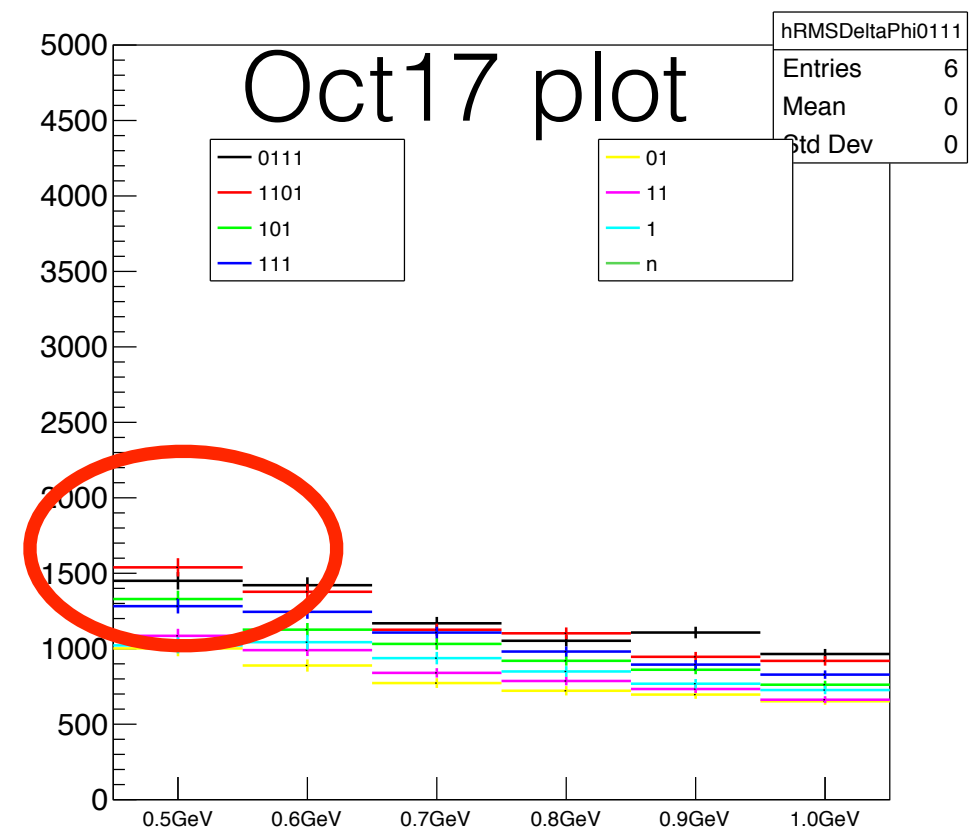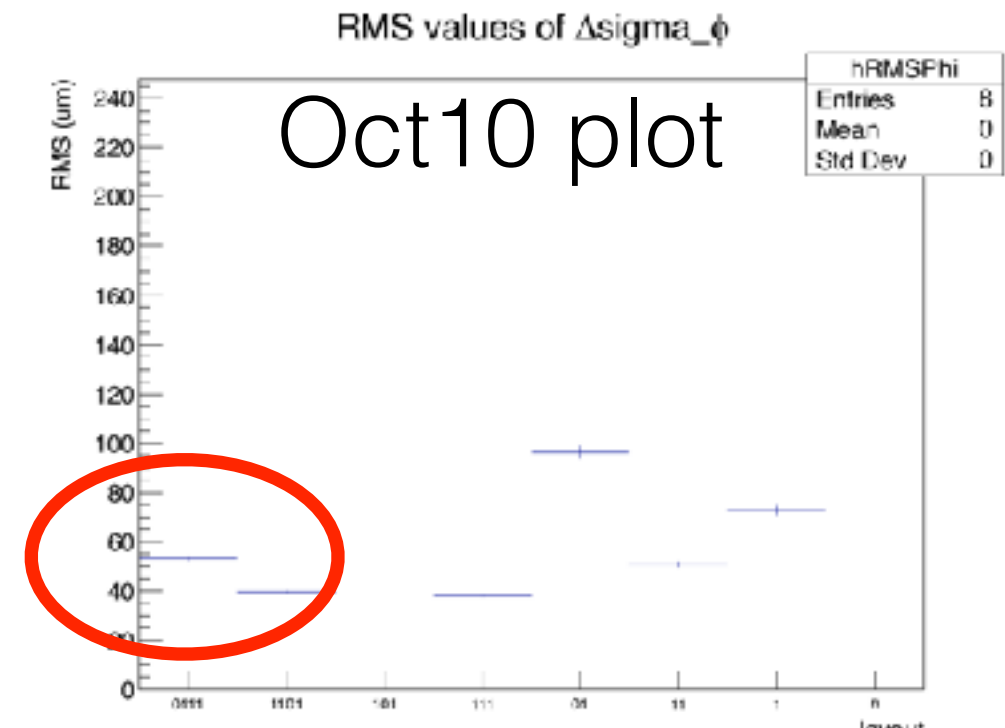# Regarding Shift in Phi Resolution

