Match Trajectories

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02/20/2013

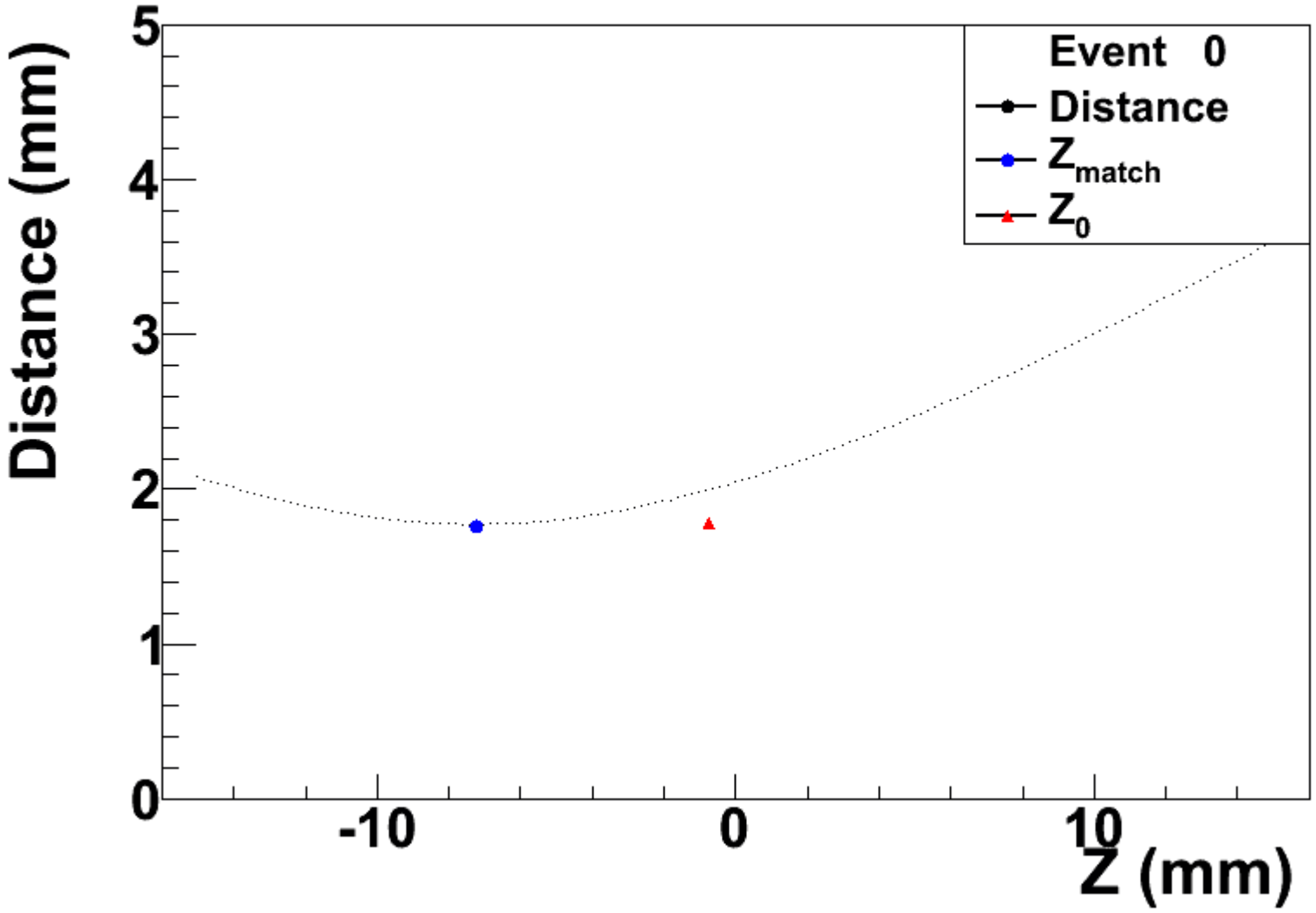
Background

- When transverse target field is on, event reconstruction goes back to only to the target end plane. Need to find out the vertex plane (or named it interaction plane) to do correction.
- Match Ytg to honrizontal BPM does not help because Ytg resolution is larger than 1 mm.
- Match distance between BPM trajectory to the reconstructed trajectory MIGHT work (since it is 3-D matching instead of 1-D matching). This work is to try this method out ...

