Linked List Segment Reconstruction

Monday, July 16, 2001

Introduction

This paper gives a short overview of the performance of the Linked List algorithm from Monday, July 16 on. The plots in this paper are made with the package version v00-00-22, which first appears in t01.53.00. All plots in this document are based on the file:
`/prj_root/779/alg_7/mudata/d0sim_mu_mb1.1_t01.24`
which holds 5000 events.

Reconstruction efficiency

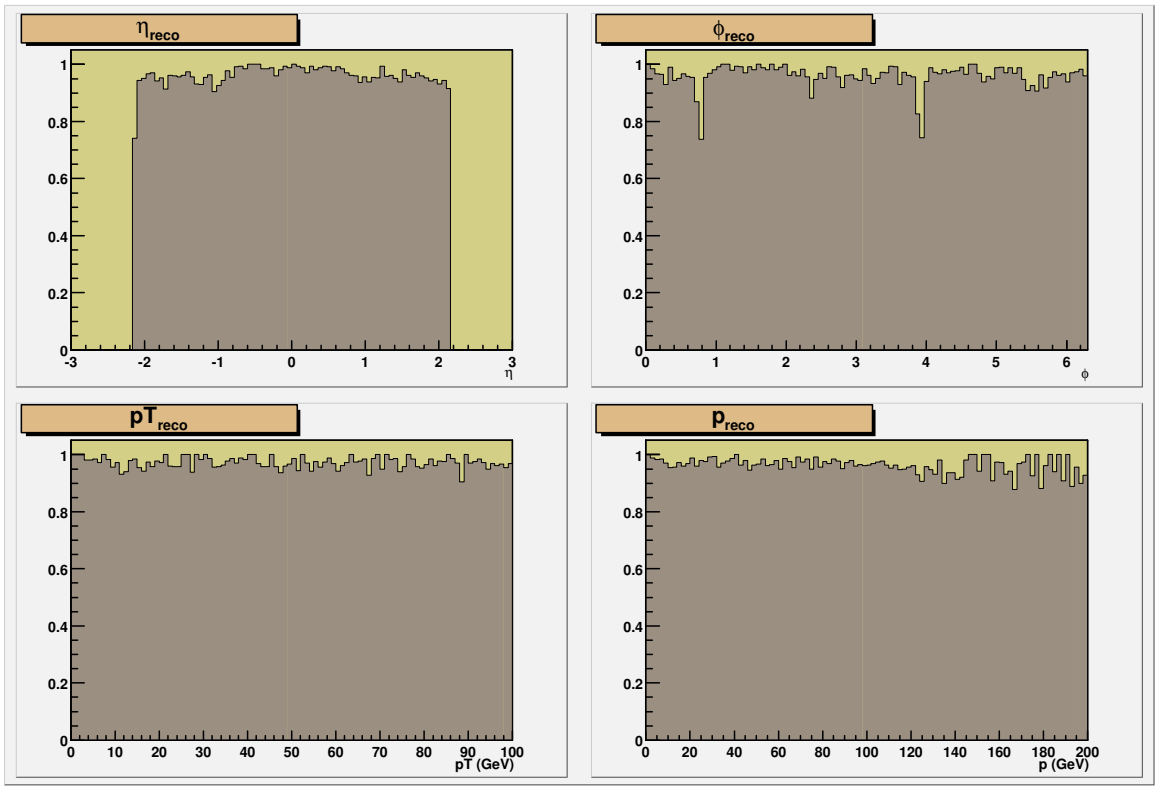

Figure 1: Reconstruction efficiency

The overall reconstruction efficiency is 96.4%. This efficiency is without the geometrical acceptance, but does have the hit reconstruction efficiency folded in.

