Centering target coordinates (attempts to…)

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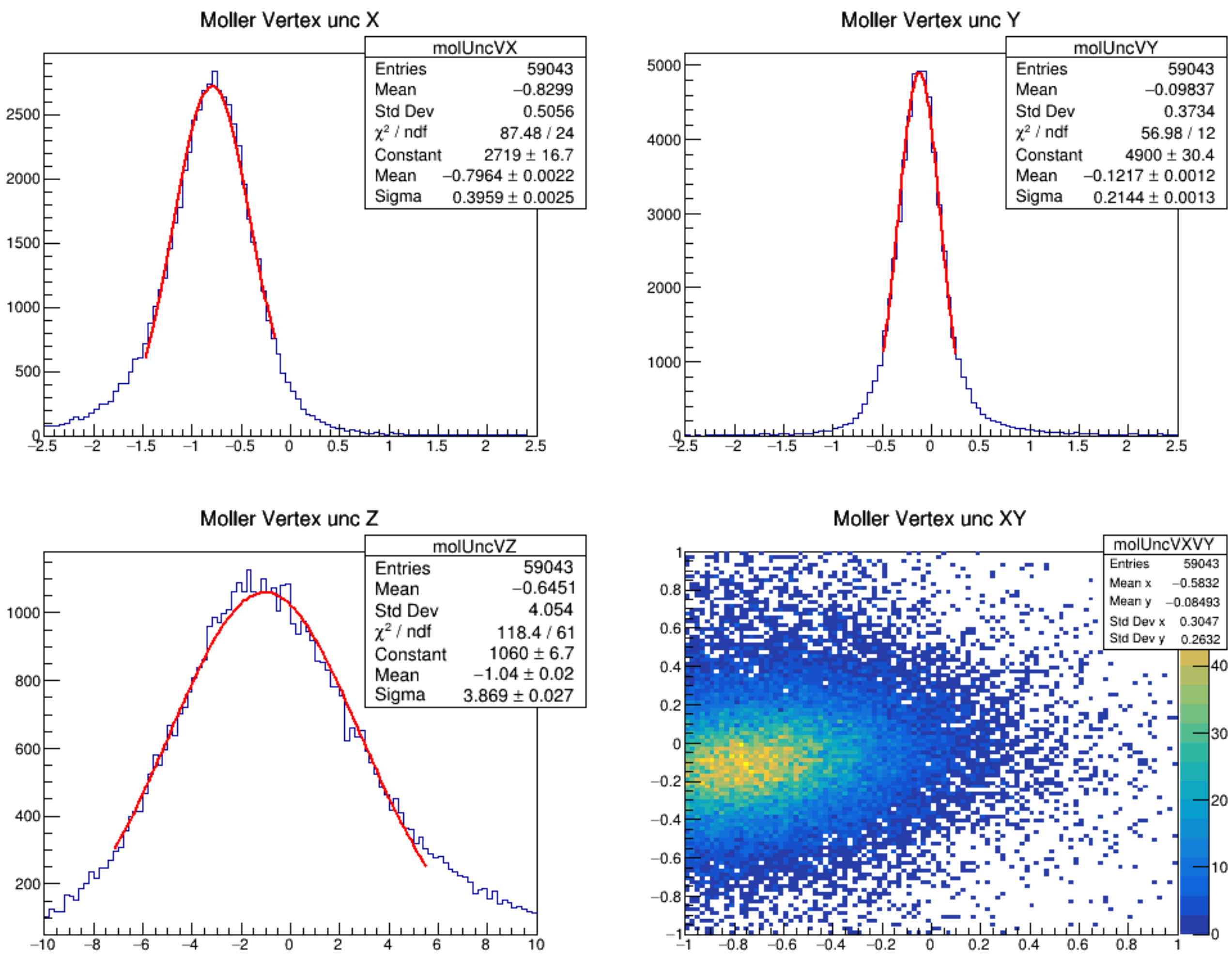
June 18, 2018