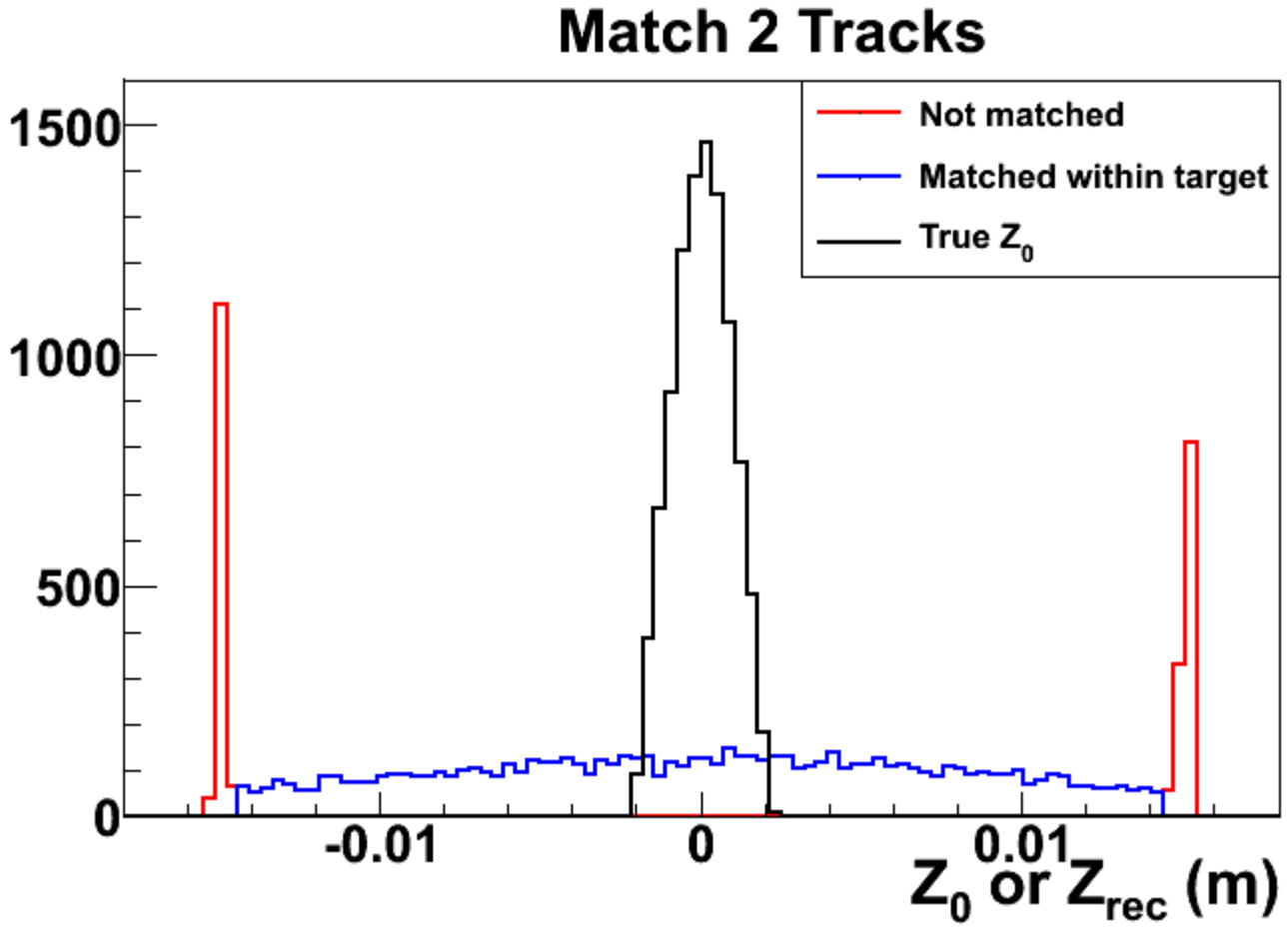
5.0T Target Field, E=2.254 Beam goes to the local dump

