3/19/19
KY

BPM vs Beam position on Muon Monitor during high intensity beam scan for FY19 run

Goal:
Observe a correlation between the proton beam position on the target and the muon beam position on the muon monitors. The result will be used to validate the simulation.

Observed Beam Center on BPM and Muon Monitors recorded in ACNET:
Figure 1 shows the observed proton beam center on the bpmTGT and the observed beam center on the muon monitor 1, 2, and 3. The proton beam was moved in parallel in horizotnal and vertical directions by a trim magnet. The beam position was held for a while at the highest position to gain statistics for the thermocouple measurement. We call the two fixed point position 1 and 2. Table 1 shows the observed position 1 and 2 at the bpmTGT and the muon monitors. The bpm121 data confirms that the beam moves in parallel. Note that those are taken with its local coordinate system.

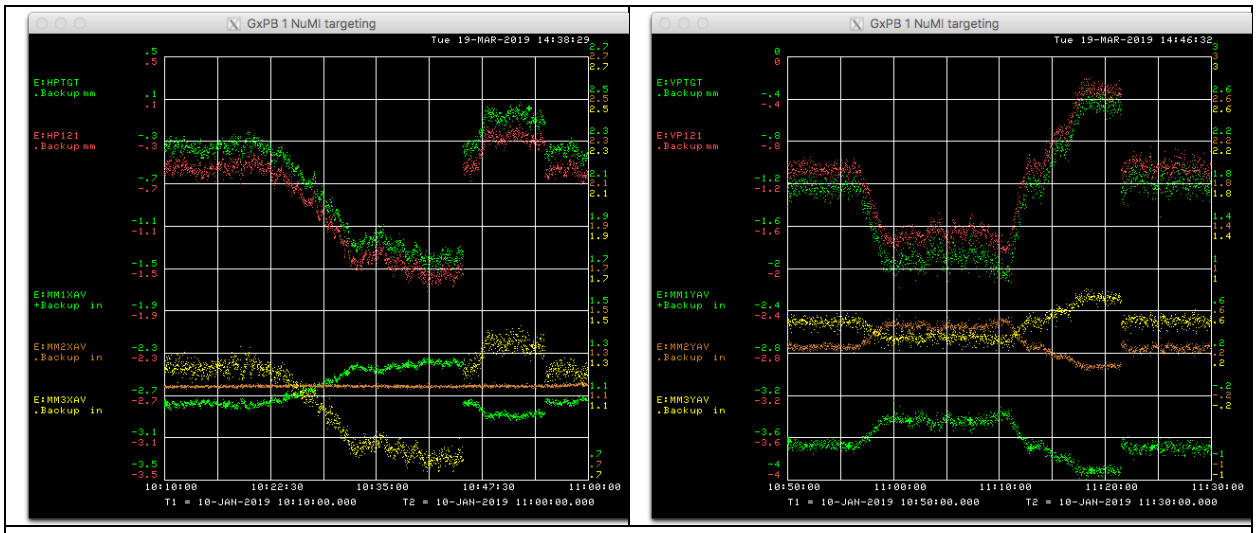

Figure 1: (Left) Horizontal and (right) vertical scans.

Movement of a beam position on the muon monitor 1 is opposite from the proton beam position shift while that on the muon monitor 3 is same as the proton beam shift. It seems that the MM2XAV is a constant value while the MM2YAV is varied by the proton beam position shift. This does not make sense. It suggests that there is an issue on the MM2XAV signal. Note that the size of movements in horizontal and vertical directions are quite different on the muon monitor 1. The vertical motion is almost twice bigger than the horizontal one. It suggests that the focusing power is not axial symmetric. On the other hand, the behavior is quite different on the muon monitor 3. Is it caused by the misalignment of the target and/or horns? Need to figure out how it happens in simulation.

Horizontal scan

Device	Unit	Position 1	Position 2	P2 – P1
HPTGT	mm	-1.406	-0.046	**1.360**
MM1XAV	Inch	1.251	0.996	-0.255
	mm			**-6.477**
MM2XAV	Inch	1.134	1.134	0
	mm			**0**
MM3XAV	Inch	0.799	1.371	0.572
	mm			**14.529**

Vertical scan

Device	unit	Position 1	Position 2	P2 – P1
VPTGT	mm	-2.031	-0.412	**1.619**
MM1YAV	inch	-0.382	-0.928	-0.546
	mm			**-13.868**
MM2YAV	inch	0.504	0.065	-0.439
	mm			**-11.151**
MM3YAV	Inch	0.325	0.736	0.411
	mm			**10.439**

Table 1: Summary of beam scan.