In addition to various improvements made, The recent set of plots also fixed an explicit error in the calculation of the phi resolution, to properly give a distance in um instead of 1e4radians:

Previously: (phi2-phi2t)*1e4

Now: (phi2-phi2t)*r2*1e4

Where r2 is the radius. At a radius of 30cm, this should result in a x30 increase in the RMS, taking 50um to 1500, which is approximately what we see for the 0111 case.
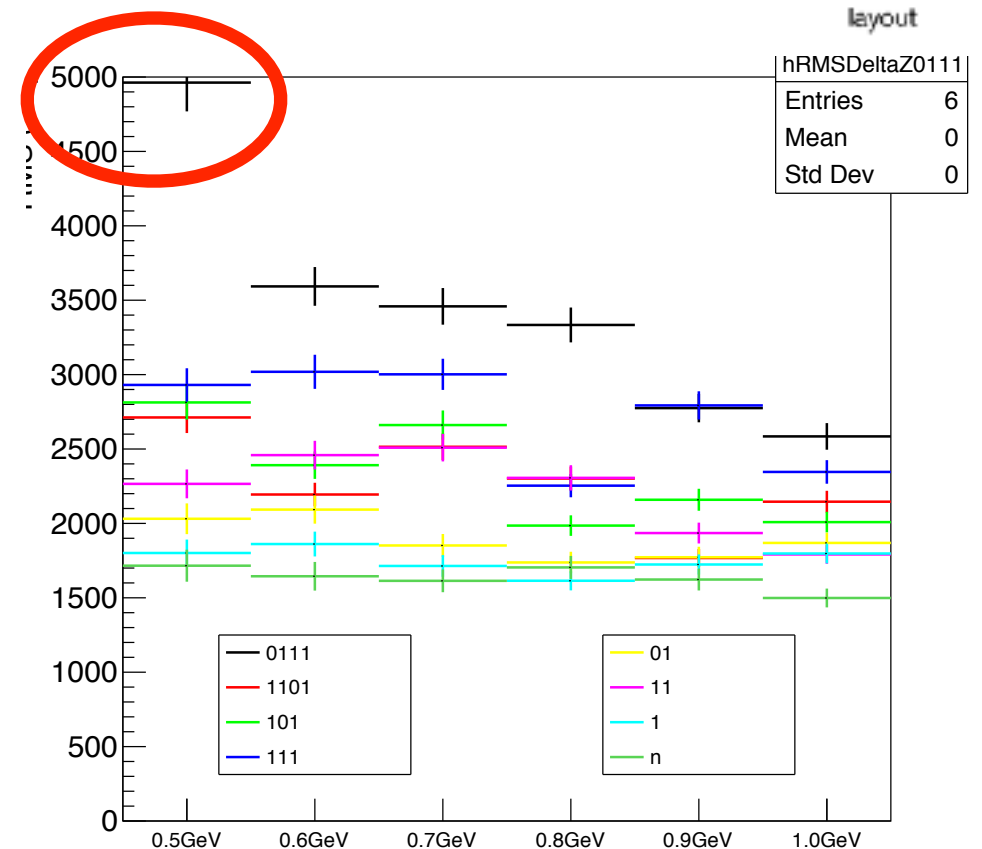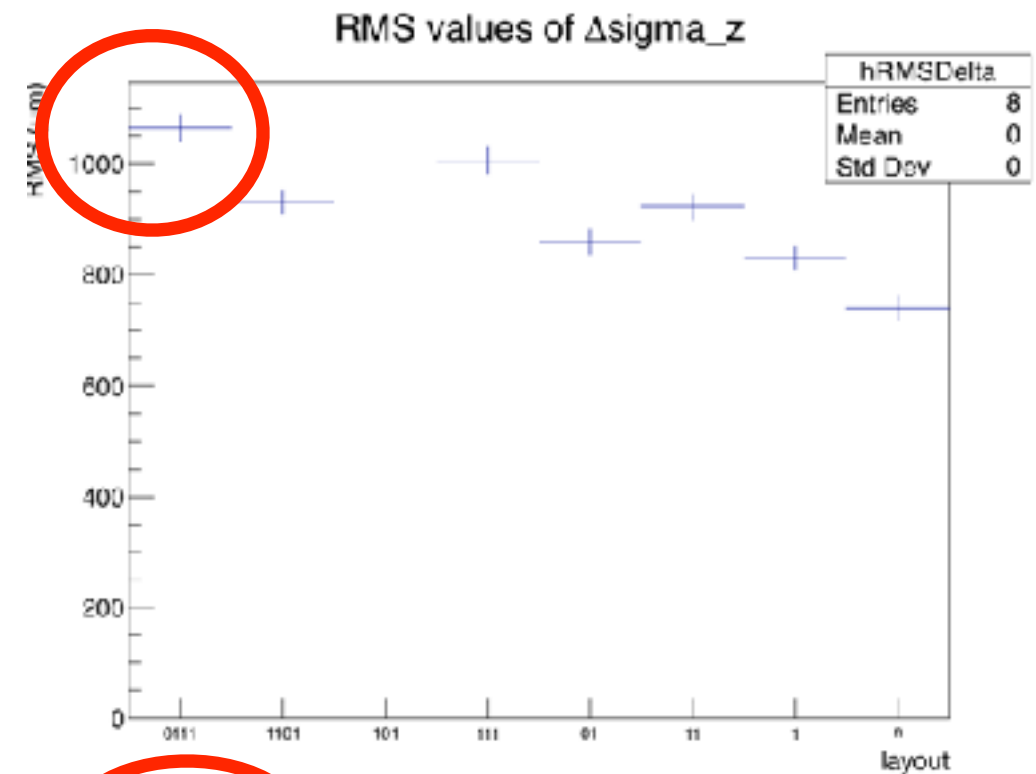
Regarding Shift in Phi Resolution

