Systematic Misalignments with Cosmic Data

Alignment Meeting Dec 4, 2008

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- **In the talks on Oct 16, Oct 30, and Nov 11**

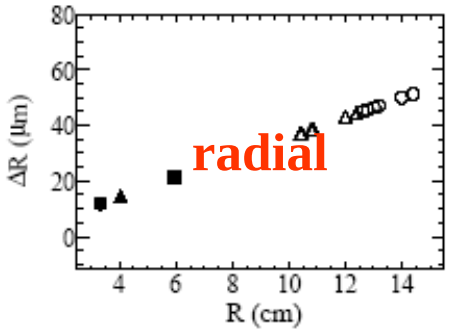
  presented the results of systematic misalignments

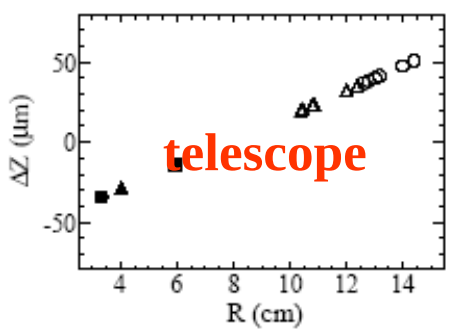
  alignment with tracks only, 4 dof, using CRUZET-4 data,
  start from best alignment with 4 dof plus misalignment,
  also investigated the survey constraint

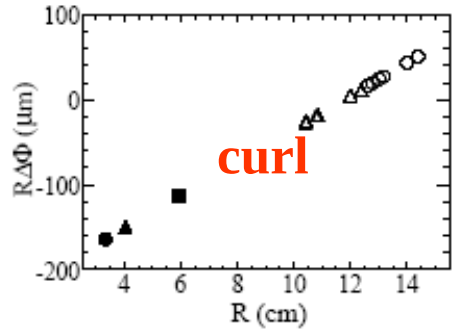
- **Now study the misalignments using CRAFT data**

