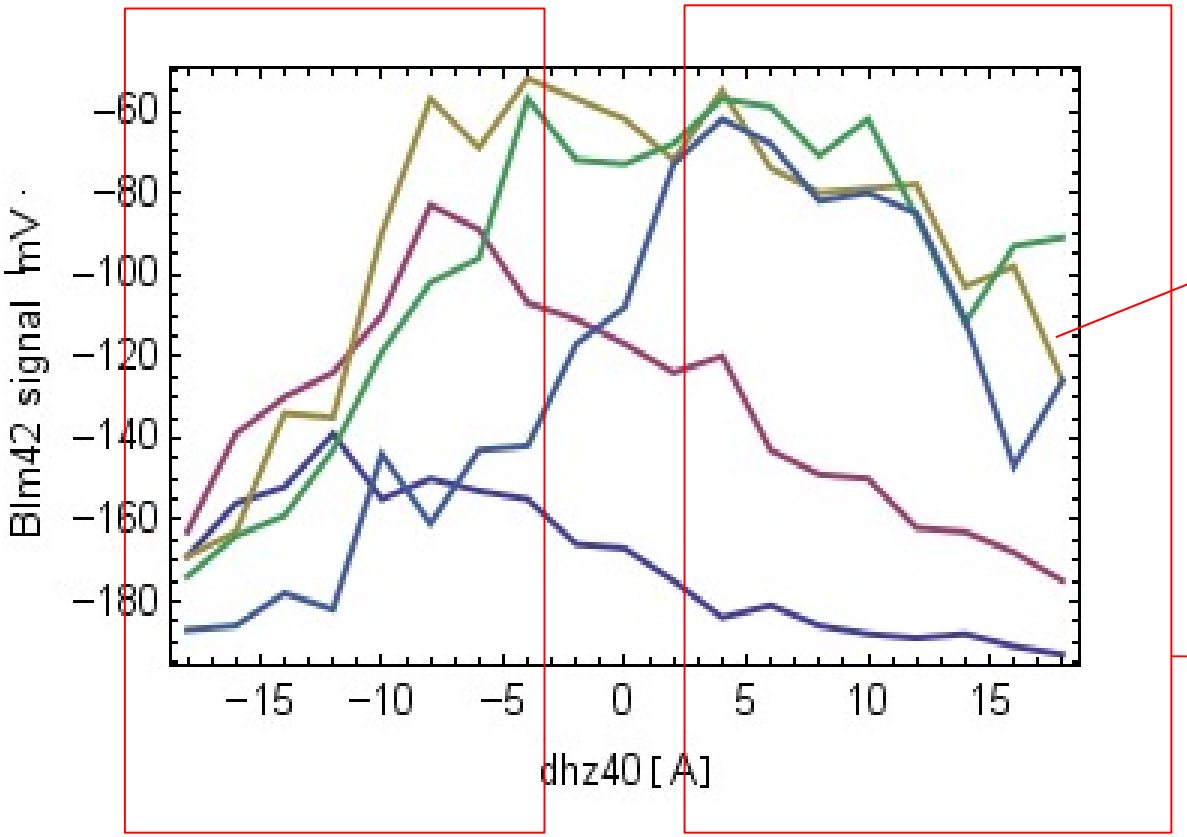
Method	D_x [m], Dp_x	Mismatch J
BPMs	D_x=1.57 , Dp_x=0.05	2.9 %
SEM42	D_x=1.58	
3-Monitors	D_x=1.86, Dp_x=0.06	2.2 %
MADX BTP model	D_x=1.73, Dp_x=0.21	15 %
Periodic values	D_x=2.31, Dp_x=0.003	

Method	D_y [m], Dp_y	Mismatch H
SEM42	D_y=0.54	
3-Monitors	D_y=(-)0.56, Dp_y=0.022	%
MADX BTP model	D_y=(-)1.47, Dp_y=-0.169	%

Table 2: Measured dispersive parameters at PS injection.

