L3 Tracking p12 vs p13 & Beam Position

L3 Algorithms Meeting

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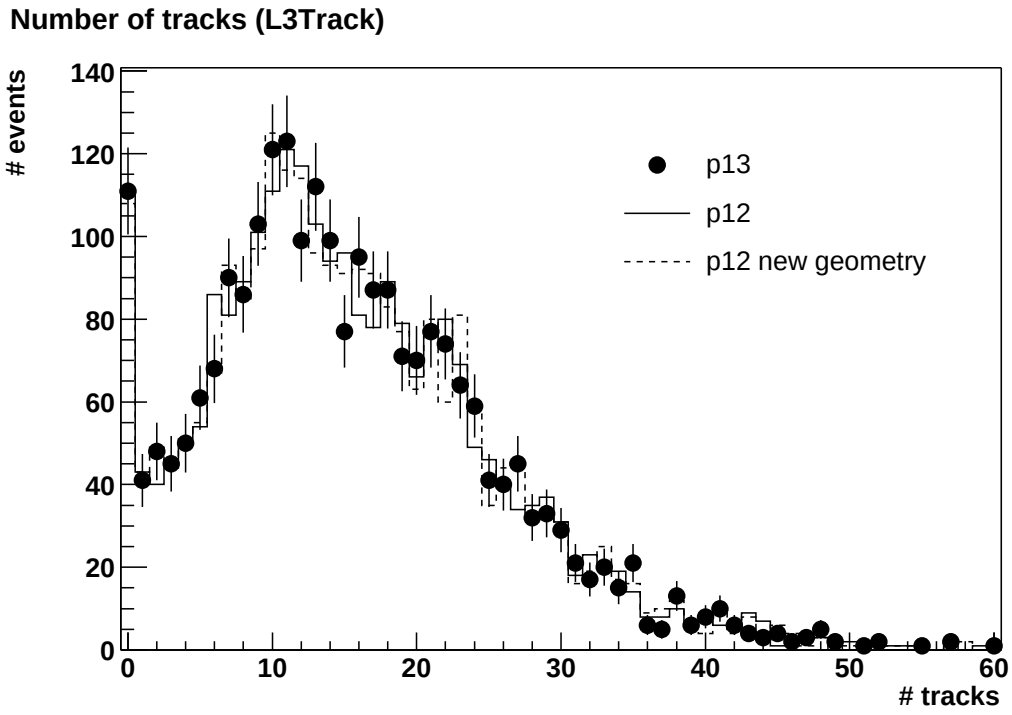
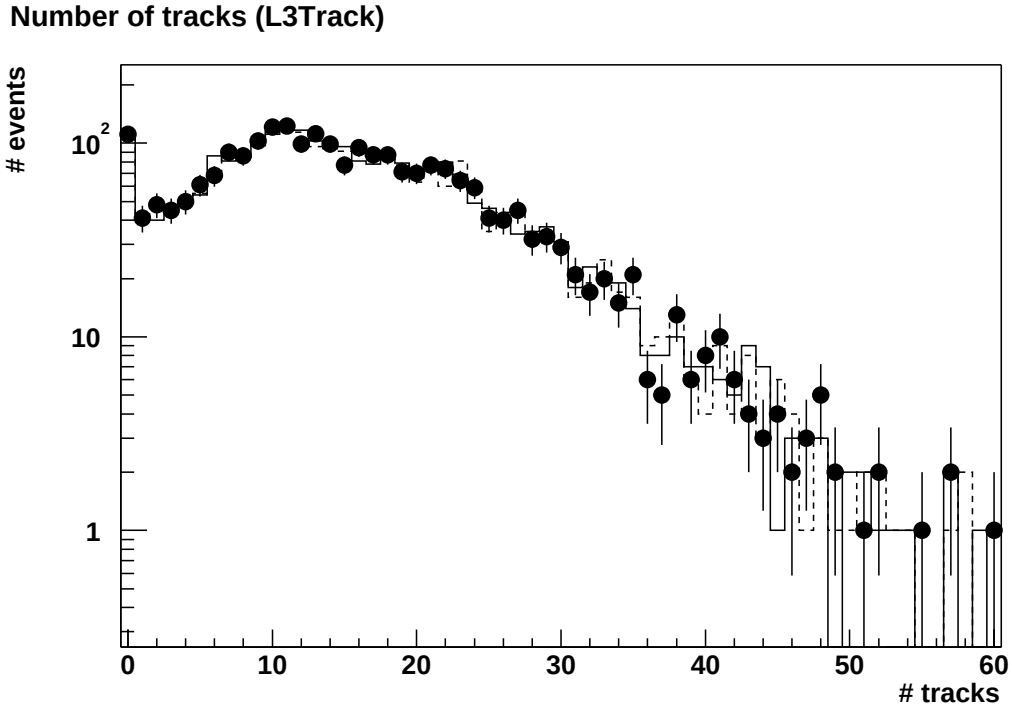
L3 Tracking

