

Beam modulation test

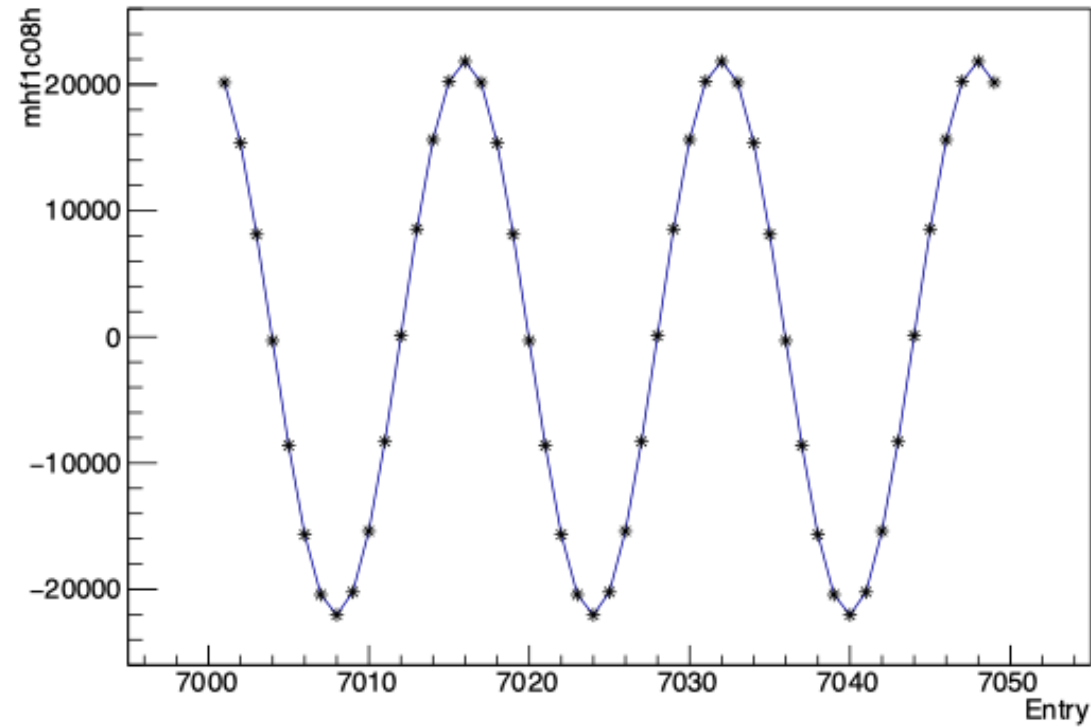
Arindam Sen

<https://logbooks.jlab.org/entry/4400440>

FFB off, Beam Current : 5 uA

Beam Energy : 10.6 GeV

Pattern



Took data with modulation frequency 15 Hz with 240 Hz sampling rate. 16 Patterns are clearly visible.

Run 18631 has an amplitude set by hand for each coil of 0.5 V and 0.178 V for SL20

18631*e-6	1c08h	1c08v	1c10h	1c10v	Ramp	1c02h	1c03v	SL20_V
11X	-2.939	0.147			0.039	1.509	-0.142	-6.747
12X	-6.140	0.164			0.096	1.813	-0.112	-43.415
16X	9.414	-0.453			-0.015	-7.098	-0.368	-71.251
1X	4.921	-0.104			-0.005	0.260	0.053	0.740
4aX	4.148	0.043			-0.022	2.031	0.074	17.483
4eX	3.924	0.239			-0.046	2.866	-0.231	25.252

18631*e-6	1c08h	1c08v	1c10h	1c10v	Ramp	1c02h	1c03v	SL20_V
11Y	0.023	-2.854			-0.070	0.153	4.037	-12.941
12Y	-0.127	-2.180			0.011	0.190	3.631	-8.441
16Y	-0.106	-2.091			0.031	0.362	5.095	3.886
1Y	-0.175	4.257			-0.030	-0.416	-8.141	8.236
4aY	-0.219	7.073			-0.031	-0.729	-14.238	8.887
4eY	-0.271	8.081			-0.036	-0.773	-16.454	8.670

Run 18632 has an amplitude set by hand for each coil of 0.75 V and 0.1 V for SL20