2016 data @ 0.5 mm global alignment

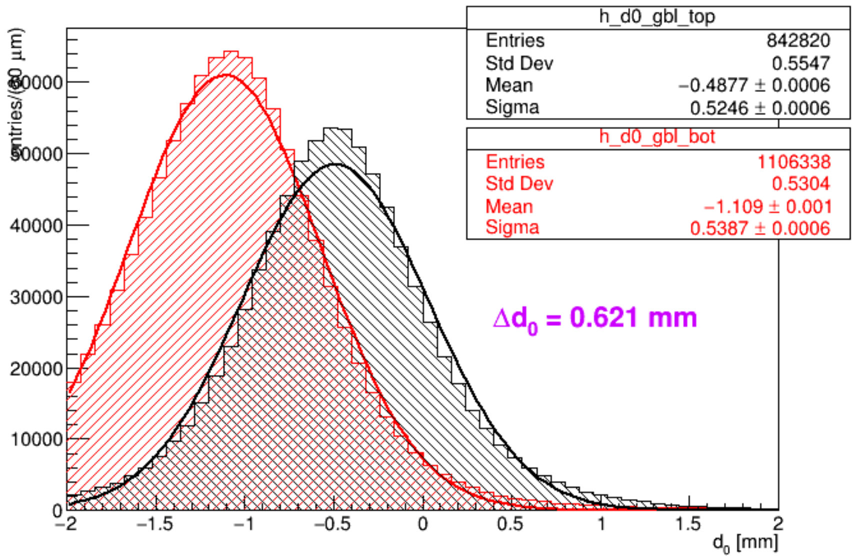
- Start version: internal alignment OK, version without global alignment, target at (0,0,0)
- Look at unconstrained z vertex coordinate for Moller tracks
- Center the z coordinate of the vertex
  - Check consistency
- Apply global alignment to center d0 and z0 (old procedure)
  - Check consistency

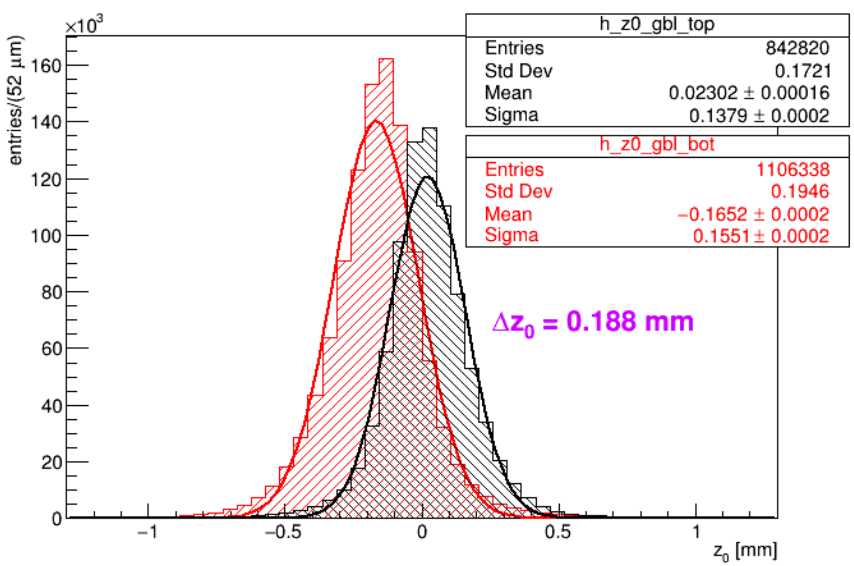
Moller sample, internal alignment ok, no global alignment



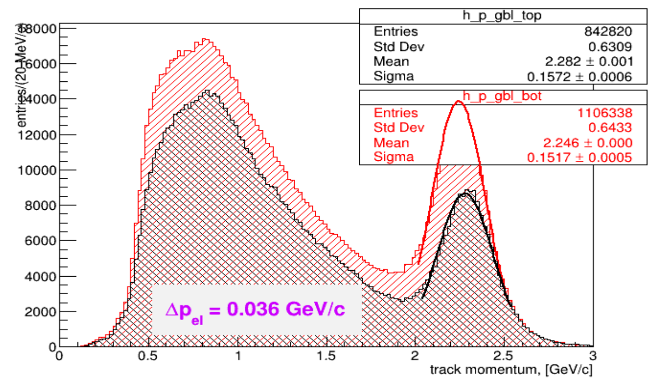
- Unconstrained vertex distributions
  - X coordinate
    - μ = - 796 μm
    - σ = 0.4 mm
  - Y coordinate
    - μ = -0.122 μm
    - σ = 0.21 mm
  - Z coordinate
    - μ =-1.04 mm
    - σ = 3.9 mm
- Reconstruction with (0,0,0) as beamspot