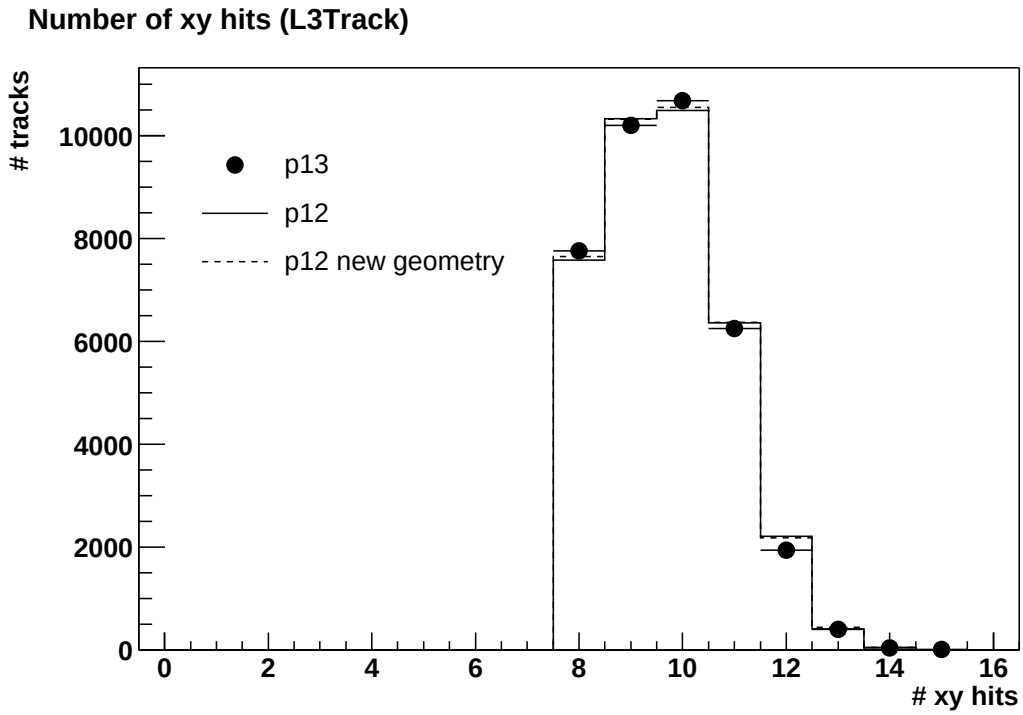
- L3 tracking in vertex examine, $p_{\mathrm{t}} > 500$ MeV
- Compare `p12.03.00` with `p13.06.00`:
  - New, improved geometry
  - Use the same `l3calib.ev` file
  - Use the same events (`all_0000170247_022.raw`)
  - Also run `p12.03` with new geometry
- Caveats:
  - Random sample of events, no trigger selection
  - In `p12.03`, use better error estimates (`l3ftrack_base`) than in release
  - Is `p12.03` identical to `p12.06` ?