18632*e-6	1c08h	1c08v	1c10h	1c10v	Ramp	1c02h	1c03v	SL20_V
11X	-2.841	0.102	-0.709	0.059	0.007	1.418	-0.134	-6.402
12X	-6.000	0.127	-2.260	0.125	-0.066	1.548	-0.171	-44.768
16X	9.324	-0.322	1.846	-0.339	0.017	-6.242	-0.041	-72.372
1X	4.972	-0.095	2.699	-0.204	0.008	0.269	0.067	0.543
4aX	4.214	0.019	3.027	-0.148	-0.001	1.883	0.054	17.534
4eX	3.995	0.218	3.237	0.053	0.015	2.550	-0.250	25.246

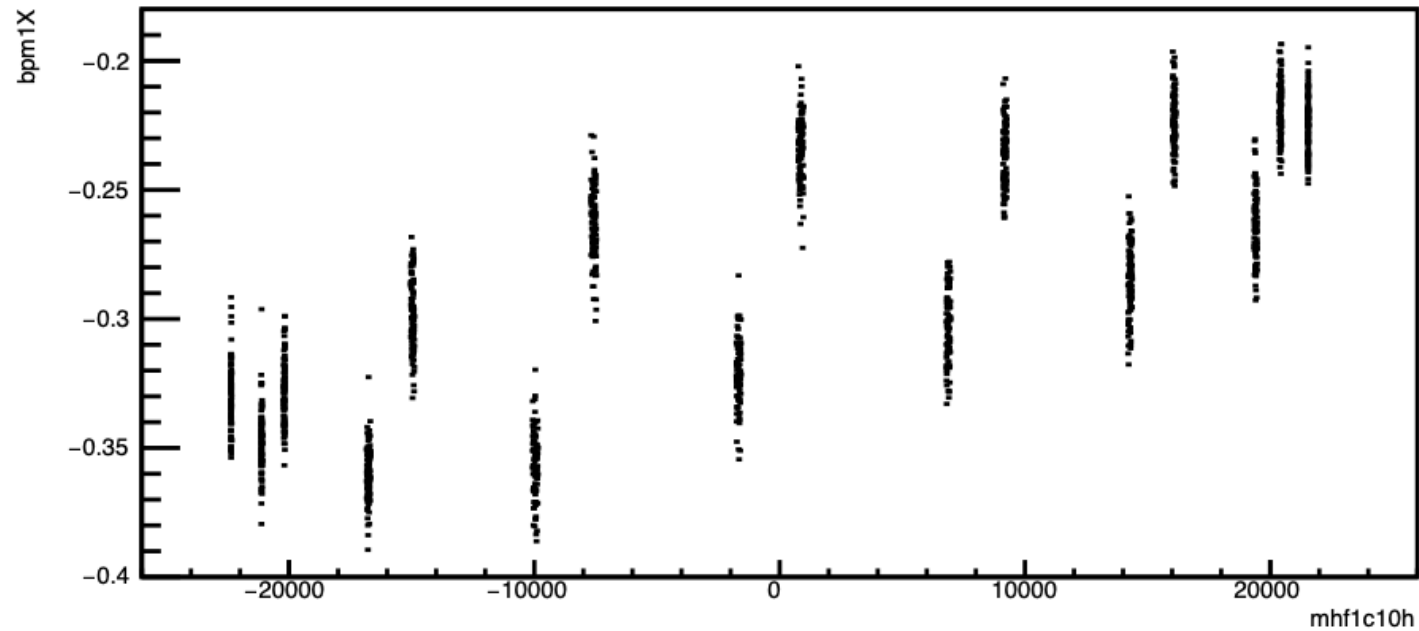
18632*e-6	1c08h	1c08v	1c10h	1c10v	Ramp	1c02h	1c03v	SL20_V
11Y	-0.014	-2.861	0.025	-0.920	0.033	0.191	4.053	-14.401
12Y	-0.162	-2.130	-0.097	-1.466	0.007	0.228	3.577	-8.728
16Y	-0.155	-2.185	-0.111	-4.122	0.075	0.311	5.044	2.949
1Y	-0.098	4.168	0.081	4.508	0.008	-0.430	-8.056	8.341
4aY	-0.108	6.889	0.169	8.694	0.019	-0.796	-14.113	8.881
4eY	-0.143	7.875	0.179	10.249	0.013	-0.965	-16.307	8.875

Summary

- Run 18631 had an amplitude set by hand for each coil of 0.5 V and 0.178 V for SL20
- Run 18632 had an amplitude set by hand for each coil of 0.75 V and 0.1 V for SL20
- Magnet 1c10h has no response for 0.5 V magnitude. Because there was a beam trip.