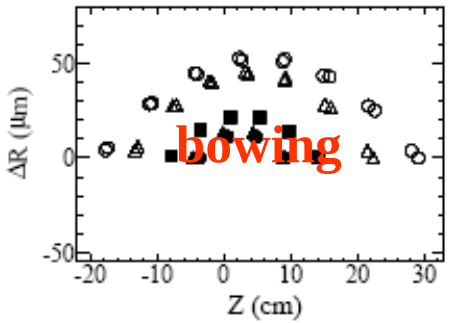
  - 3.9 million AlcaReco

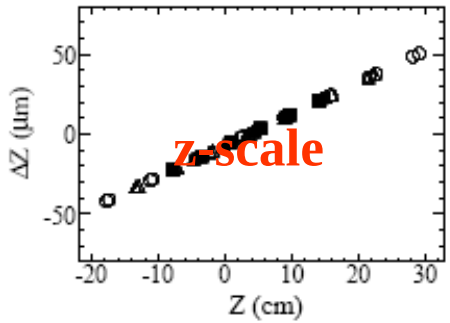
Some history from BaBar studies

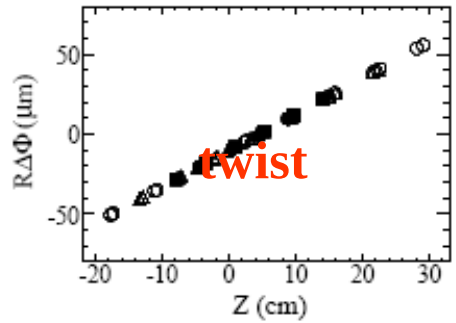


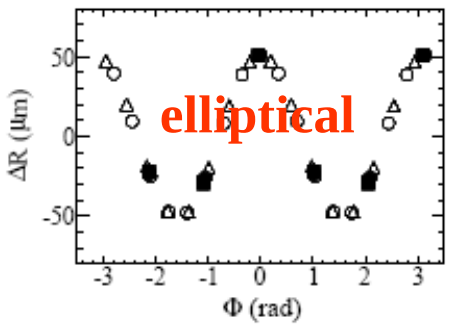


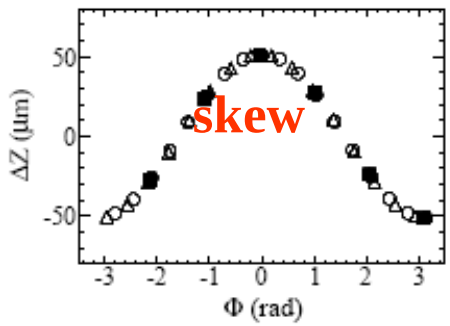


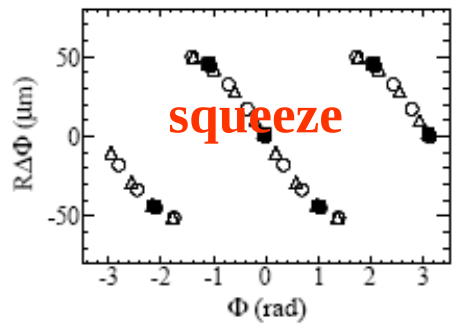