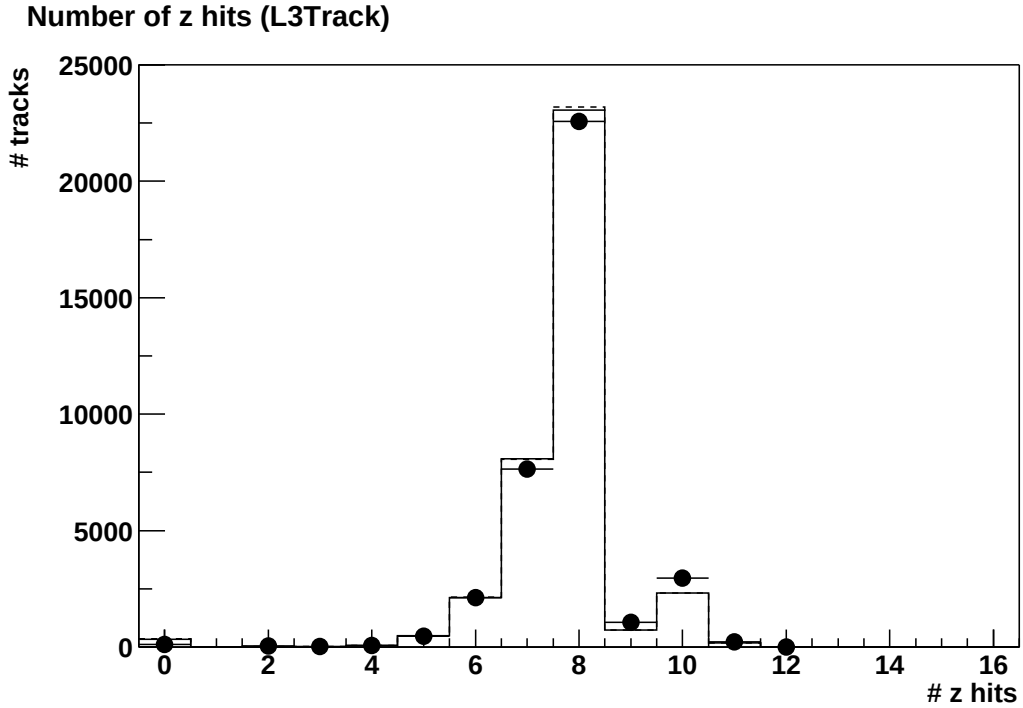
Track Multiplicity



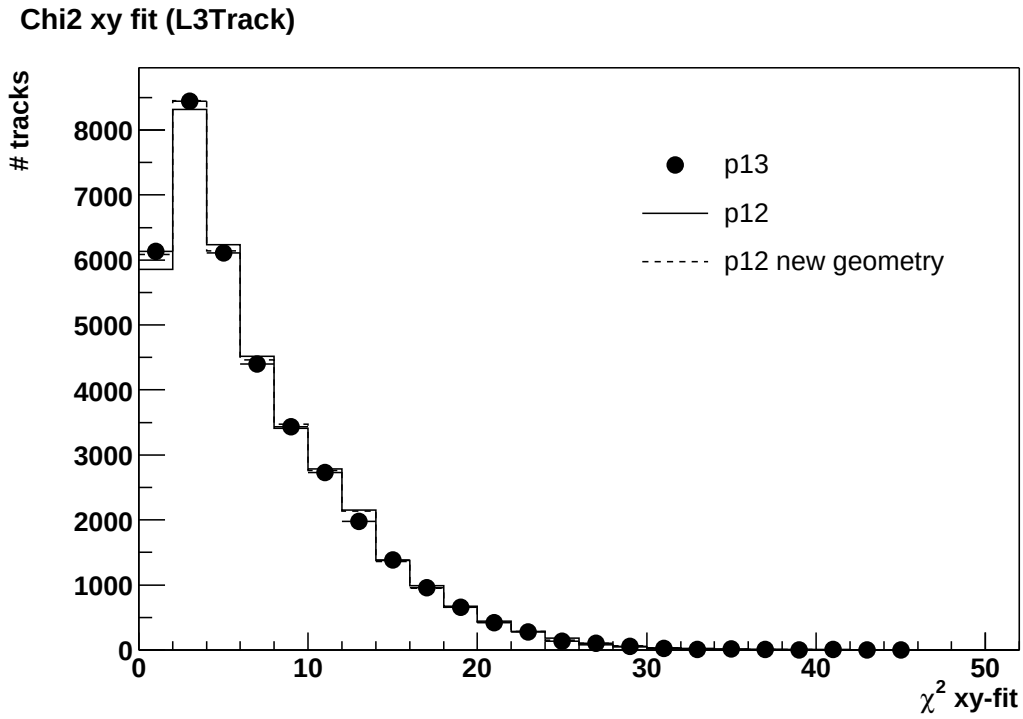


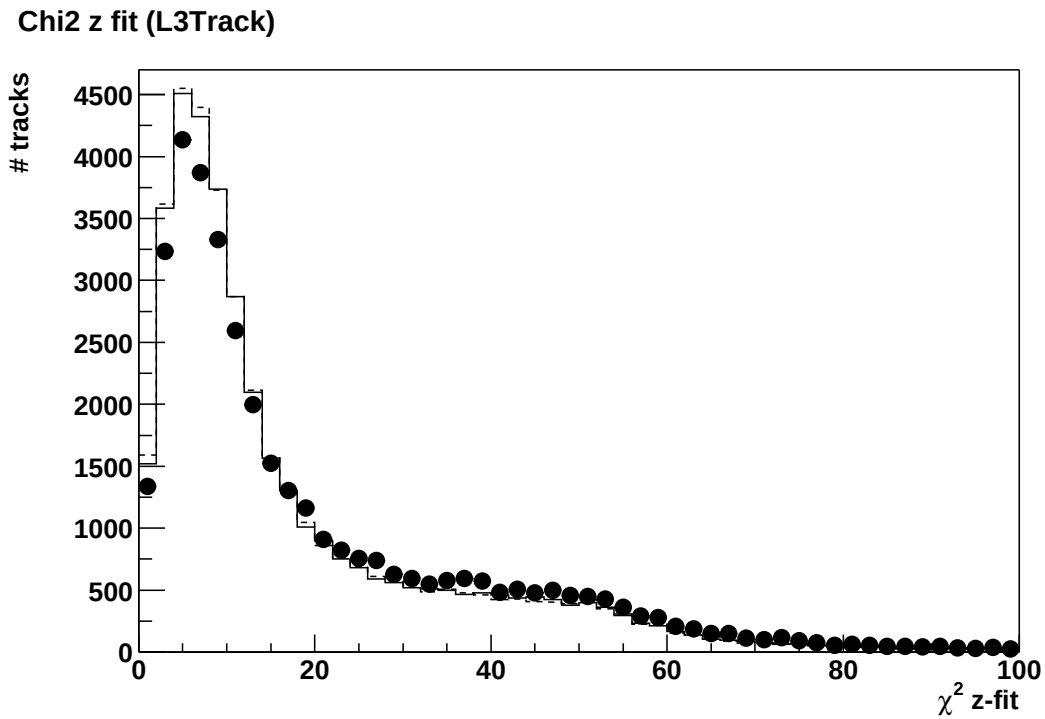
Track Hits


Number of xy hits (L3Track)
tracks
10000
8000
6000
4000
2000
0
p13
p12
p12 new geometry
0
2
4
6
8
10
12
14
16
xy hits

