

## Compare Long Track and 6pt Reference Track resolution

D. A. Jensen

31 October 2008

I have been studying the resolution in Bo by finding tracks, doing a fit to the track, nominally 30 points ( minus inefficiencies of course ), and then looking at the deviation of each of the points used to fit the track from the fit track.

The alternative method is to find a track, then use say 6 ( a parameter of course ) points that are on the track but not including the point under consideration, to determine a straight line and then look at the deviation from the point in question from that line. The point in question is nominally the point half way between, so say 3 points on either side of the point in question. At the ends of course, one must select reference points more to one side or the other.

I have implemented this second method. In testing the routine, I noted that if one builds a track with jittered points ( no scattering, just a simple Gaussian smearing, the observed resolution is about 10% wider than the smearing put in. That is, the 'true resolution' ( ignoring multiple scattering ) is about 10% less than the observed resolution.

The data selection includes that the events be clean ( number of excess hits average less than 2.5 per hit wire ). The differentiation is included, with 20 pre and 10 post samples. The window in the track search is + or - 0.75 cm.

To compare the results of the two methods, I processed the data from run 121 ( sensitive to long tracks in the first two induction planes ). A and B refer to the first half and second half of the wire planes respectively

	Observed Resolutions - cm			
	1A	1B	2A	2B
Long	.047	.049	.059	.063
6 Pt	.048	.052	.064	.068

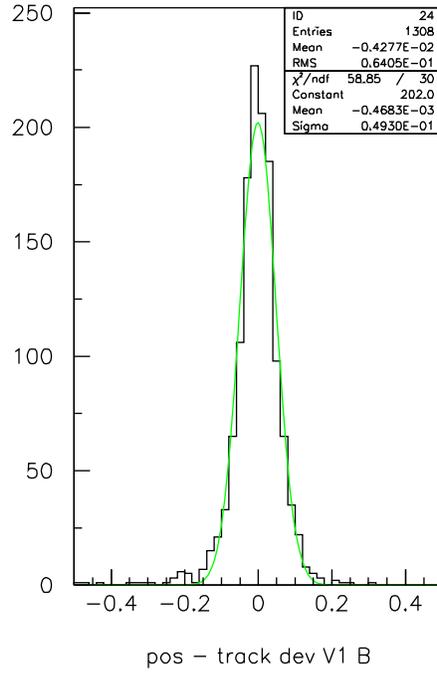
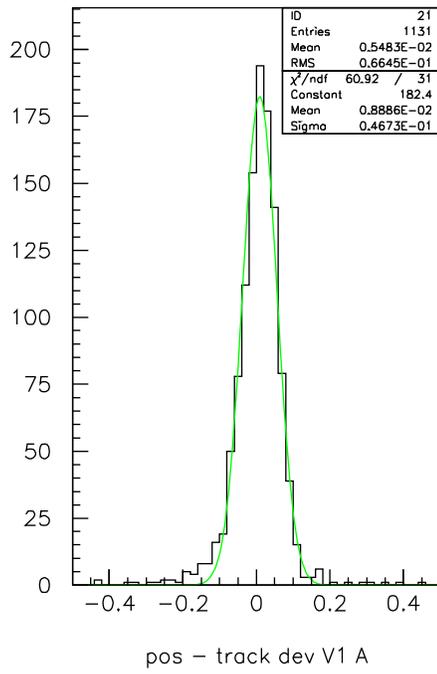
The errors on the fits to the gaussians are of order 5% or about 0.002.