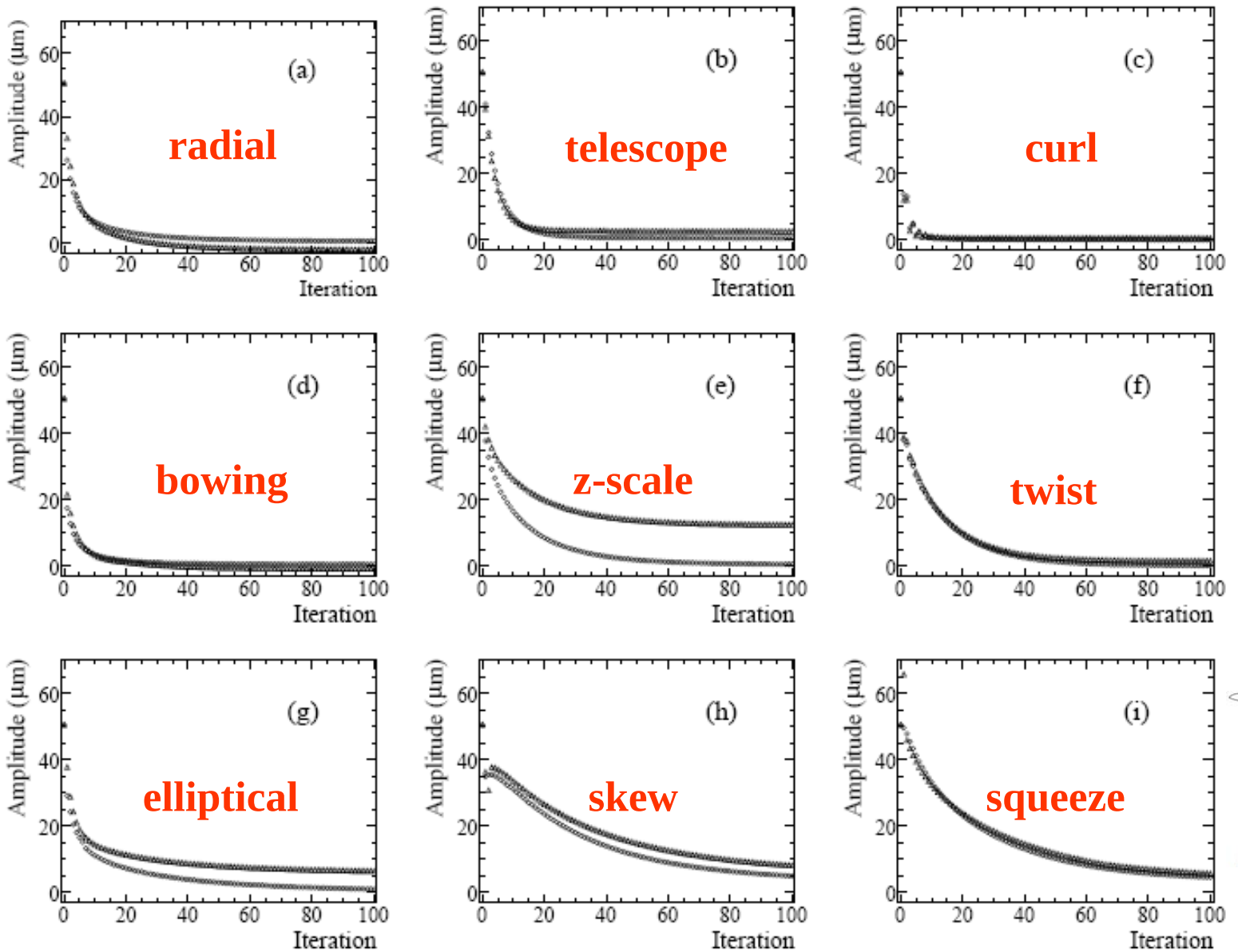






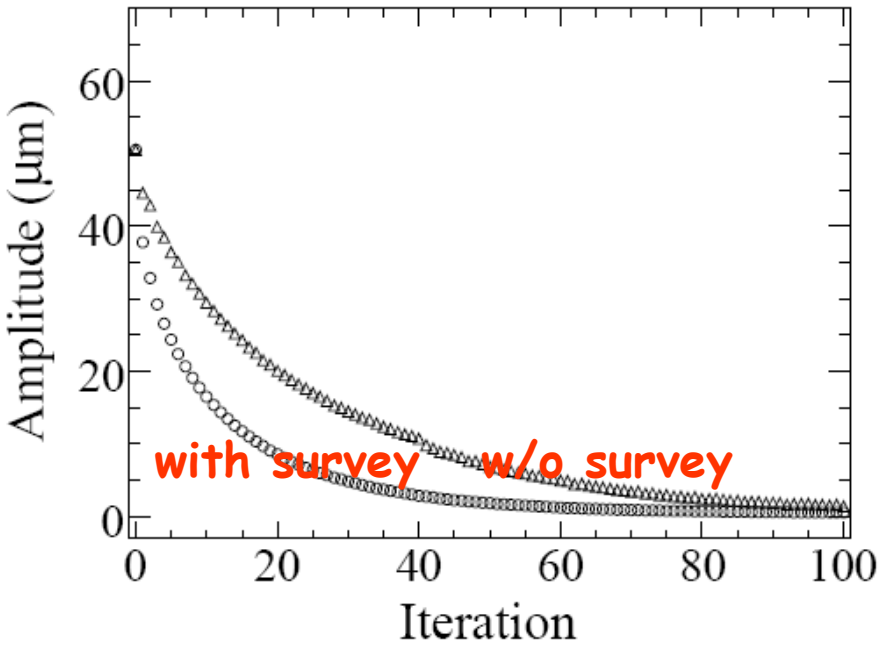
Nine global systematic distortions based on BaBar's experience

Tracks remove all systematic distortions on BaBar



Amplitude of the remaining distortions as a function of iteration

See arXiv:0809.3823 [physics.ins-det]