- Create vertex point V3X0(X0,Y0,Z0), and V3P0, Swing it to the sieve
- Smear the sieve with SNAKE resolution (1 mm in position, 1 mrad in angle), then swing it back to the target end plane. Get position V3snake(Xsnake,Ysnake,Zsnake) and V3Psnake.
- BPM positions and angles at target end plane: Gaussian smeared X0,Y0 by BPM resulution (1 mm). Theta_bpm and phi_bpm come from a random gaussian with zero mean and 1 mrad sigma. Convert these values into Lab frame to get V3Xbpm and V3Pbpm
- Reconstructed trajectory: swing from V3Xsnake and V3Psnake
- Reconstructed trajectory: swing from V3Xbpm and V3Pbpm
- Compare these 2 trajectories to get the most closest distance. Sign the variables of the matched point on the reconstructed track as #rec (# stands for x, y, z, theta, phi...). Sign the variables of the matched point one the BPM track as #match.
- Will show the results in next few slices ......

Matching 2 Trajectories

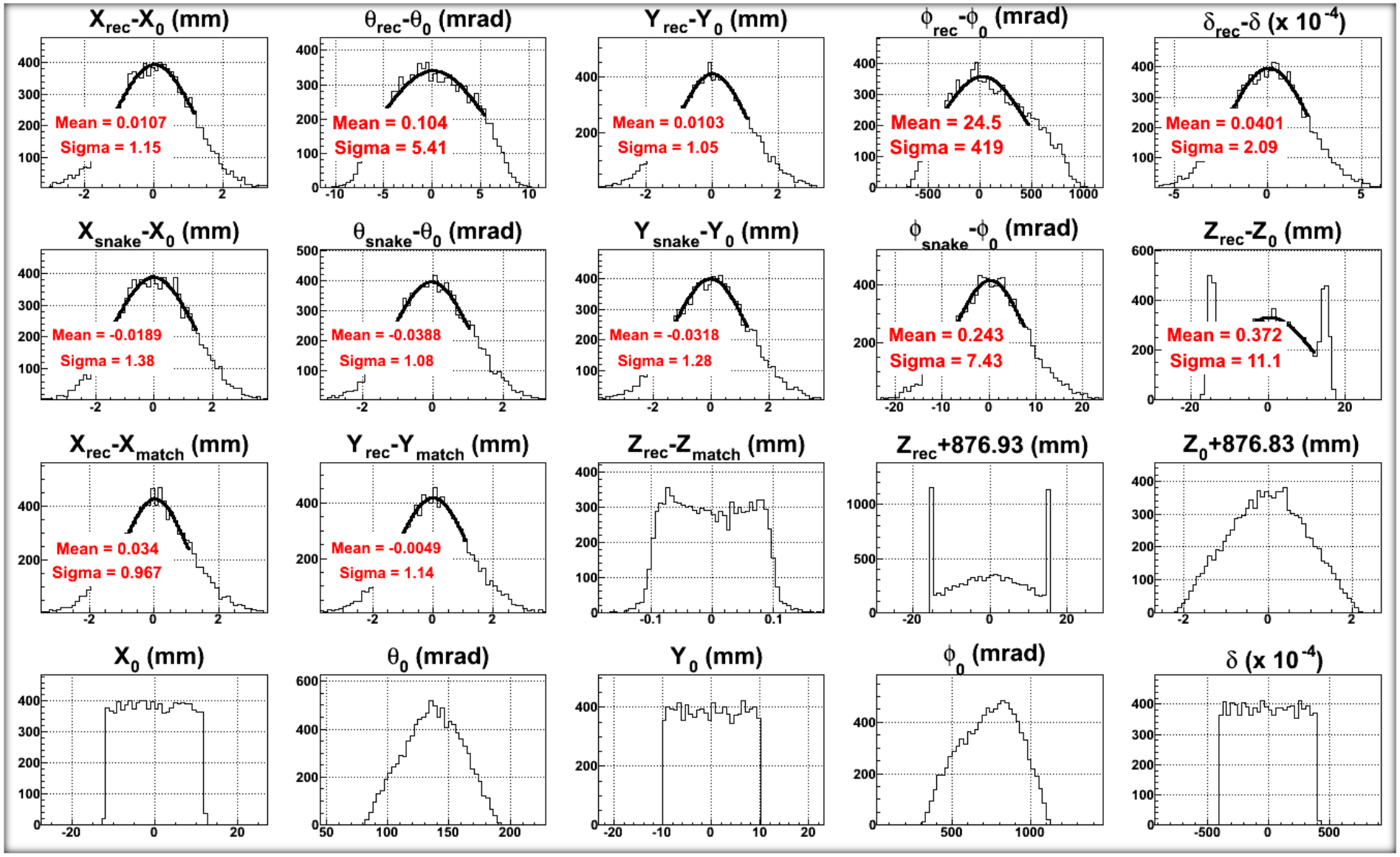


How good is the result?

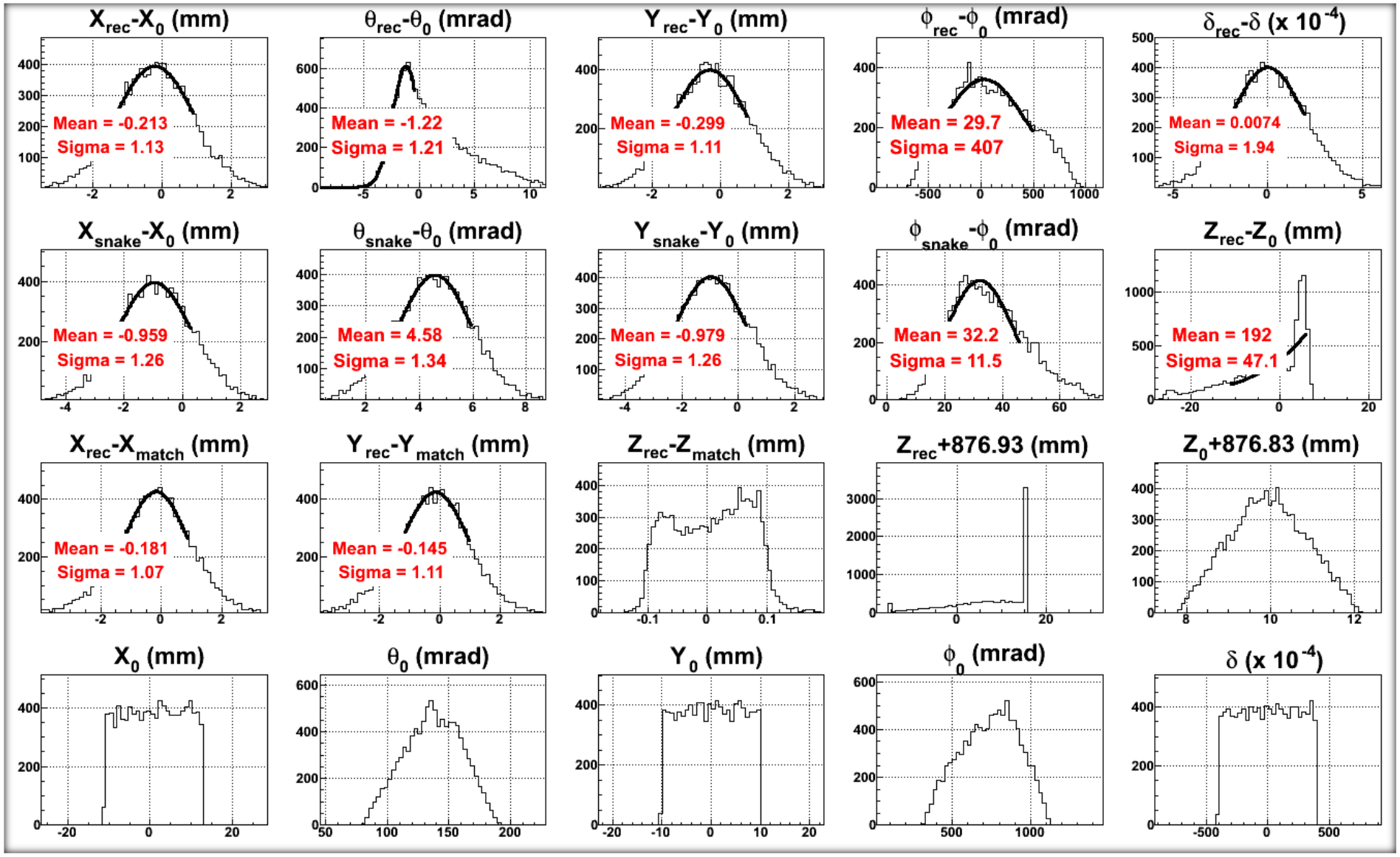


About 24% never matched. The other 76% will find the most closest point but no obvious peak exist within the target, which means no REAL match at all.

