

MEBT Trajectory, Corrector Response and BPM Offset

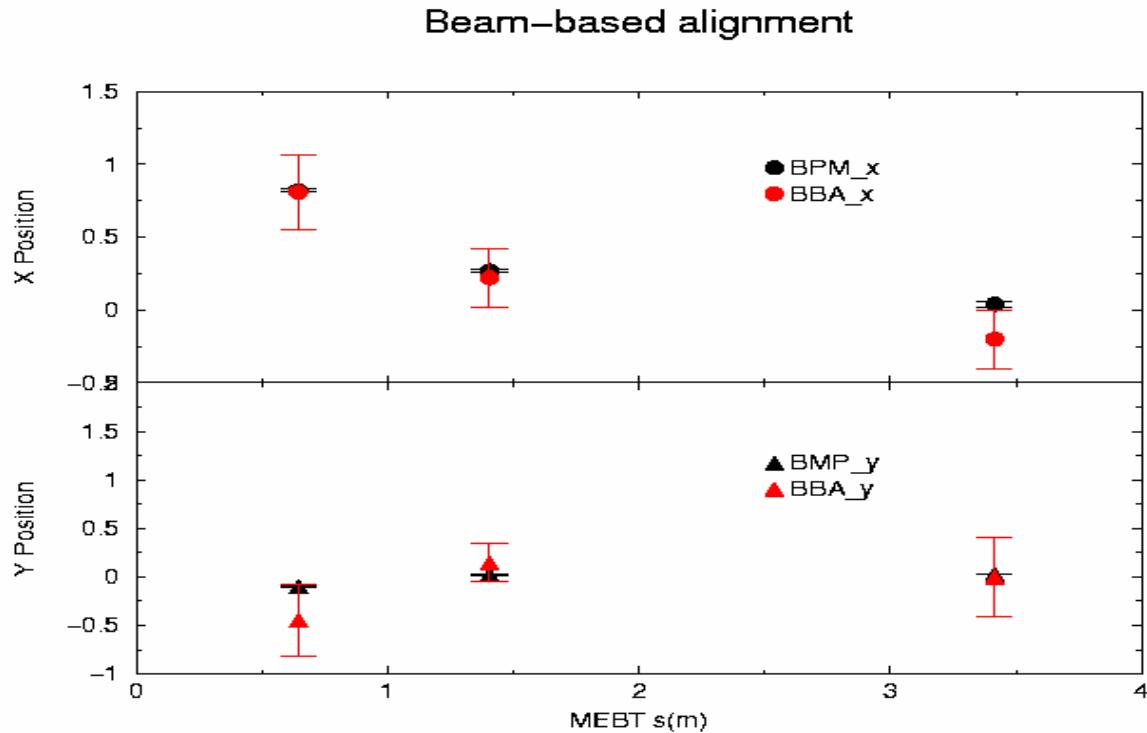
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Beam-Based Alignment (T. Pelaia)

- Use Orbit Difference application to generate Twiss parameters for current machine settings
- Edit the twiss file and add BPM data by copying the associated Quad data
- Flatten the orbit as much as possible since beam angles aren't measured
- Run the beam-based alignment script for each Quadrupole