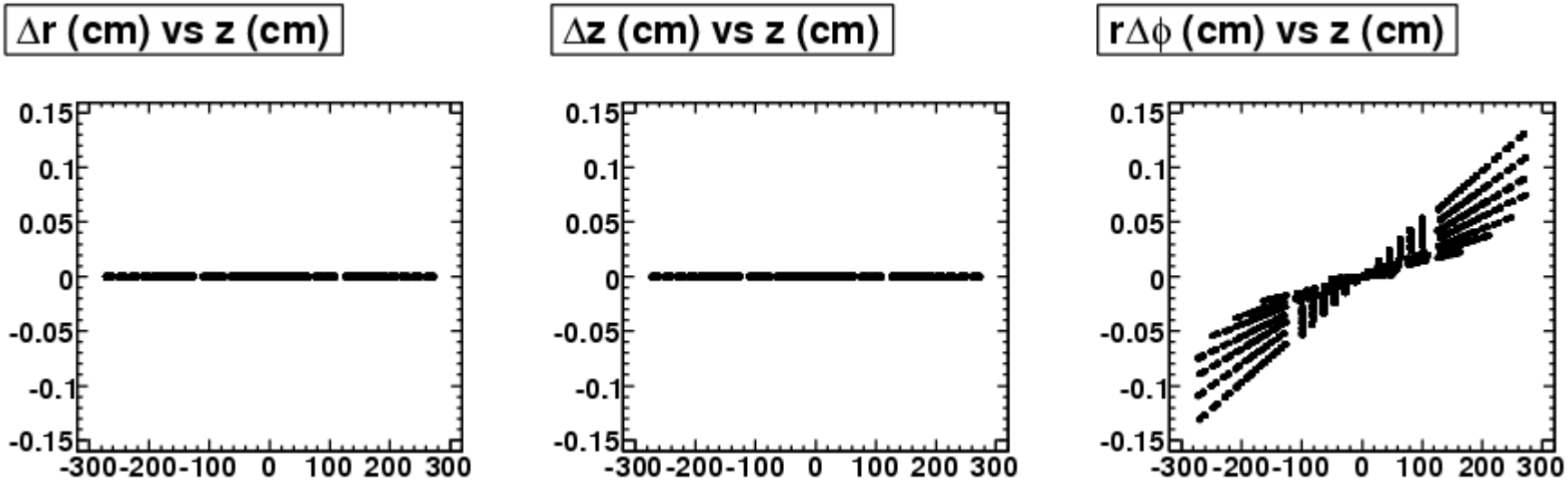


Amplitude of the remaining z-expanion distortions as a function of iteration

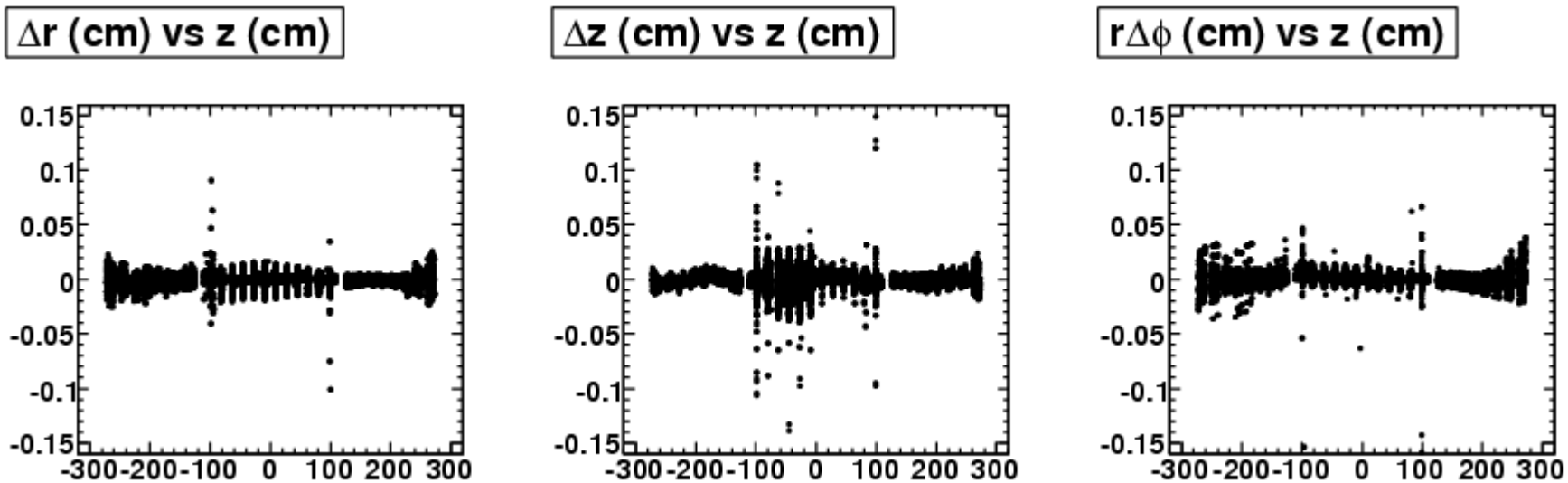
	Δr	Δz	$r\Delta\phi$
vs. r	radial	telescope	curl
decay (iterations)	5.6	5.1	1.3
distortion (μm)	0.7	0.5	0.1
vs. z	bowing	z-scale	twist
decay (iterations)	2.6	11.2	12.0
distortion (μm)	0.6	0.6	0.1
vs. ϕ	eliptical	skew	squeeze
decay (iterations)	11.8	33.6	32.0
distortion (μm)	0.9	4.9	4.5