Reconstruction resolution

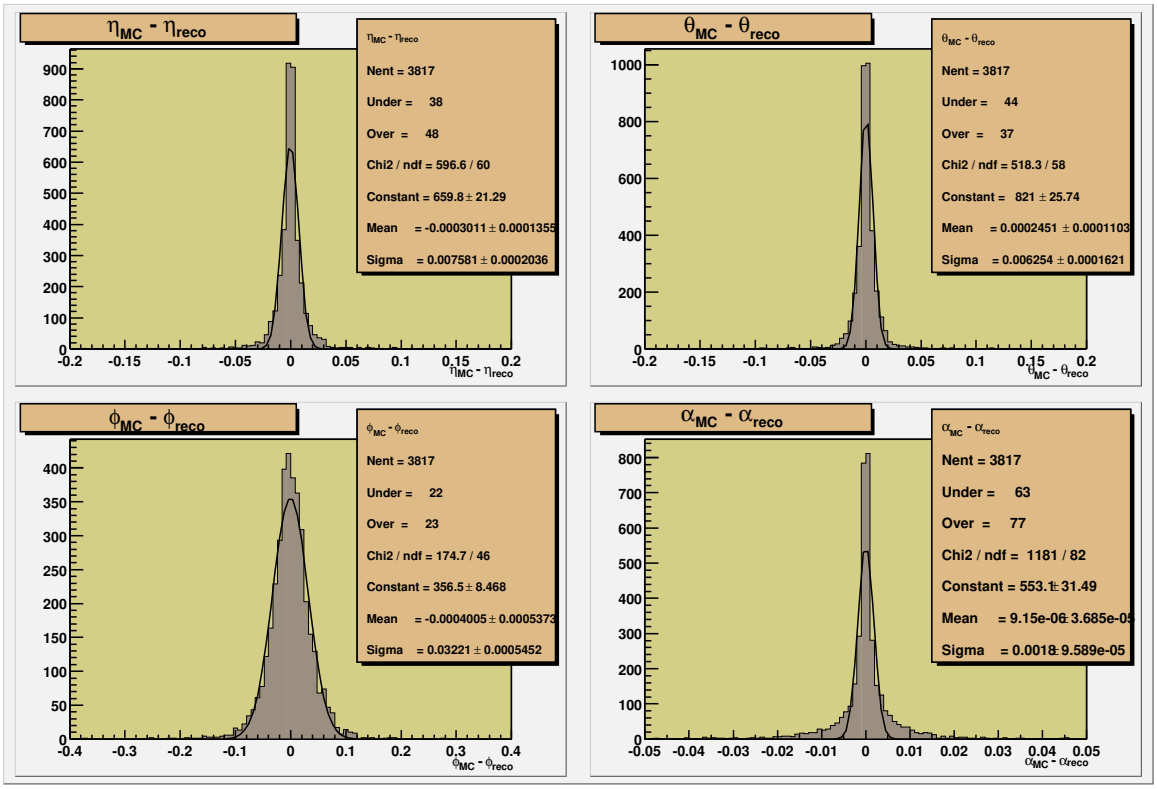

Figure 2: Resolution in the central region with a vertex constraint on the A-layer segment

Figure 2 shows the resolution in the central region. For the A-layer, a vertex constraint is put on the direction of the segment: it is required to point to the origin. For high p_T tracks, this might be a sensible thing to do (the file analyzed contains tracks between 0 and 100 GeV with a uniform distribution, so most are 'high' p_T tracks). However, for low p_T tracks I am not too sure if a vertex constraint is applicable, due to the multiple scattering in the calorimeter. Figure 3 shows the resolution without this vertex constraint.
The use of this vertex constraint is governed by a RCP switch in MuoSegmentLLReco.rcp, called 'useVertexA' so that it can be turned on and off at will.
Note, that the combinatorial algorithm uses this vertex constraint by default.