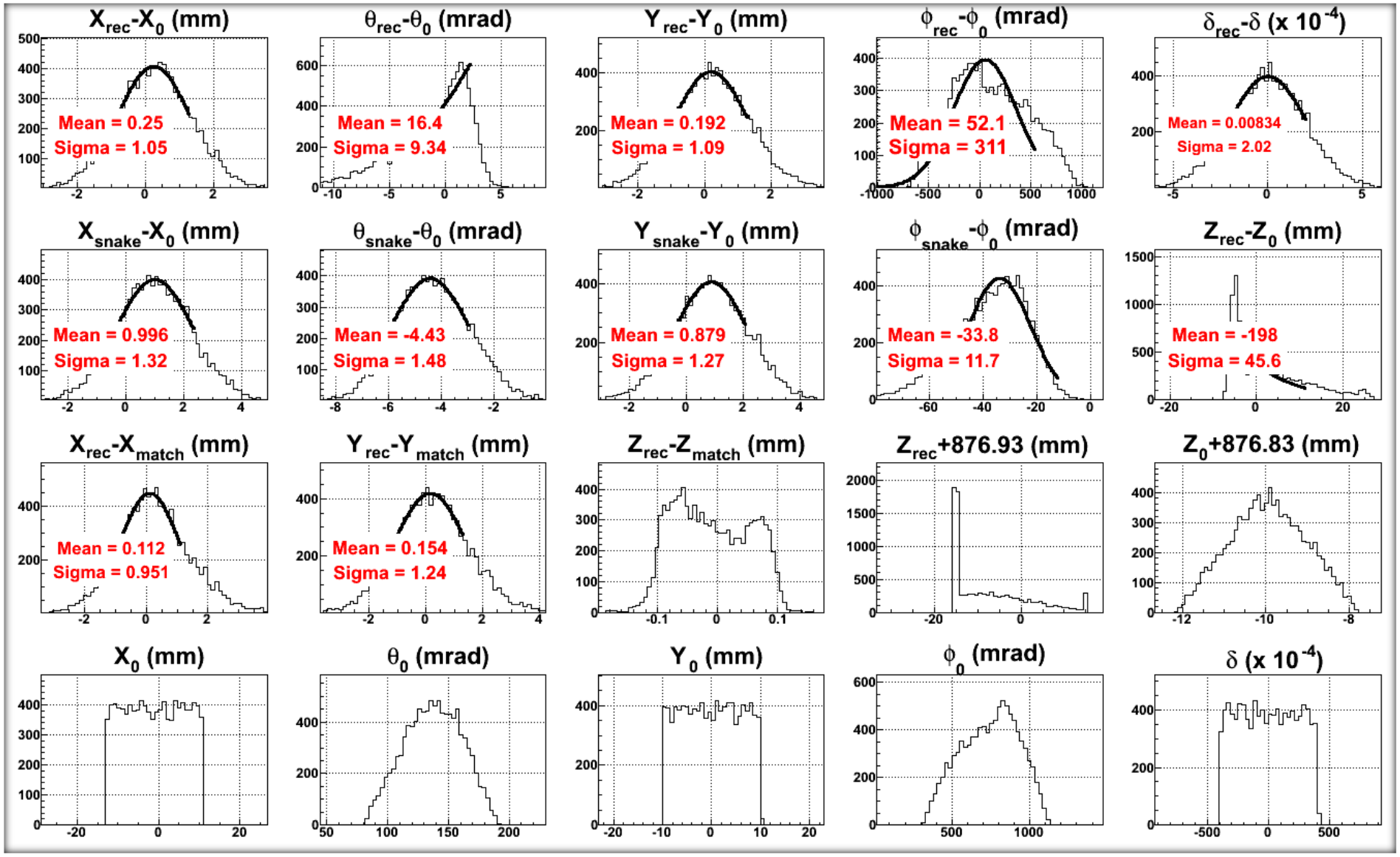
4 mm Slice at Target Center



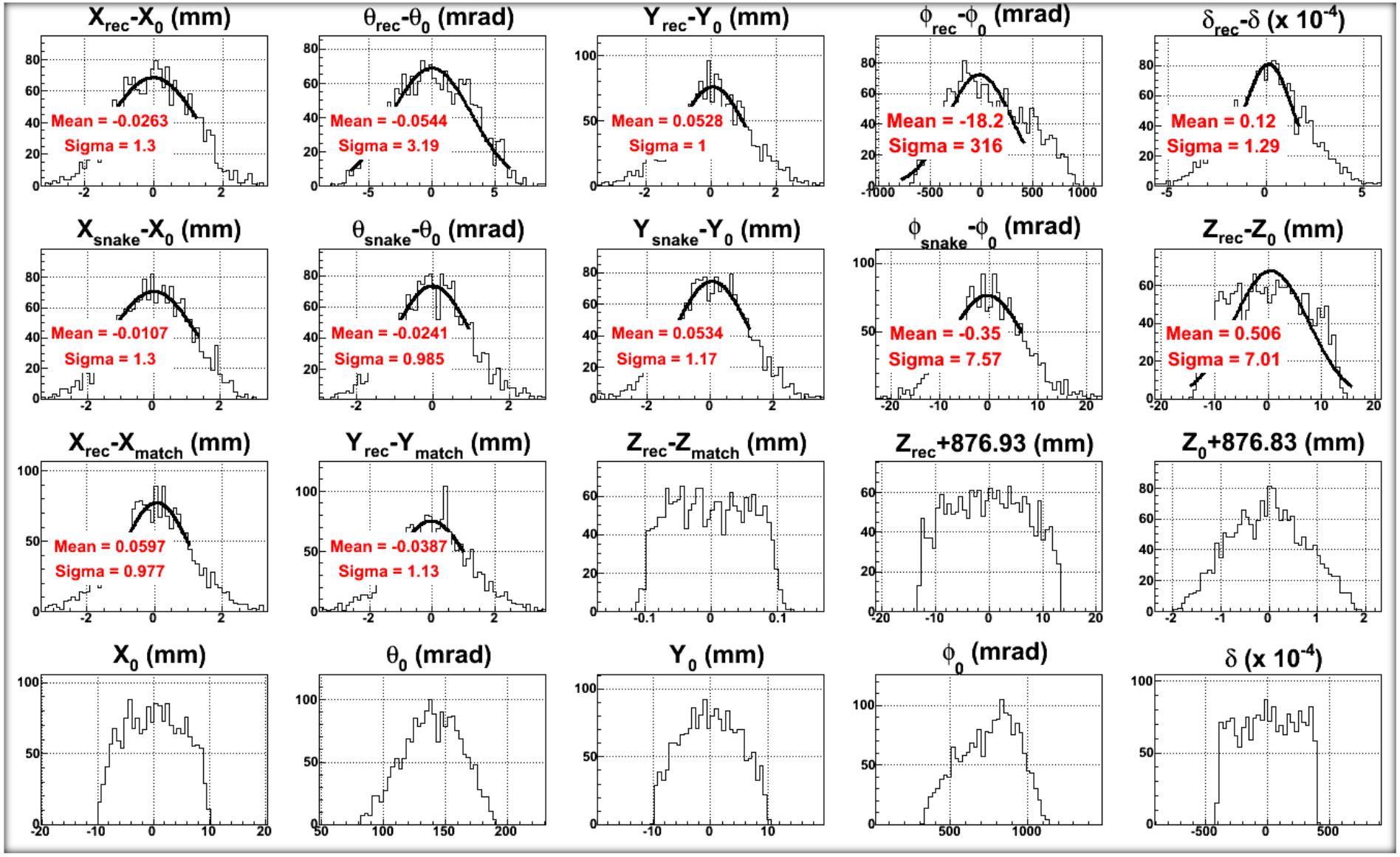
4 mm Slice at 10 mm downstream