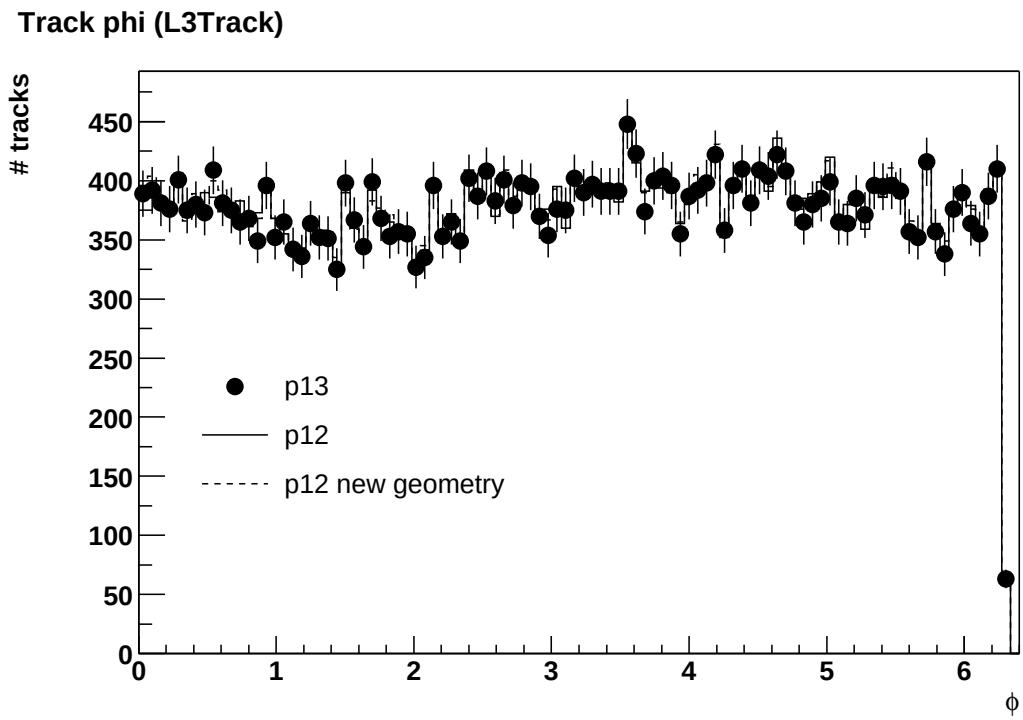

Number of z hits (L3Track)
tracks
25000
20000
15000
10000
5000
0
0
2
4
6
8
10
12
14
16
z hits