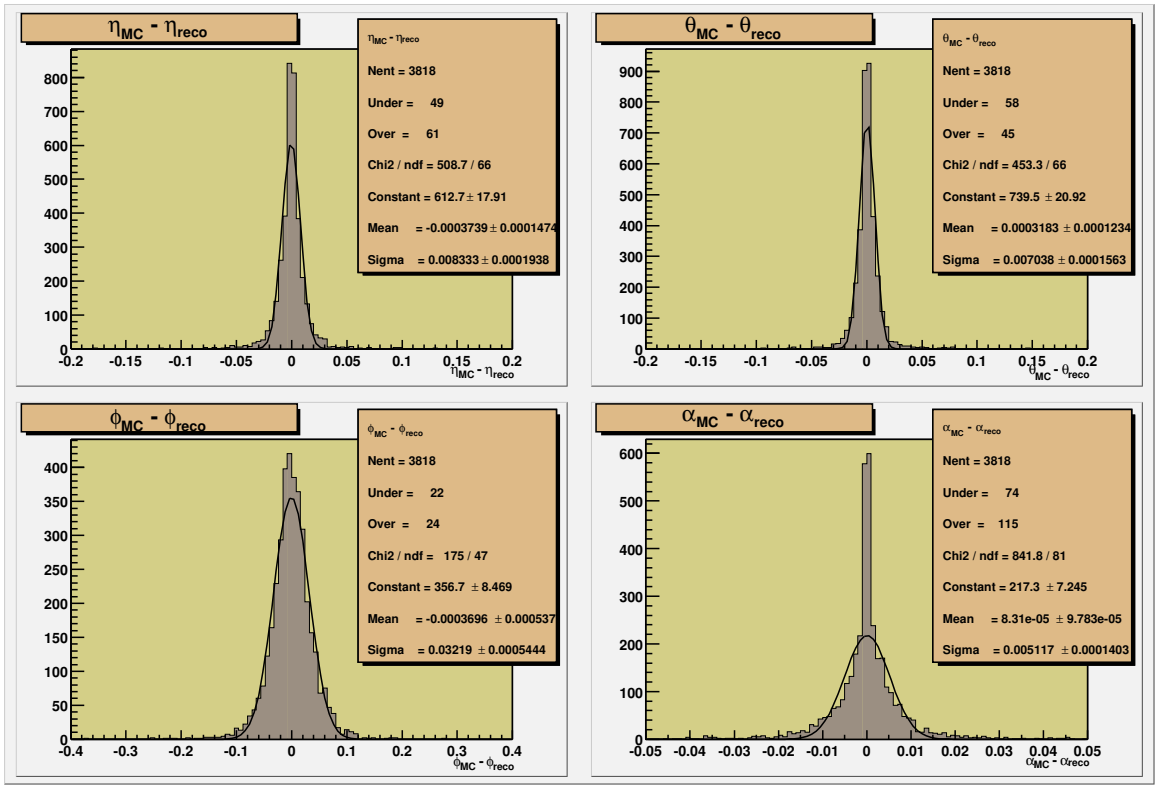

Figure 3: Reconstruction resolution in the central region without a vertex constraint on the A-layer segment