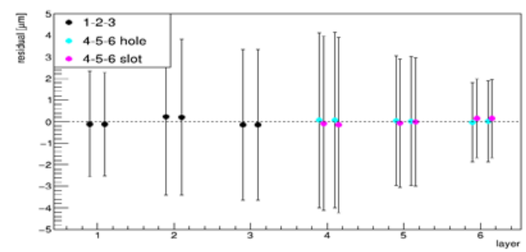
All data, no global alignment, impact parameters & residuals

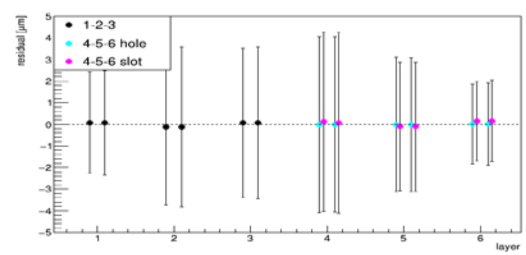




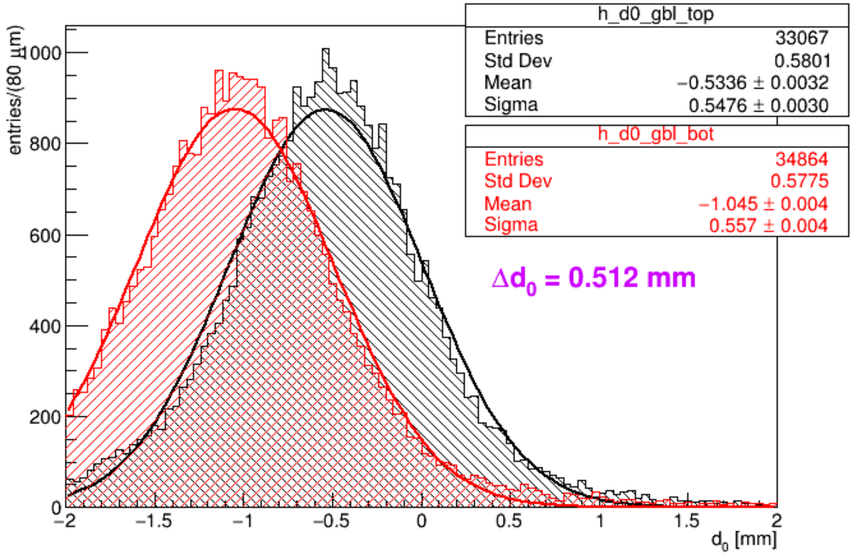
- residuals for internal alignment OK
- Impact parameters are displaced
  (OK, no global alignment is applied