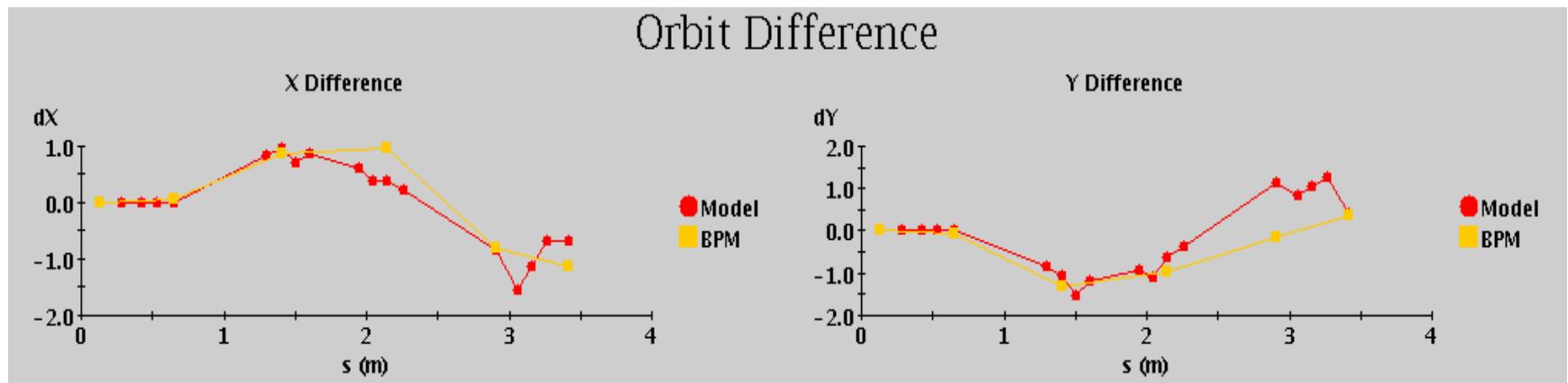
Beam-Based Alignment (cont.)



- Beam-base alignment gives ~0.2-0.4 mm position error
- BPM and beam-based alignment difference ~0.01-0.34 mm

MEBT Trajectory and Corrector Response

- Use the Orbit Difference application to check the dipole steer vs. BPM response (flatten the orbit first).
- Plots below show the difference before and after a dipole corrector changed: horizontal (DCH04) is left plot and vertical (DCV04) is right plot. The Model used here is Trace-3D.
- Repeat for all dipole correctors: they are all consistent with the nearby BPM response.

