Update on PrimeVtx Status

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Tracking Meeting

- Method
- Data
- Results/Status

Resolution and Pulls: Method

1. Divide tracks in two independent sets (A and B)
   - Select tracks as in standard PrimeVtx
   - For each pair of selected tracks randomly choose which track goes in which set (A or B)

2. Find vertex using the two independent track sets

3. Get x, y, z difference between the 2 vertices

4. Resolution:
   - Histogram $x_1 - x_2$
   - Fit gaussian
   - Divide sigma by $\sqrt{2}$

5. Pull:
   - $\frac{x_1 - x_2}{\sqrt{\epsilon_1^2 + \epsilon_2^2}}$
   - Fit gaussian and get sigma

Data

Using 4.11.1 PrimeVtx with default parameters

Data:

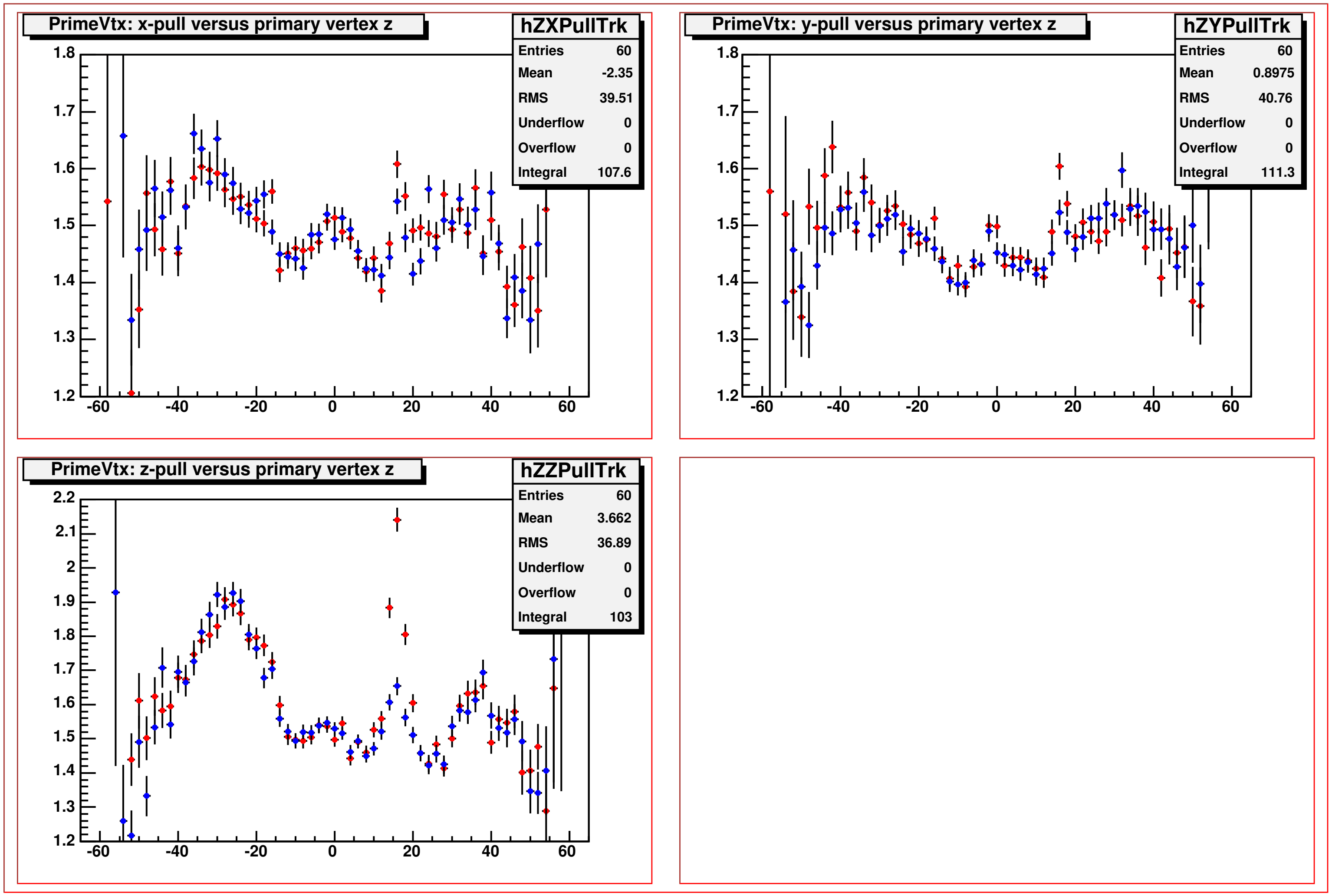
- SumEt sample (4 jets/event)
- Production 4.8.4
- Refit with 4.11.1
  - Start with alignment table "100035 2 GOOD"