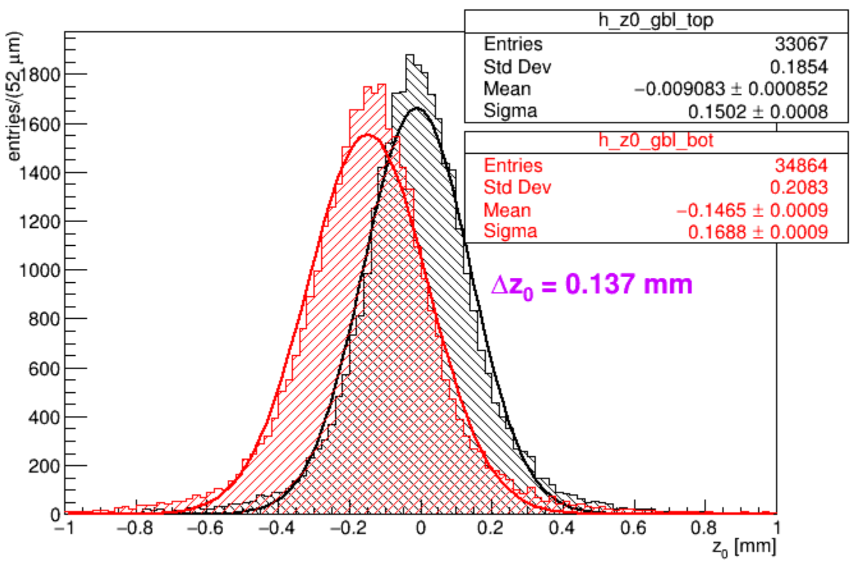




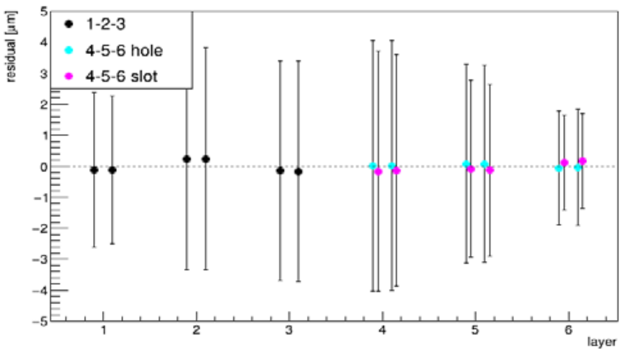


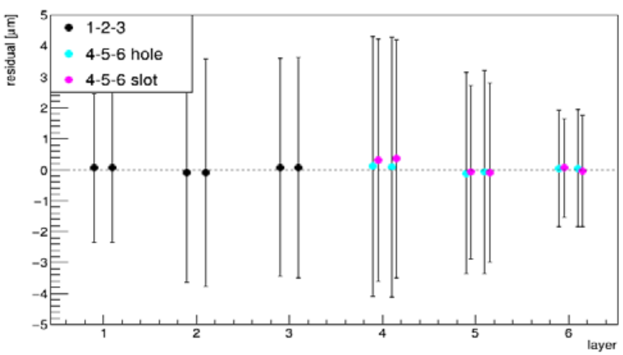
All data, no global alignment, impact parameters & residuals: Moller tracks only