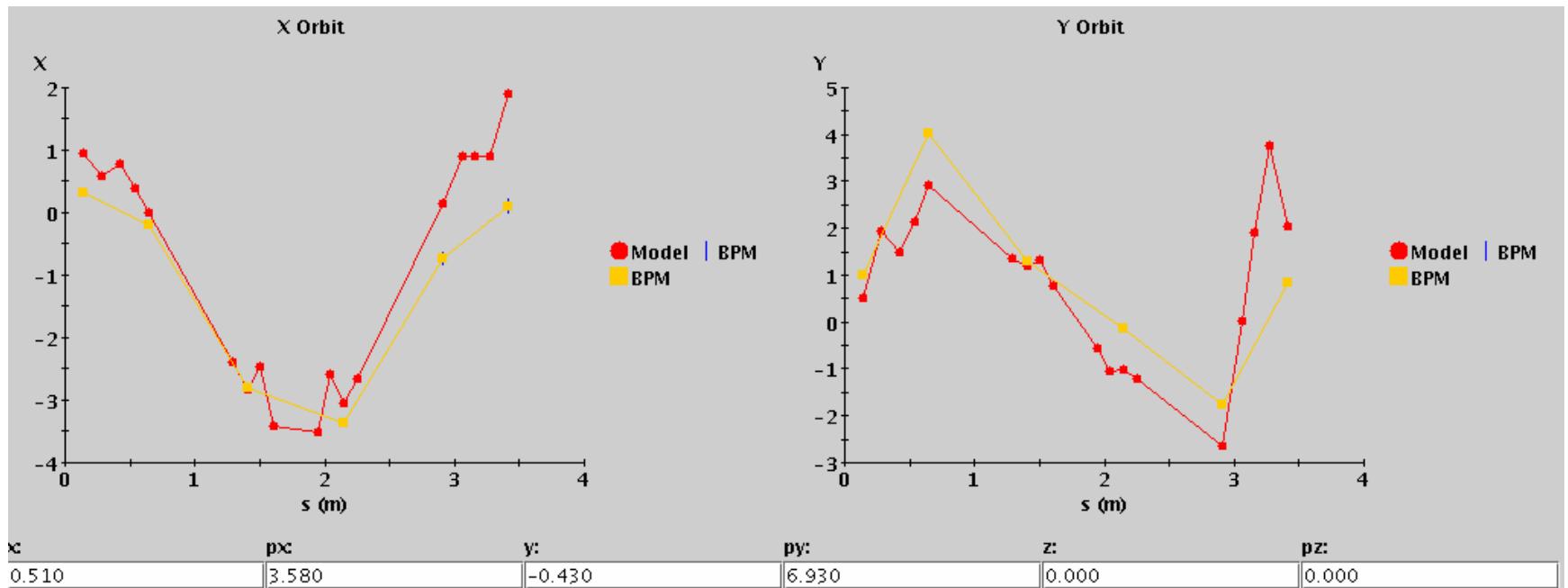


MEBT Trajectory (A. Shishlo, S. Aleksandrov)

- The initial x , x' , y , y' are unknown in the model.
- Try to fit the initial x , x' , y , y' with BPM measurement.
- Adjust LEBT steers and repeat the previous step.
- BPM offset provided by Sasha.

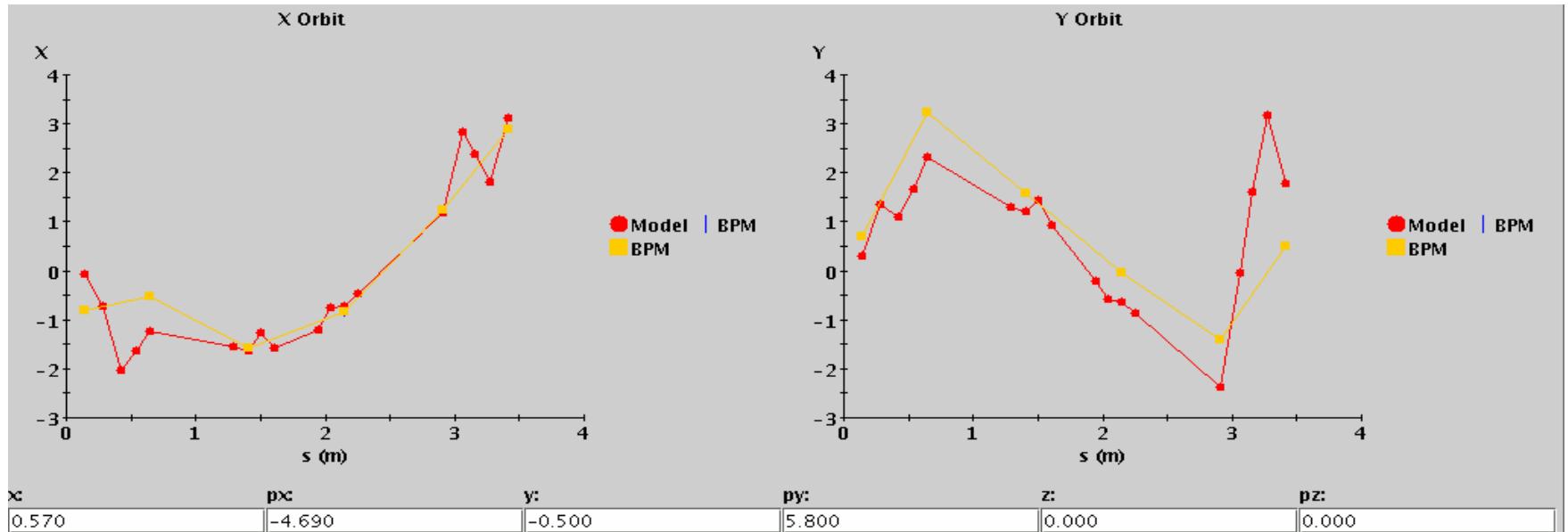
A	B	C	D	X	X'	Y	Y'
No LEBT Steering:							
1.5	1.5	1.5	1.5	0.51	3.58	-0.43	6.93
Horizontal LEBT Steering:							
1.3	1.7	1.5	1.5	0.57	-4.96	-0.5	5.8
1.2	1.8	1.5	1.5	0.56	-5.9	-0.5	5.36
Horizontal + Vertical LEBT Steering:							
1.3	1.7	1.7	1.3	0.66	-4.12	-0.35	4.03
1.3	1.7	1.8	1.2	0.65	-2.86	-0.37	4.09