The resolution I report is the RMS of the distribution, which is sensitive to outliers. By removing five large-delta events in the 0111 set from Oct17 we can change the RMS by a factor of 3 or more, so it seems reasonable to expect the results to differ by a factor of up to 30*few=100 between Oct10 and Oct17. We will replace the RMS value with an actual gaussian fit, but this is not implemented yet.
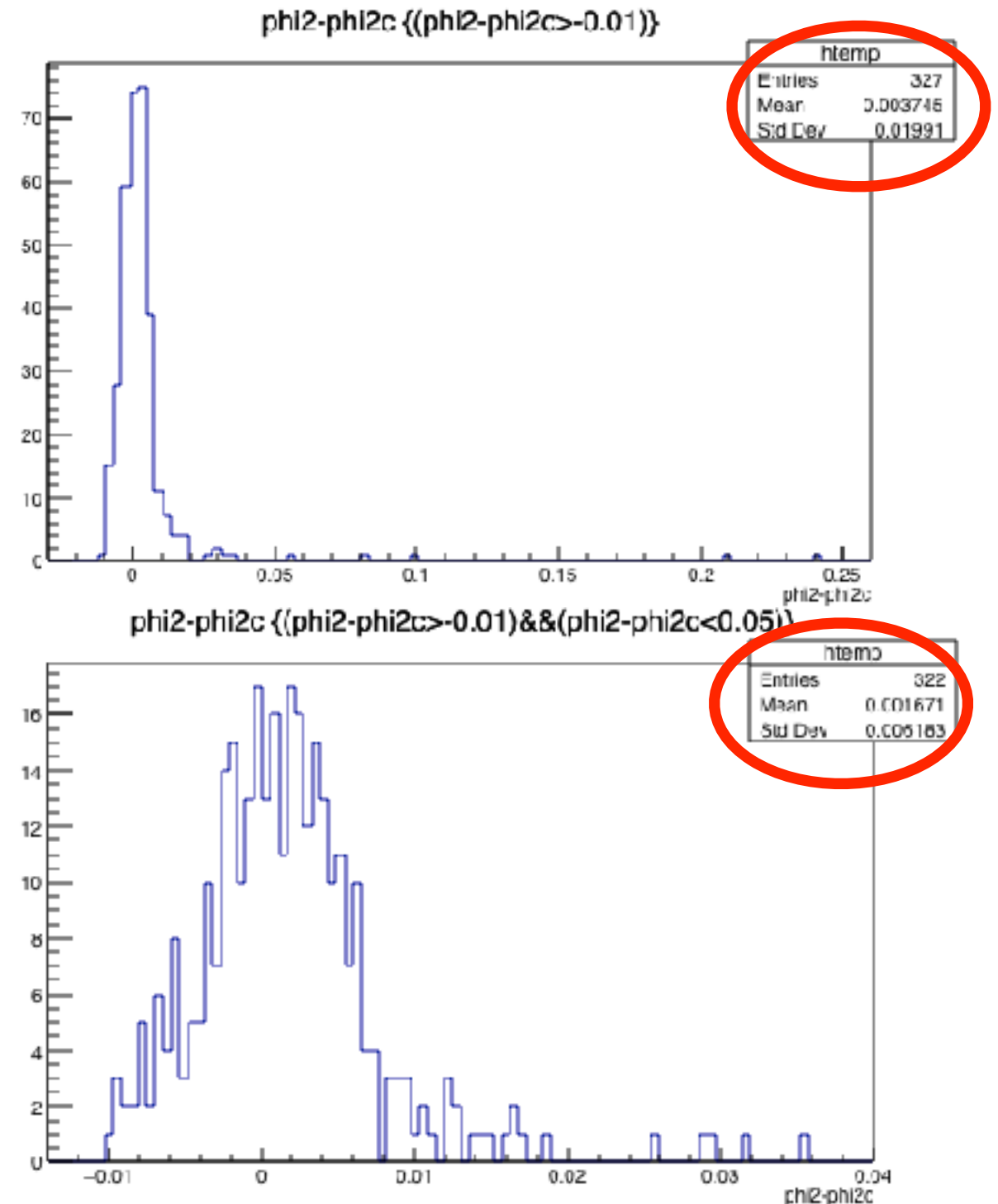
Regarding Shift in Z Resolution