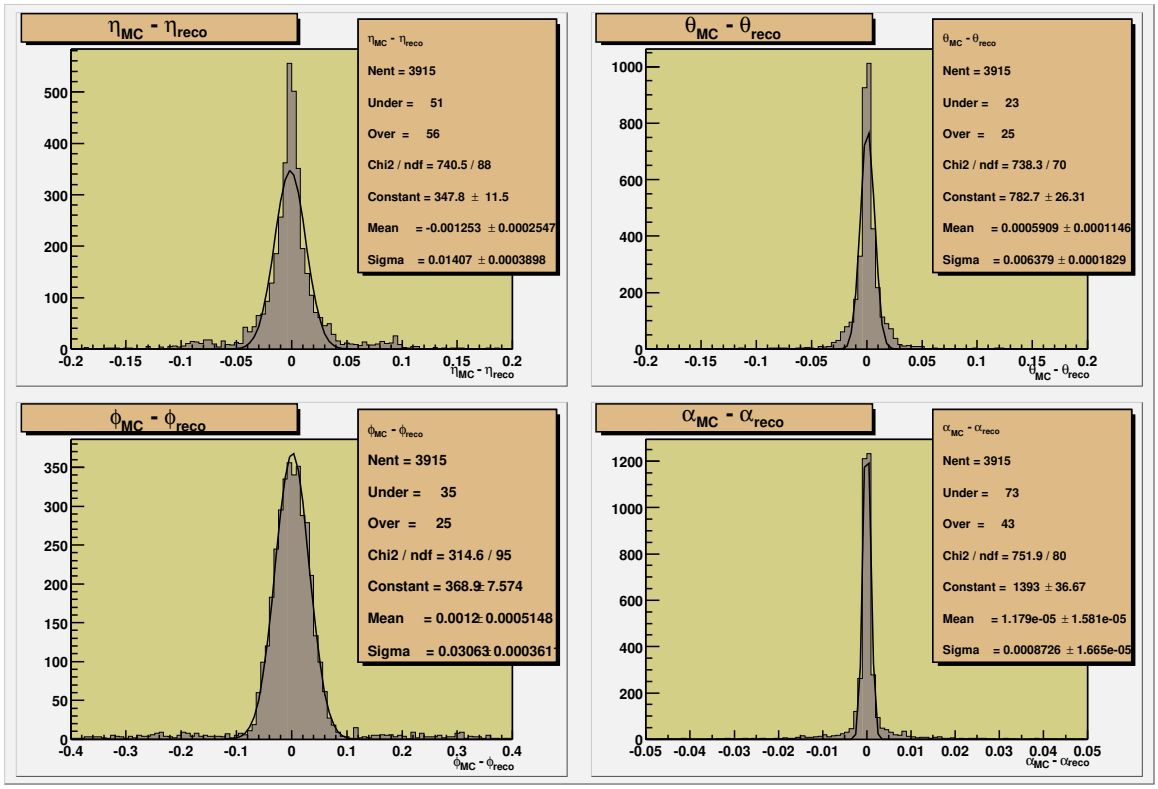

Figure 4: Reconstruction resolution in the forward region with a vertex constraint on the A-layer segment

Figure 4 shows the reconstruction resolution in the forward region, using the vertex constraint on the A-layer segment. Figure 5 shows the same resolution, without that constraint.