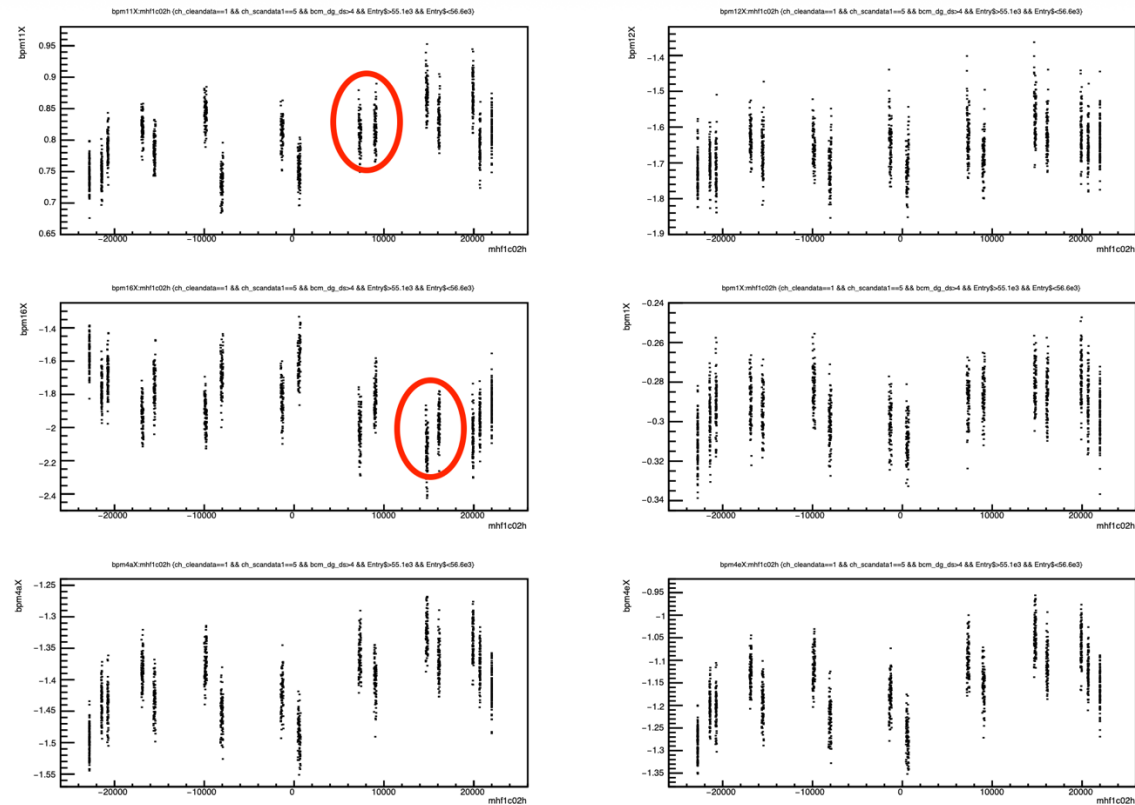
Summary

- bpm1X shows some kind of hysteresis pattern with magnet 1c10h. There is a phase difference between the coil signal and the beam motion at that BPM.



Summary

- The non-overlapping structure may be some smaller phase shift, or it could be that we're picking up some other noise that is a multiple of the modulation frequency.



Summary

- All bpm X responses are flat for magnet 1c03v, 1c10v, 1c08v. So as expected vertical corrector magnets are not affecting beam motions. Vice versa true for Y responses.
- Vernier has a small effect on the beam motions.
- Ramp function does not affect the motions at all.
- We don't need additional beam tests before MOLLER, but we will need to do a test of the script that runs everything (since we had to do all of this manually) during one of the SAMs. This work will be done in collaboration with I&C (Paolo).
- Thanks for I&C (Paolo) for being there and helping us trigger the coils individually

Beam motions (in mm)

BPM	1c08h		1c10h		1c02h		Vernier	
	0.5 V	0.75 V	0.5 V	0.75 V	0.5 V	0.75 V	0.178 V	0.1 V
4aX	0.085	0.086	0	0.062	0.042	0.039	0.114	0.061
4eX	0.080	0.082	0	0.066	0.059	0.052	0.164	0.088
12X	0.126	0.123	0	0.046	0.037	0.032	0.282	0.157

BPM	1c08v		1c10v		1c03v		Vernier	
	0.5 V	0.75 V	0.5 V	0.75 V	0.5 V	0.75 V	0.178 V	0.1 V
4aY	0.145	0.141	0	0.178	0.292	0.289	0.058	0.031
4eY	0.166	0.161	0	0.210	0.337	0.334	0.056	0.031

Amplitude motions are basically in the same order. We don't see the change of the motion when we change the amplitude settings in the func generator.