Old Results:

- Spike at +15 cm in pull distribution
  - Reproduced by Ray, fixed in alignment ("100037 11 TEST" in 4.11.1)
- 5 μm sawtooth shape in track d0
  - Reproduced by Ray, no fix (yet)
- Worse resolution/pulls in Barrel 0
  - Not (yet) reproduced

Pulls vs. Z

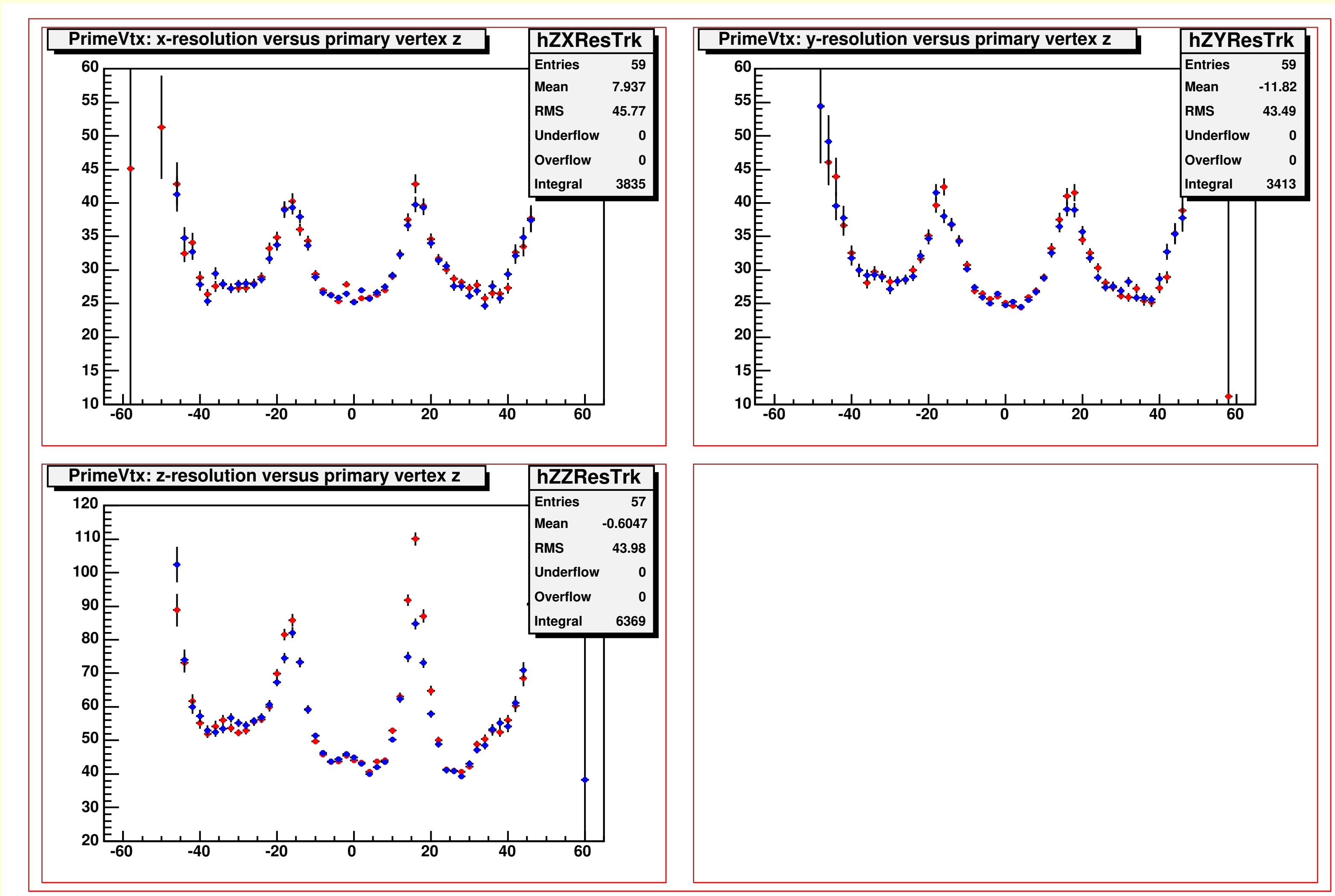
New alignment in blue, old alignment in red