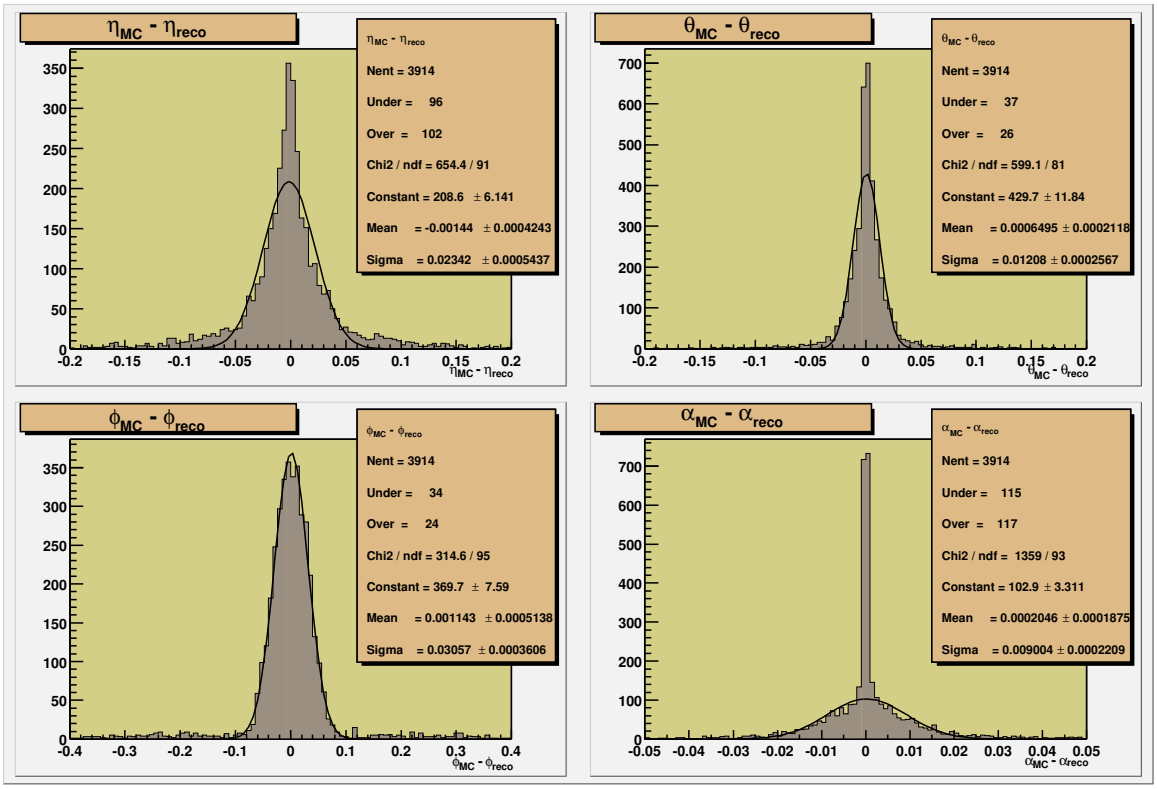

Figure 5: Reconstruction resolution in the forward region without a vertex constraint on the A-layer vertex