The differences are small, suggesting multiple scattering of the tracks is not a large effect. These results suggest the 'true' resolution is approximately 0.045 cm

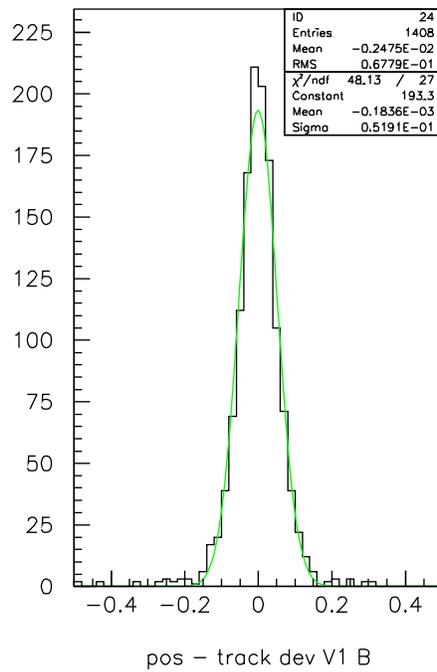
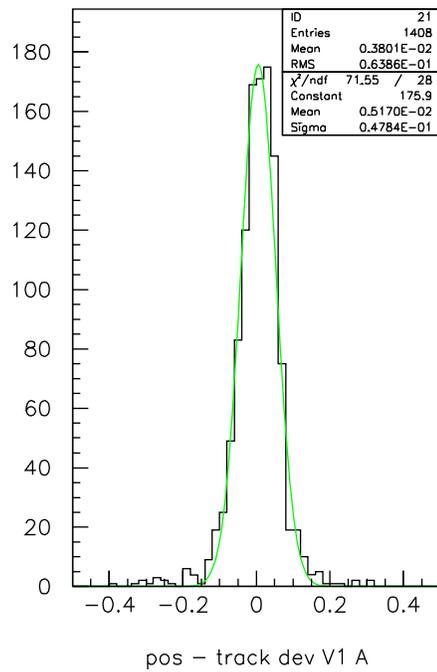
The differences in determining resolution are as expected. Using 6 outside points, one expects to observe 1.08 times the resolution. Using 2 points, 1.22 times the resolution, and with the full track ( point under consideration included), 0.97 times the intrinsic resolution.

The plots are on the following pages. The last page shows the 6 reference point resolutions on a semi-log plot.

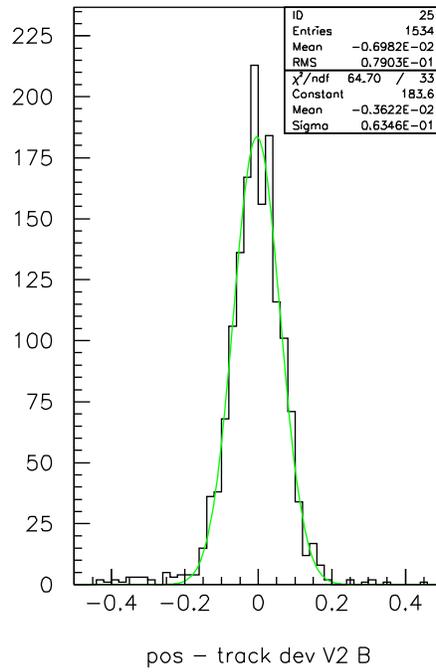
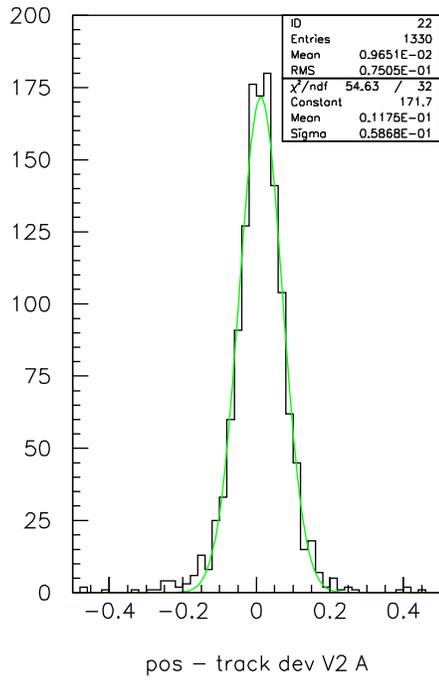
### Run 121, Long Tk Res