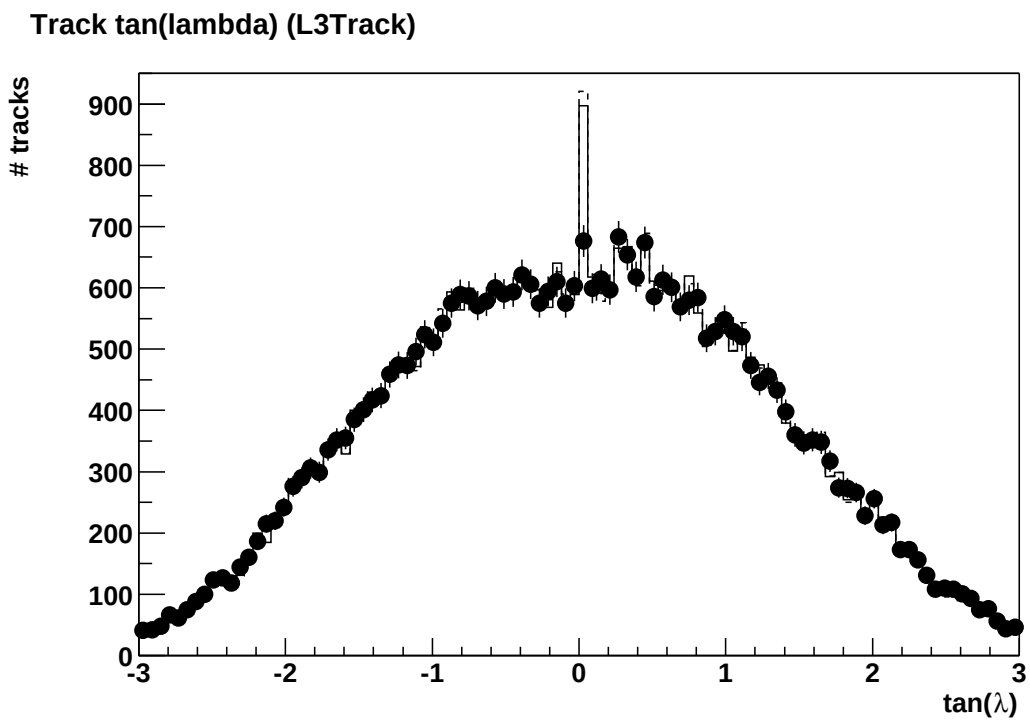
Track Fit Quality



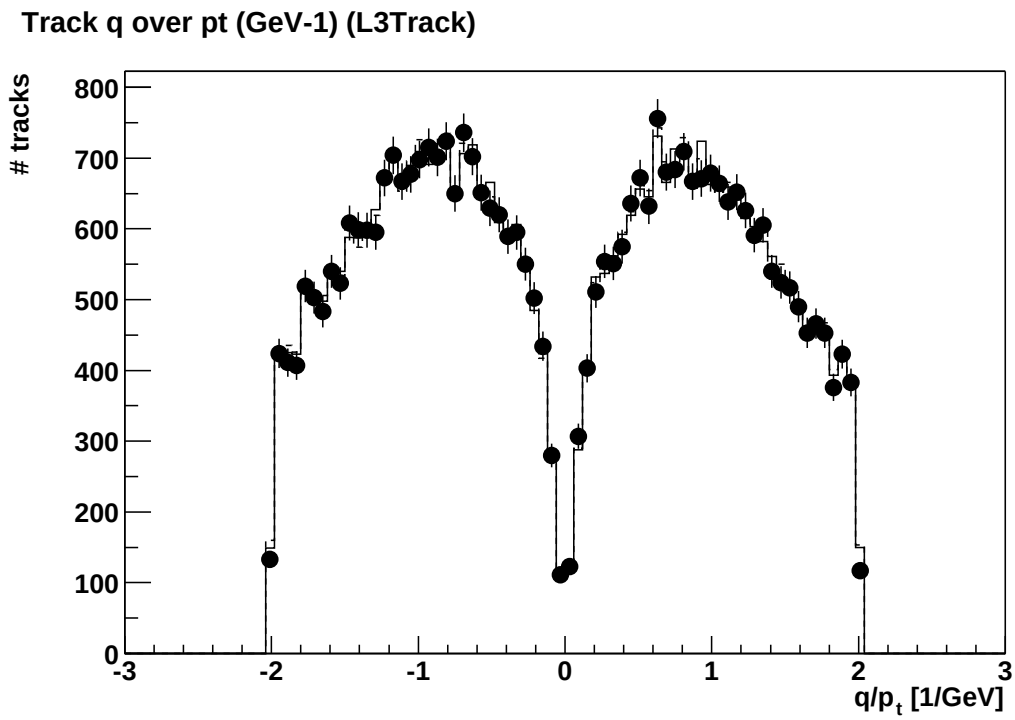


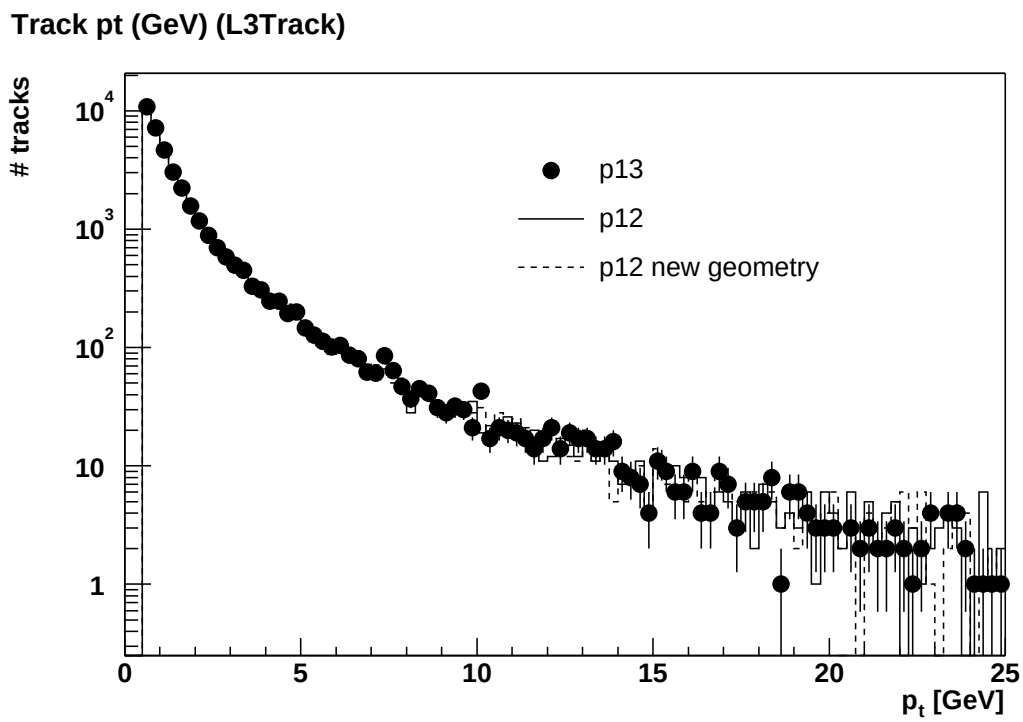
Track Parameters (1)





Track Parameters (2)





Tracking Conclusion

- No significant differences!
- Few more tracks at $p_{\mathrm{t}} > 10$ GeV, not significant
- Stereo fit slightly improved
- Track parameter errors worse in `p13.06` ?

Beam Position (1)

- Average position from 19 fits, each fit at least 1000 (good quality) tracks

- Track parameter errors for `p12.03` are estimated with `l3ftrack_base v00-07-08`, which is "better" than release version

- Error quoted here is RMS of all measurements

`p12.03`, average $\chi^2 = 2.3$

$$\begin{aligned} \bar{x} &= -359\ \mu\text{m} & \sigma_x &= 14\ \mu\text{m} \\ \bar{y} &= +399\ \mu\text{m} & \sigma_y &= 14\ \mu\text{m} \\ \bar{xz} &= -137\ \mu\text{rad} & \sigma_{xz} &= 64\ \mu\text{rad} \\ \bar{yz} &= -220\ \mu\text{rad} & \sigma_{yz} &= 51\ \mu\text{rad} \end{aligned}$$

`p13.06`, average $\chi^2 = 3.1$

$$\begin{aligned} \bar{x} &= -373\ \mu\text{m} & \sigma_x &= 15\ \mu\text{m} \\ \bar{y} &= +407\ \mu\text{m} & \sigma_y &= 13\ \mu\text{m} \\ \bar{xz} &= -139\ \mu\text{rad} & \sigma_{xz} &= 69\ \mu\text{rad} \\ \bar{yz} &= -217\ \mu\text{rad} & \sigma_{yz} &= 54\ \mu\text{rad} \end{aligned}$$

Beam Position (2)

- Quite consistent!
- Beam position error in `p13.06` further off from RMS than in `p12.03` (and worse χ^2) $\Rightarrow$ track errors?
- Have used an earlier `v9` geometry before, gave very different beam position parameters!

Beam Position Plans

- Make real-time beam position available in L3, for b-tagging, vertexing, etc.
- Will transfer beam parameters from vertex examine to Coor database
- At the start of a run, Coor will read database and send parameters to ScriptRunner