The calculation of the z resolution is the same, but the true track position at that layer, previously taken to be the center of the cluster at that layer, is now the position of the g4hit with radius closest to the desired layer (if multiple hits have the same radius, we use the first one we find). We would expect to see similar performances in the Oct10 and Oct17 plots, but are instead off by a factor of ~2 to 5.

Regarding Shift in Z Resolution

Given the 'factor of few' we see in the phi resolution just due to outliers, we would expect Z resolution to be similarly sensitive, and indeed it is: When looking at the distance between track and cluster (rather than g4hit) positions in Oct17, trimming is able to move the RMS significantly. A factor of 2 comes from two outliers, and another factor of 2 from the next ~10%.

Gaussian fits and a modest increase in statistics should help stabilize this.
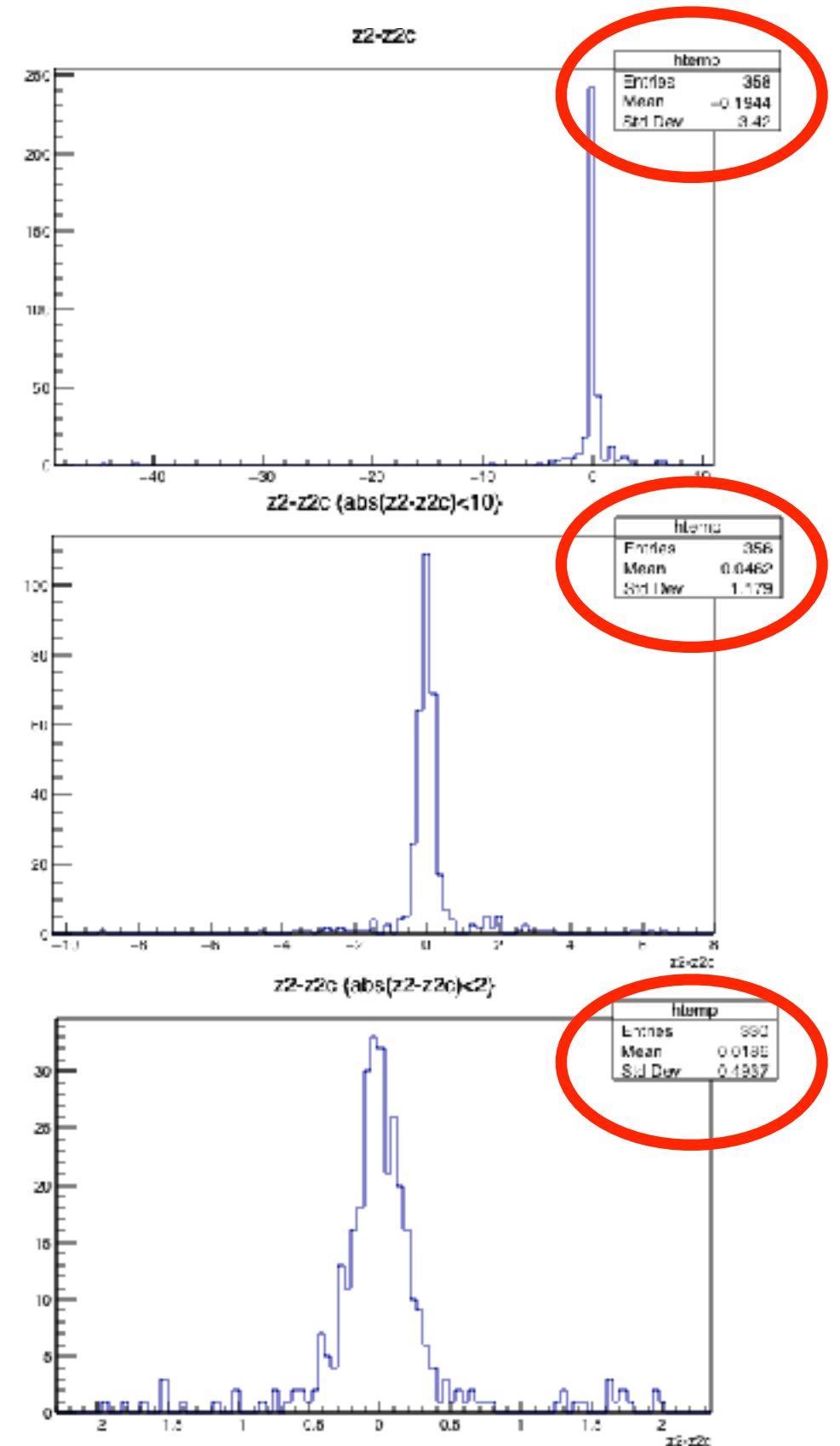
Regarding Extrapolating to Cluster Position

Tony also noted that the current procedure incorrectly compares the phi and z positions of the closest g4hit and the extrapolation to the radius of the nearest cluster, which may not be at the same radius as the hit itself. These differ by as much as 0.5cm at 0.5GeV.

The differences in the means is slightly larger than the standard deviations of the samples, but this is once again dominated by outliers. This will be corrected in the next version.