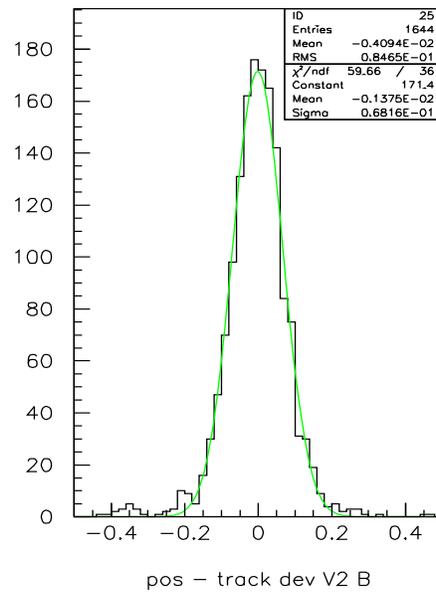
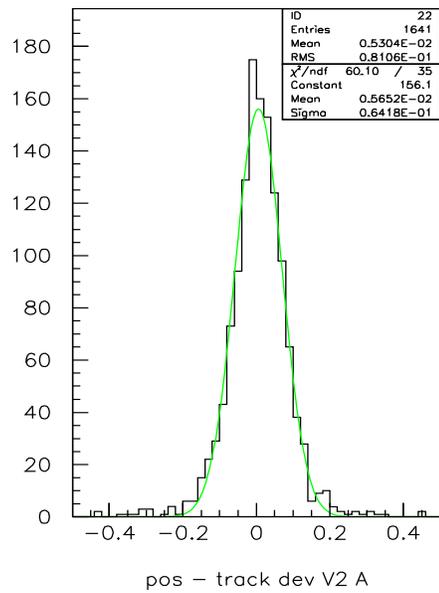
### Run 121, 6 Pt Ref Tk Res



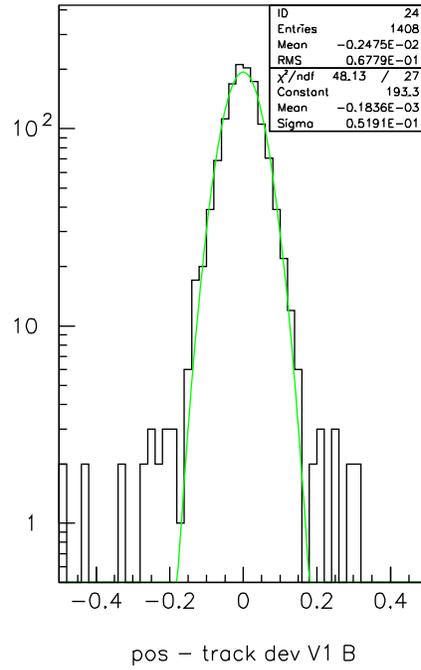
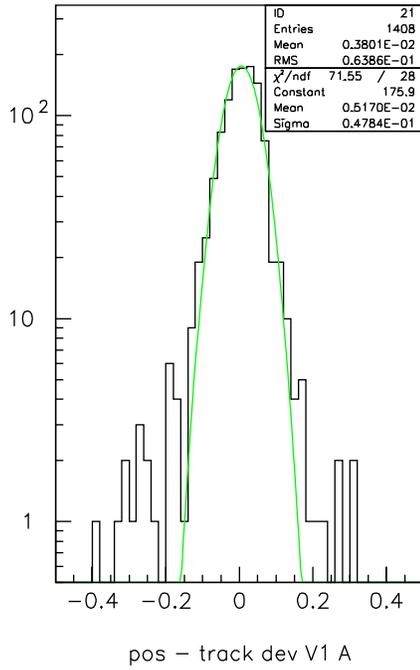
### Run 121, Long Tk Res



### Run 121, 6 Pt Ref Tk Res



### Run 121, 6 Pt Ref Tk Res



### Run 121, 6 Pt Ref Tk Res