MEBT Trajectory Example 1



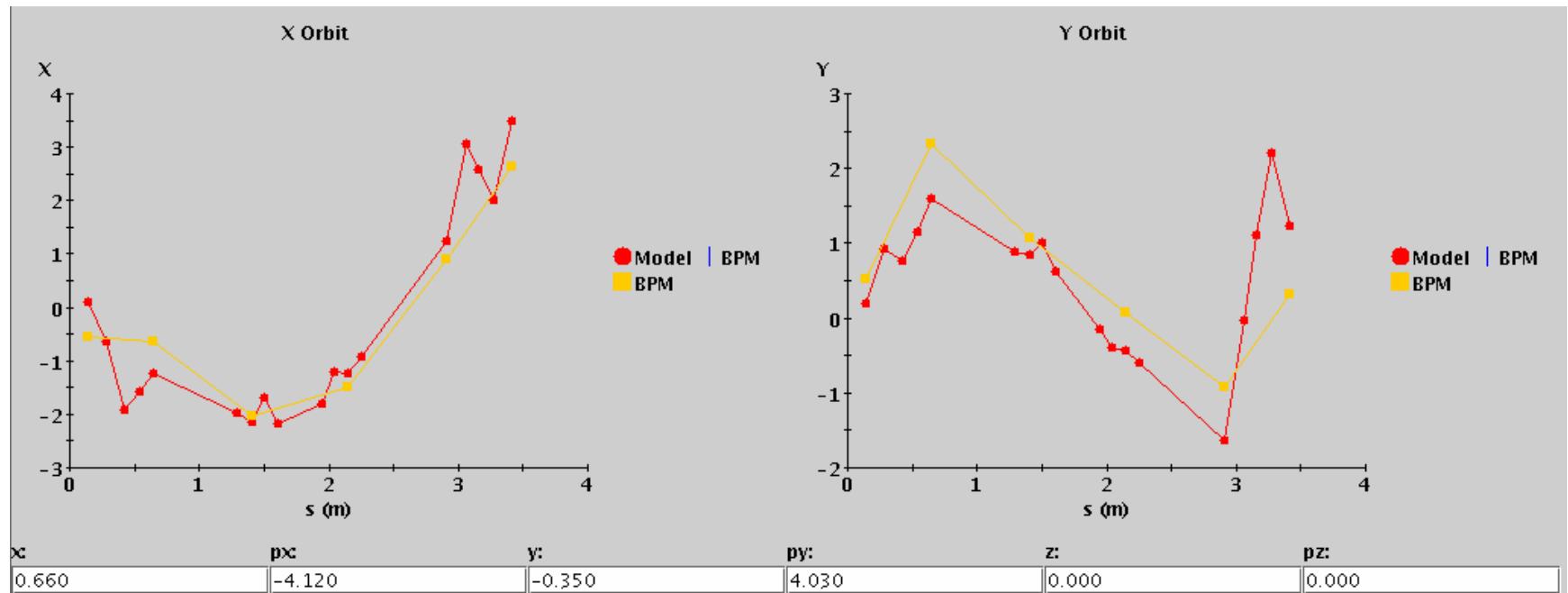
No LEBT steering

MEBT Trajectory Example 2



Horizontal LEBT steering: Steer A=1.3kV, B=1.7kV,
C=1.5kV, D=1.5kV

MEBT Trajectory Example 3



Horizontal + vertical LEBT steering: Steer A= 1.3kV, B=1.7kV, C=1.7kV, D=1.3kV

Conclusions

- Trace 3D can give us relatively good model prediction.
- The initial parameter fit can give us the feeling of the alignment between source/LEBT vs. MEBT.
- For absolute orbit, the initial parameter fitting is not satisfactory for the entire MEBT trajectory. Possible reasons are BPM calibration, Quad calibration, re-buncher calibration (phase)...
- Suggestion: maybe use emittance device to cross check BPMs.