Pull distributions

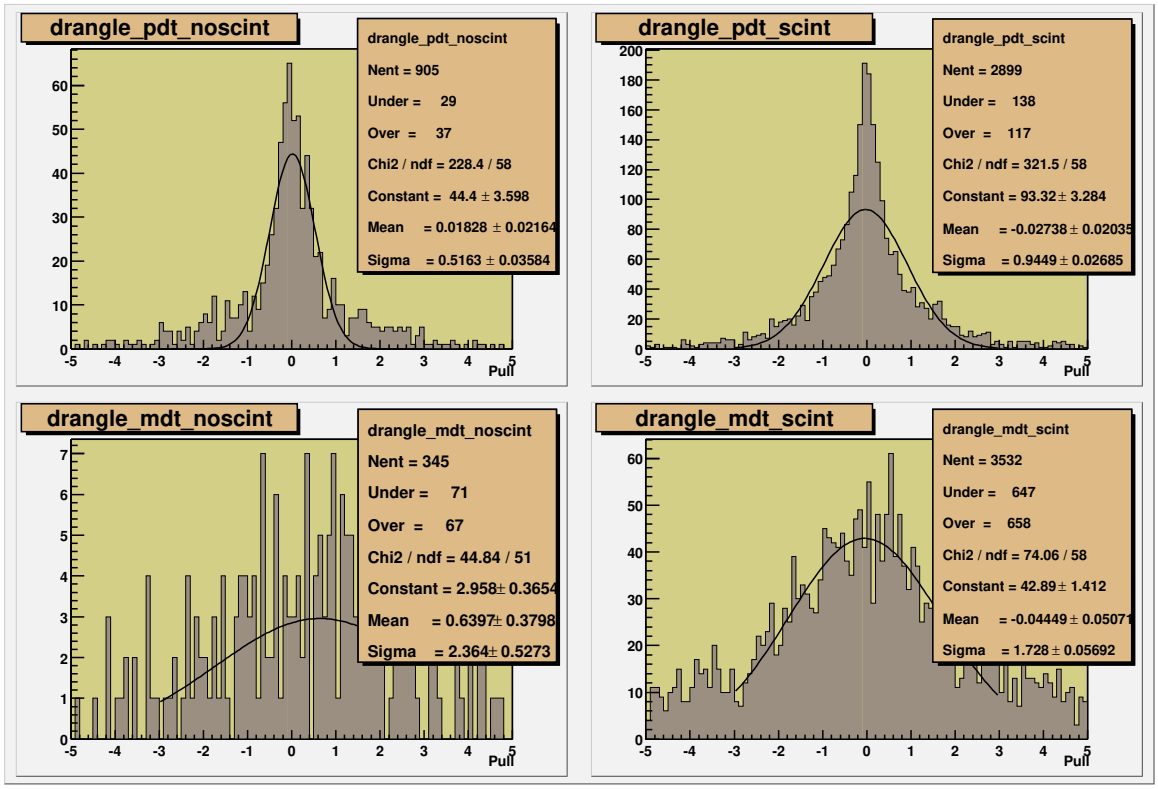

Figure 6: Pull distributions for the angle in the drift plane

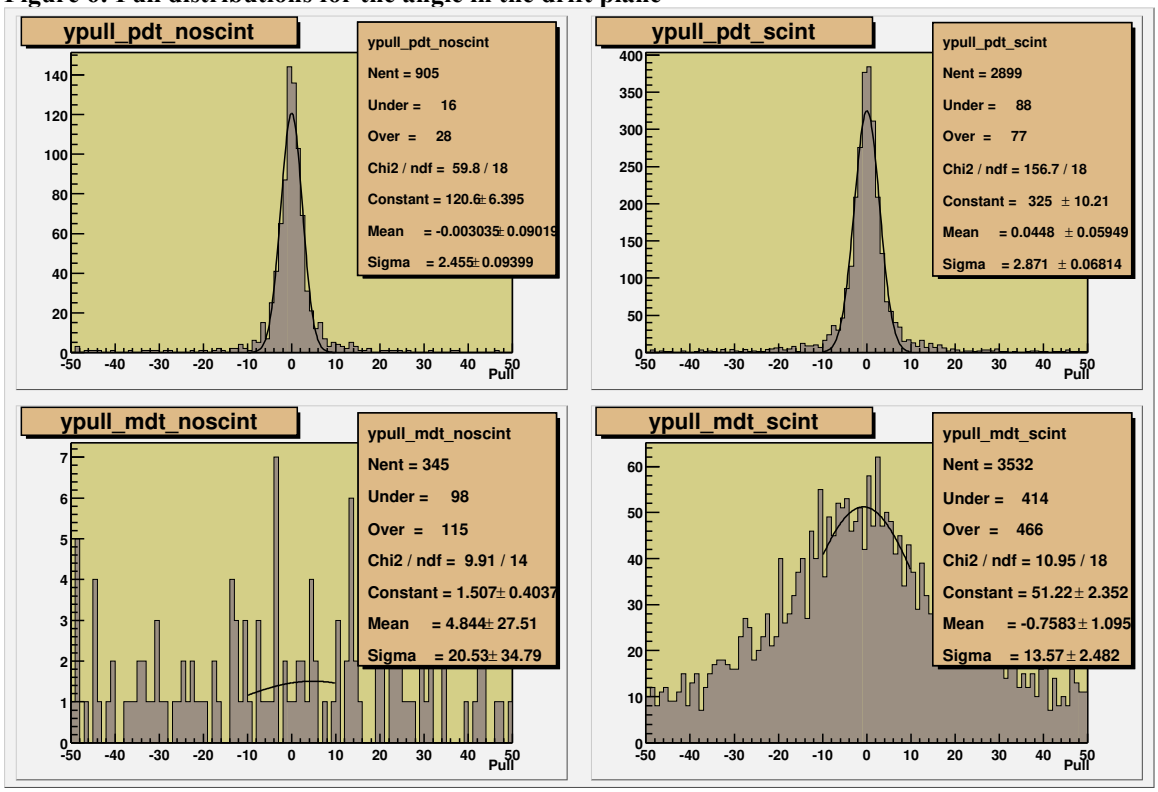

Figure 7: Pull distributions for the position in the wire plane, perpendicular to the wires