Horizontal scan aperture

- Losses measurements at BLM42 as a function of position and angle in the septum 42.
- Use of2 correctors (BTP.DHZ40 for position, BTP.DHZ30 for the angle)

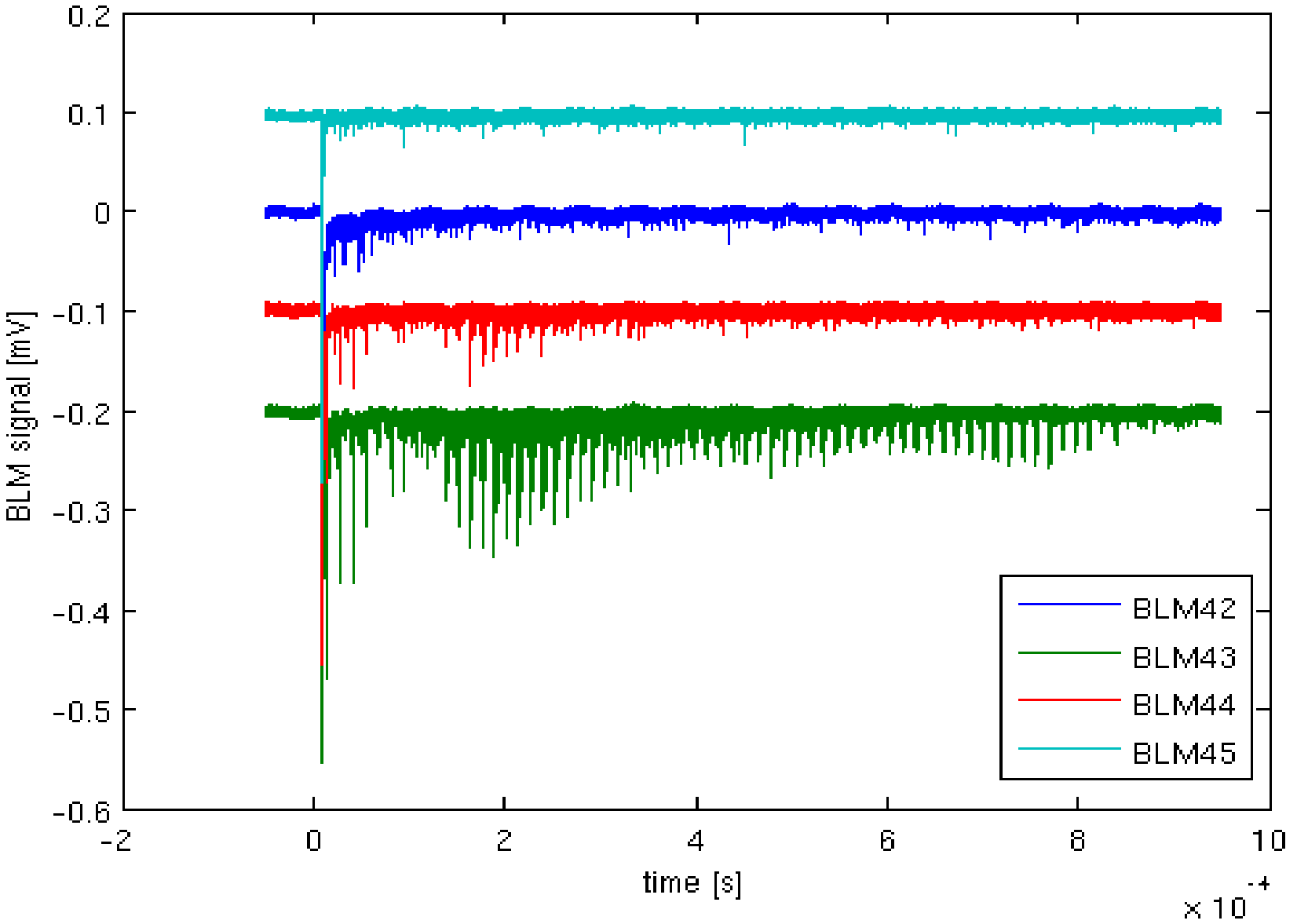


Nominal case

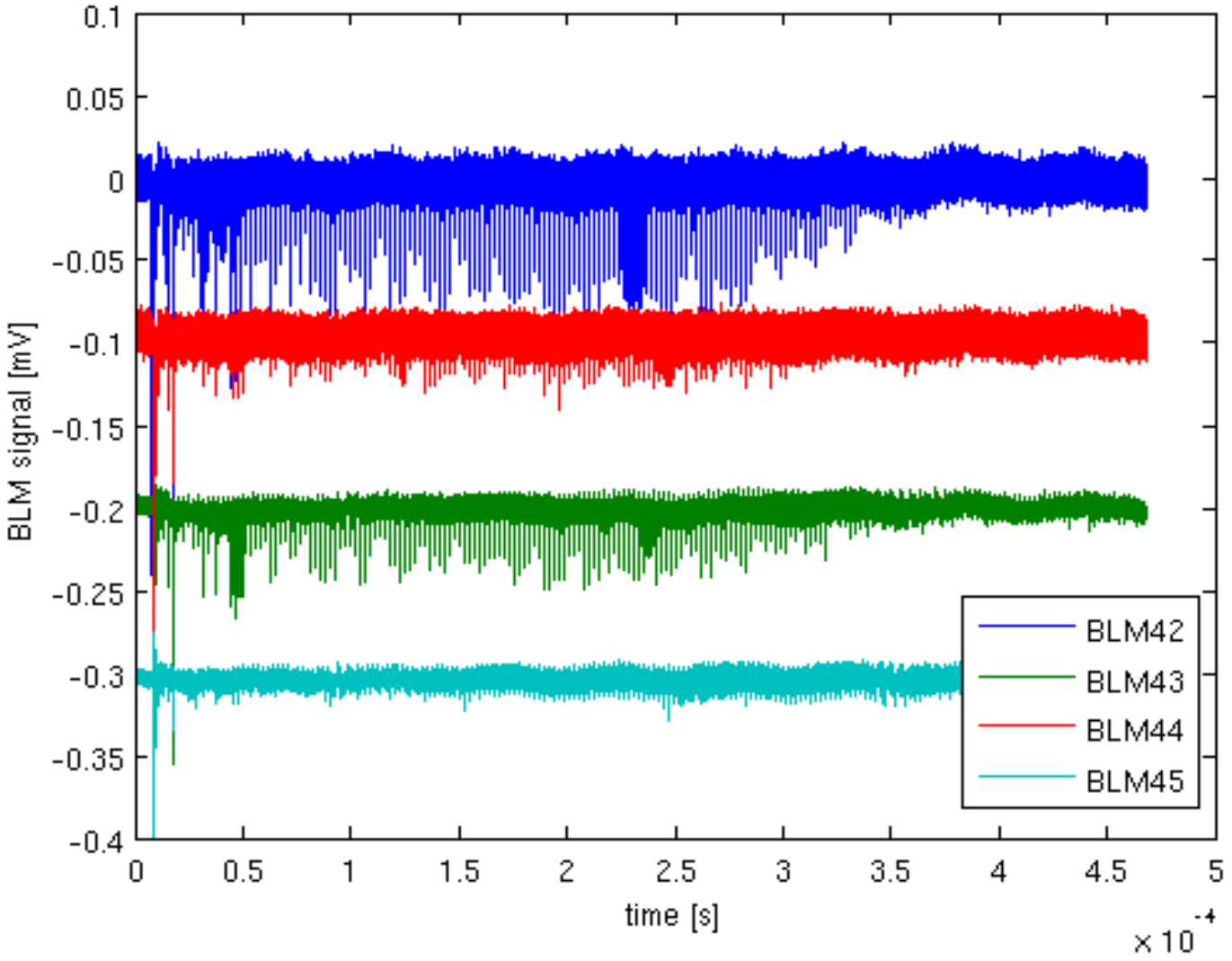
Vertical aperture restriction

Horizontal aperture restriction, septum blade

Turn by turn losses after injection
CNGS



Turn by turn losses after injection
TOF



For both, frequency studies are ongoing to determine if the losses are related to the tune, mismatch and so on.

Conclusions, Outlooks

- Thanks to the analogical ACEM BLM signal, accurate measurement of losses have been done.
- Confirmation of turn by turn losses after injection, the causes are not clear yet
- The measurements done on Thursday might confirmed losses come from the horizontal plane, when the beam touches the septum blade, but the amount is still not clear compared to the BLMs.
- Fluka blms will be really needed to understand the BLM signals.
- Frequency studies on the losses patter taken on TOF and CNGS beam are under study.