Decay time (in units of iterations) and the remaining distortion

Twist with CRAFT data

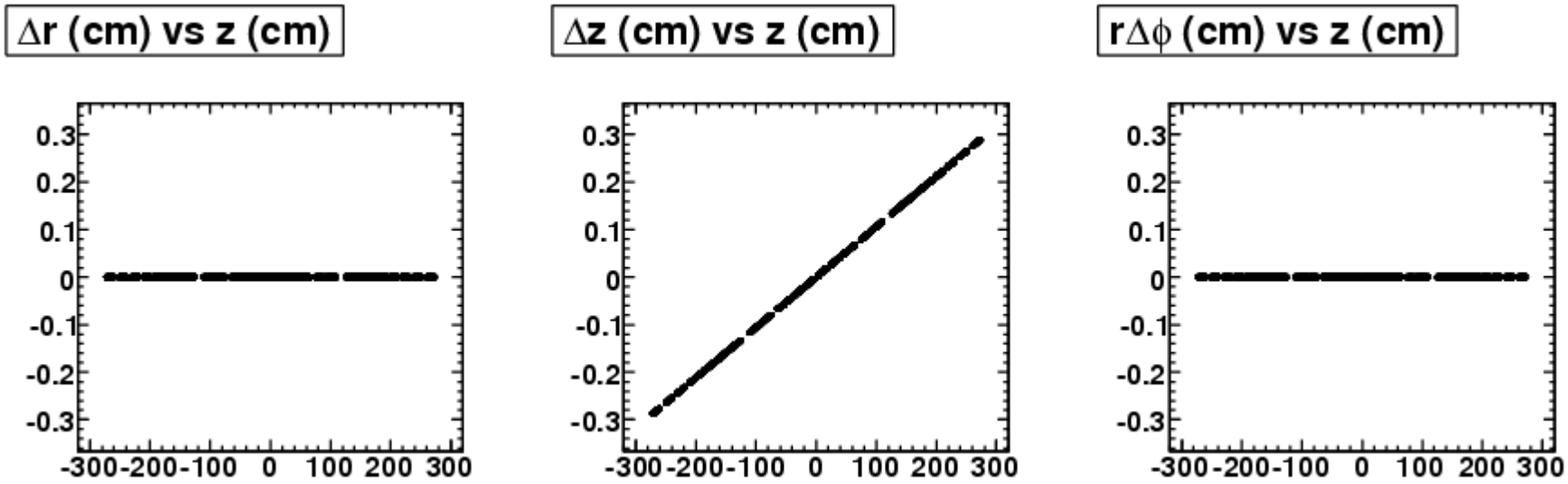


Geometry Comparison (before Alignment)

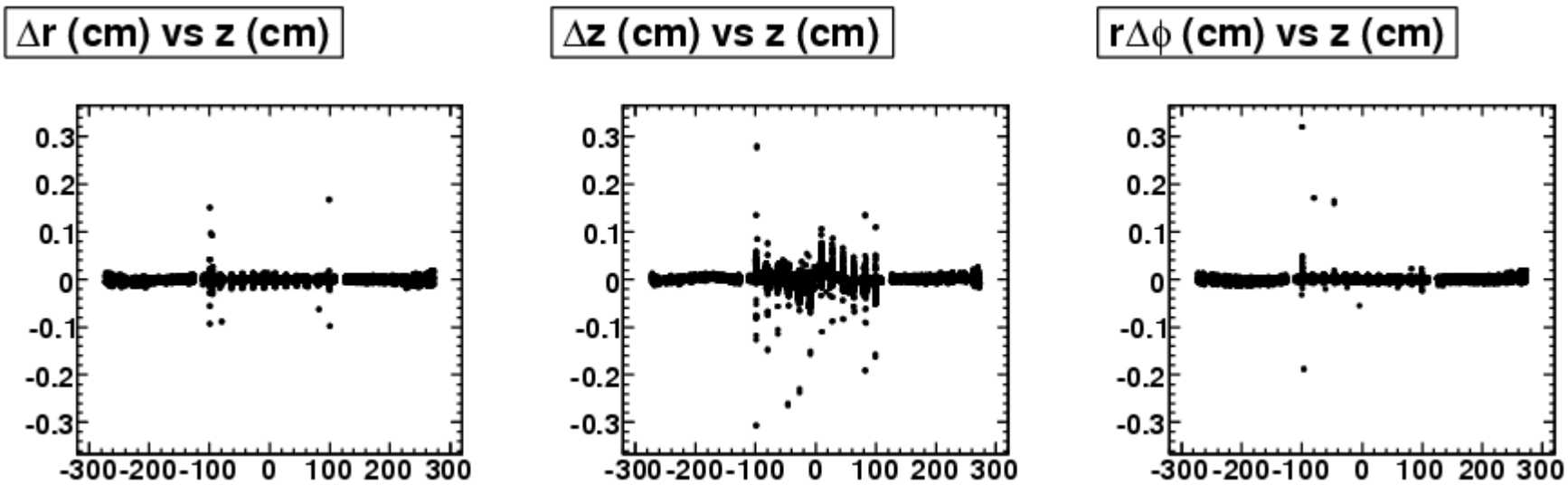


Geometry Comparison (after Alignment)

Z expansion with CRAFT data



Geometry Comparison (before Alignment)



Geometry Comparison (after Alignment)

Summary

- The CRAFT tracks get rid of the weak modes
  - more pixel hits, could help to constraint z-expansion, and for the twist?

- Some wiggles and scatter are introduced in all dimensions

- The differences between CRUZET and CRAFT are pixel hits and track curvature
  need to understand the effect on these weak modes

- We plan to run a test with the pixel hits removed.