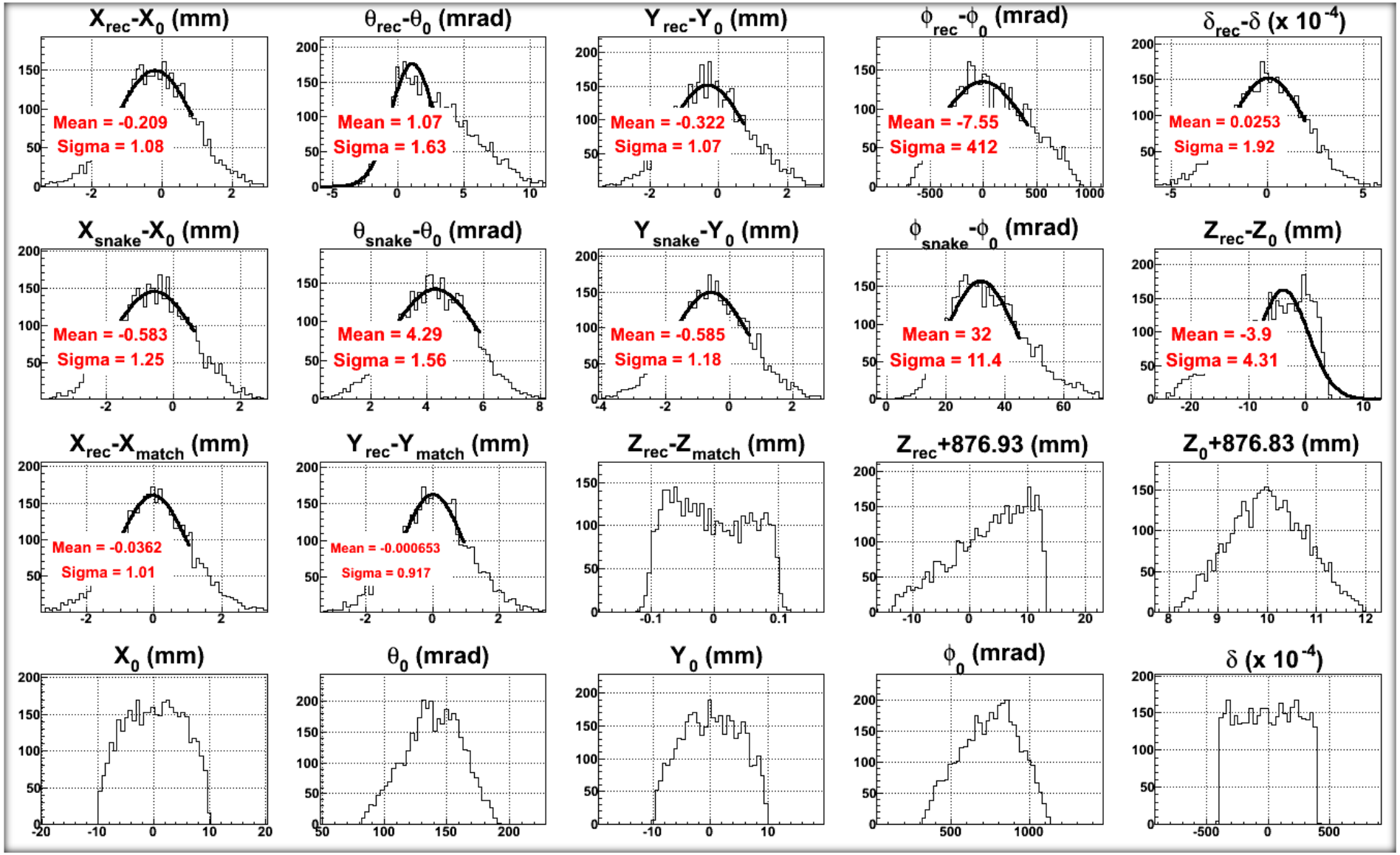
4 mm Slice at 10 mm upstream



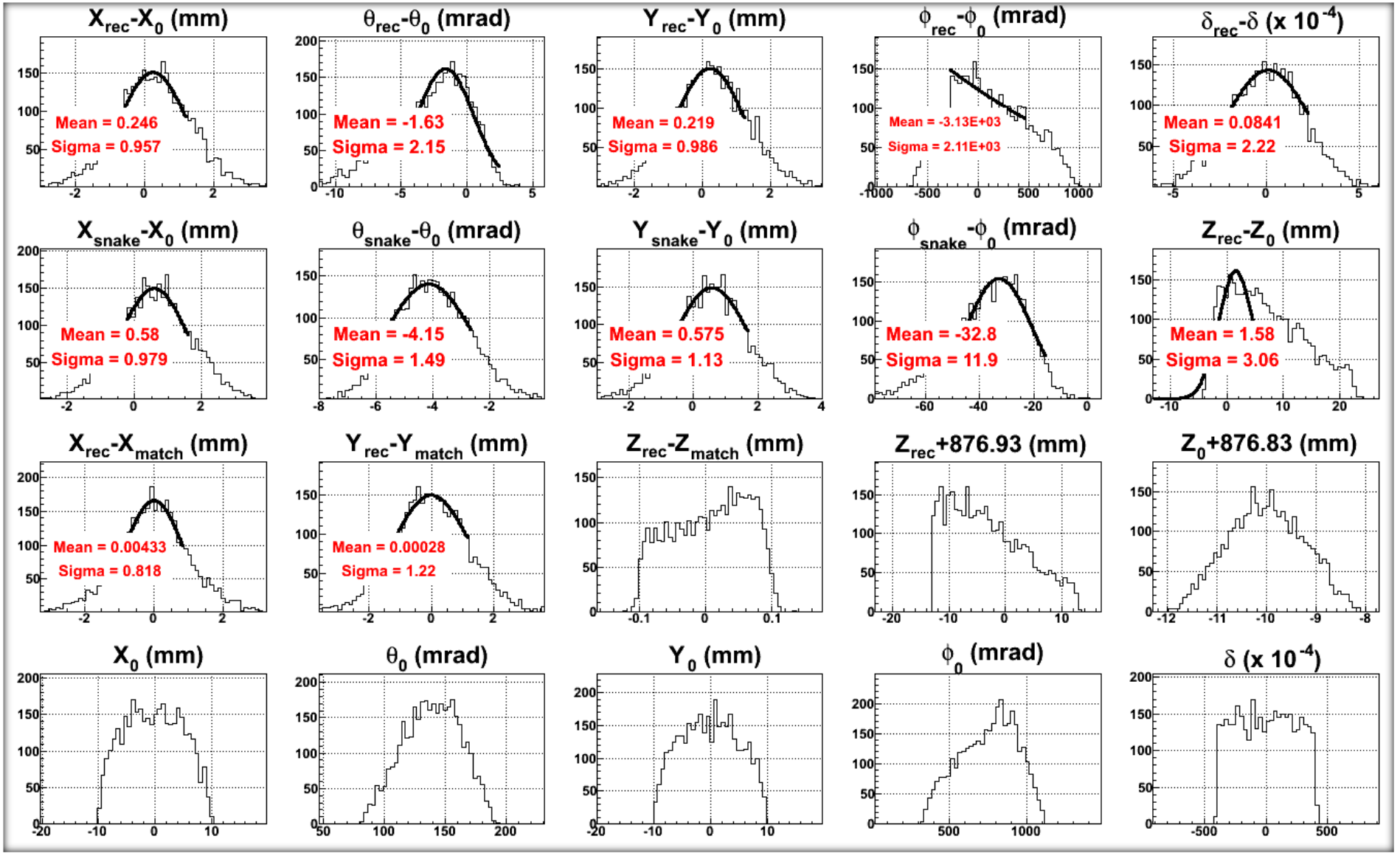
4 mm Slice at Target Center, CUT



4 mm Slice at 10 mm downstream, CUT



4 mm Slice at 10 mm upstream, CUT



Conclusion

- Could there be any mistake in the method? Need more time to double check.
- If this work is correct, then we can say matching 2 trajectories in 3-D will not do anything better than matching in 1-D.
- Need some more good ideas.