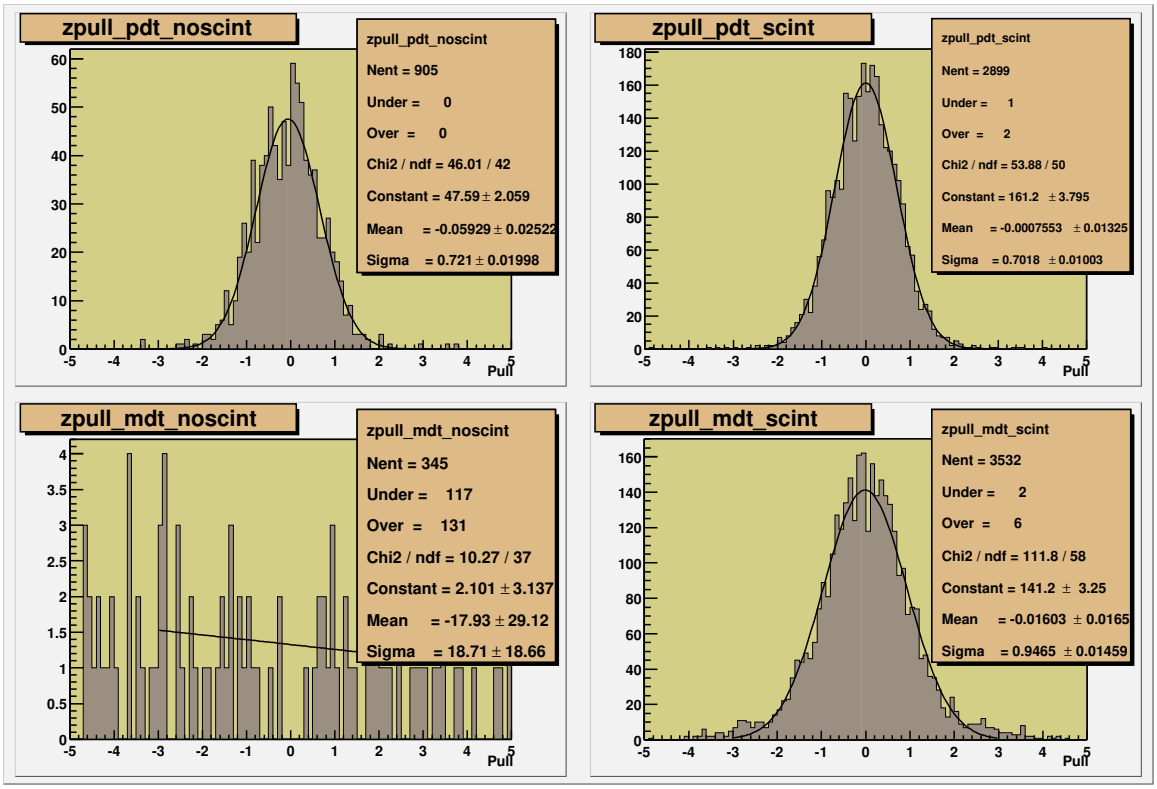

Figure 8: Pull distributions for the position in the wire plane, along the wires

From the pull plots, it is clear that not all errors are assigned correctly. However, whether this is due to an bug in the error assignment in the segment reconstruction or due to incorrect errors on the reconstructed hits can only be seen when the pull distribution for the hits are found to be correct.

Timing

For L3, we need to have a reasonable timing. In this version of the software, the segment reconstruction takes 26 ms. per event (i.e. per single muon), in the unoptimized build on d0mino. In the optimized build, the segment reconstruction takes 12 ms. per event.