Barrel spacing at negative bulkhead decreased by 78 μm and by 140 μm at positive bulkhead

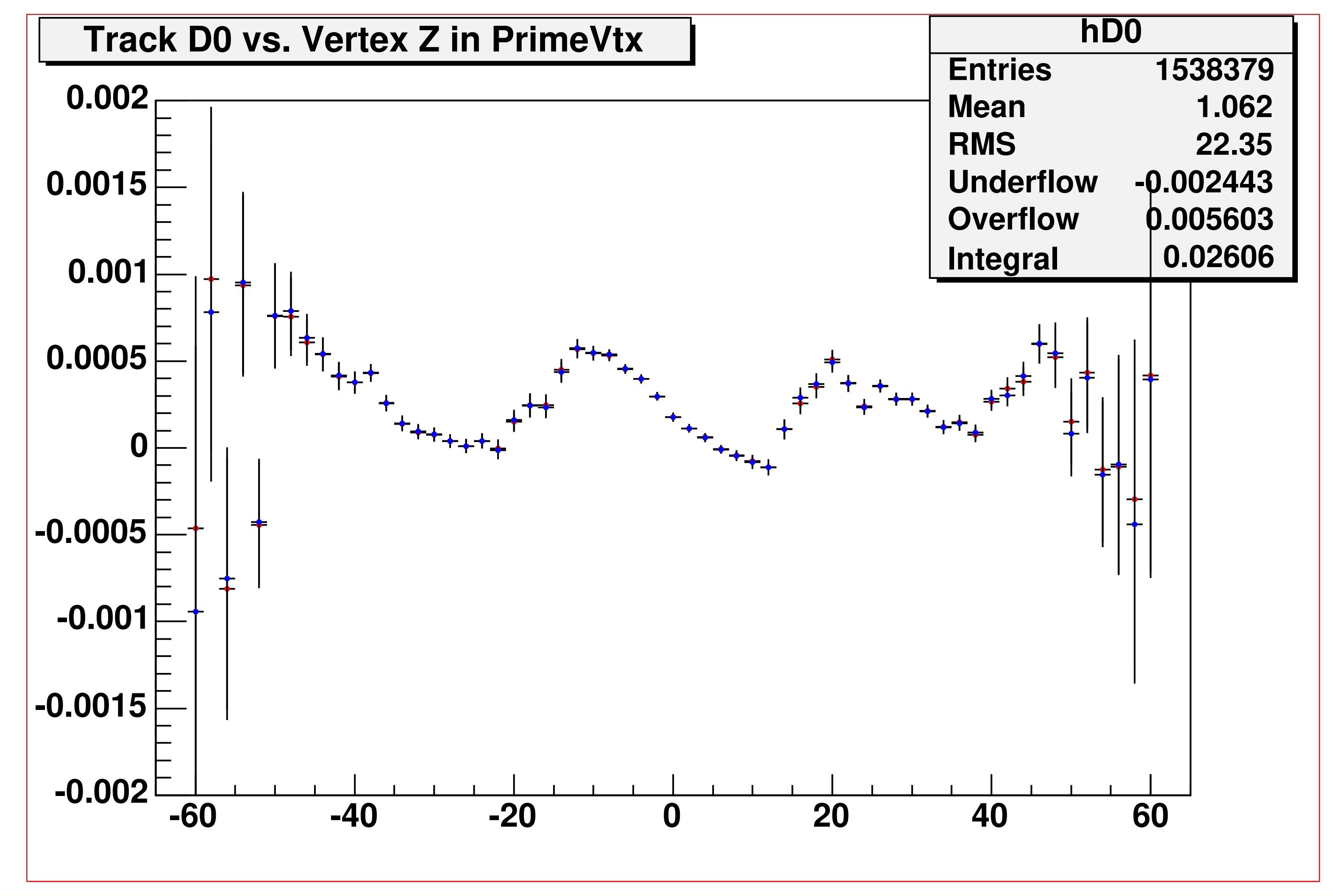
Resolution

Resolution is worse in the negative barrels, but more symmetric with new table



Mean Track d0

Mean track d0 versus vertex Z - sawtooth shape not improved



Summary

Some old issues are nearly cleared up:

- New alignment table from Ray moving the barrels improved spike in pulls and resolution
  - Some residual effect remains (may need to move barrels further apart)
- Track d0 sawtooth pattern can be seen without PrimeVtx, but not yet corrected
- High pulls in Barrel 0 still not reproduced or understood

Work is still going on to fix remaining problems!