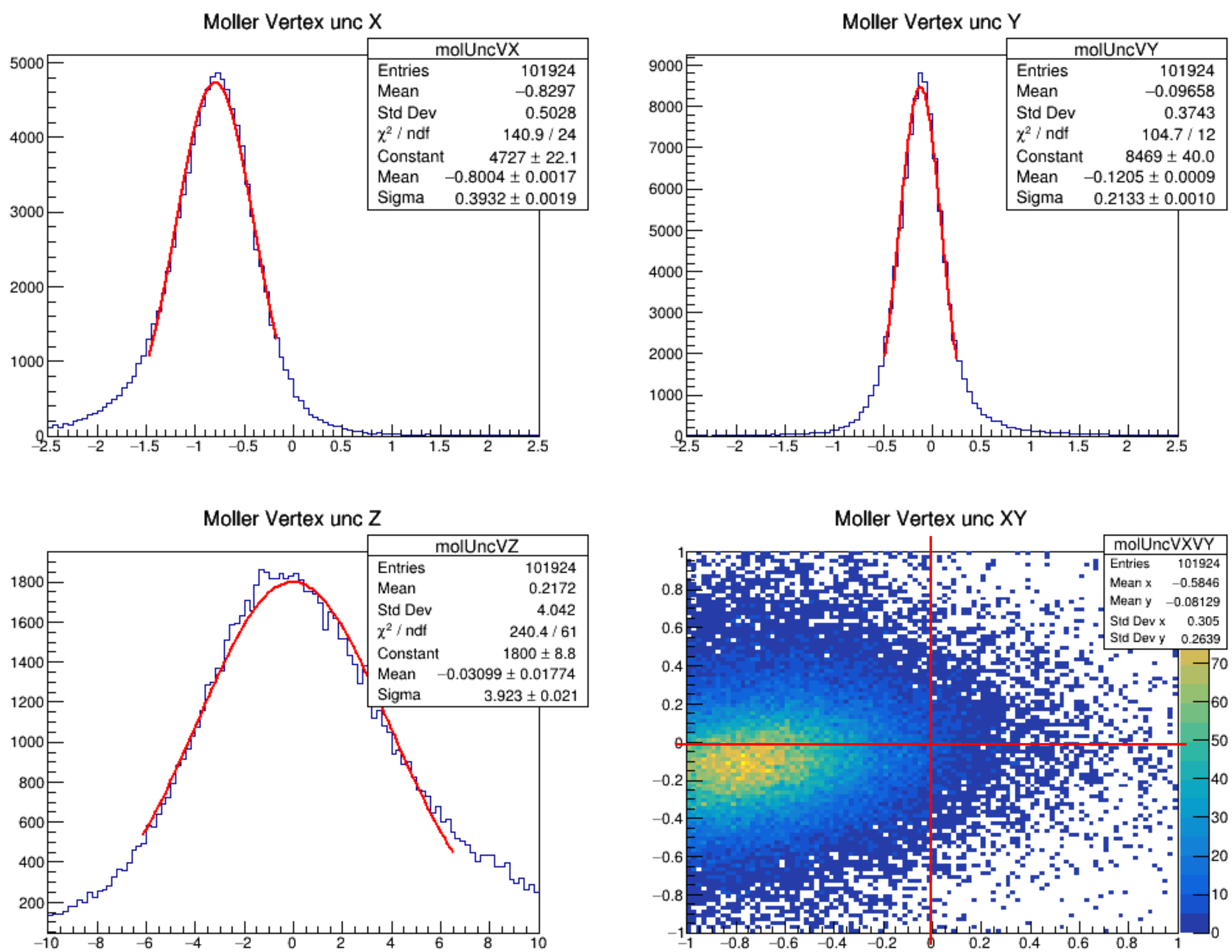


- residuals for internal alignment OK
- Impact parameters are displaced (OK, no global alignment is applied) and *different* from those found for all tracks





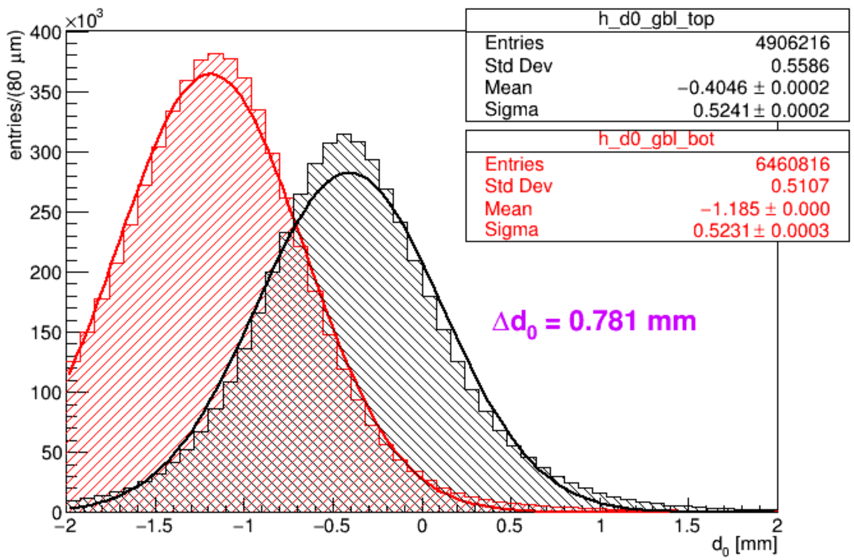
Moller sample, internal alignment ok, z_{tar} moved, no global alignment

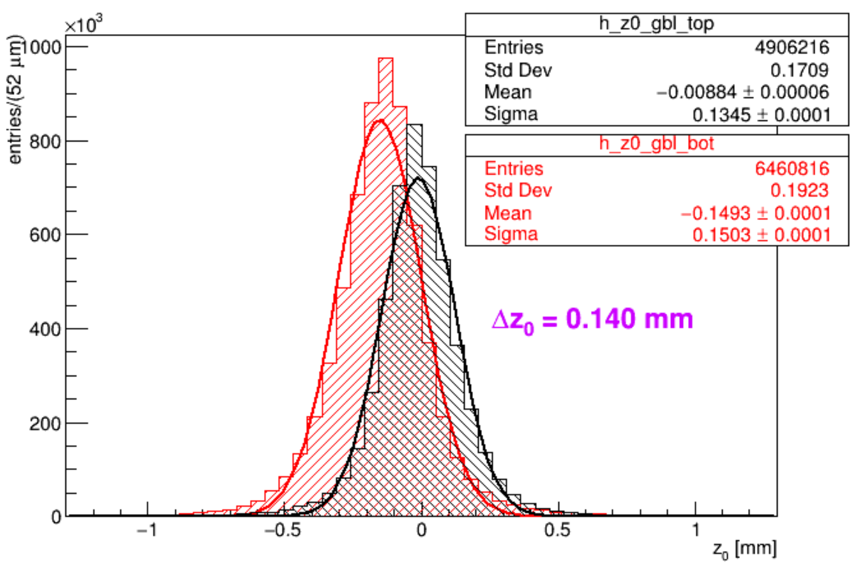


- Unconstrained vertex distributions
  - X coordinate
    - μ = - 800 μm
    - σ = 0.4 mm
  - Y coordinate
    - μ = -0.120 μm
    - σ = 0.21 mm
  - Z coordinate
    - μ = -0.03 mm
    - σ = 3.9 mm
- Reconstruction with (0,0,0) as beamspot

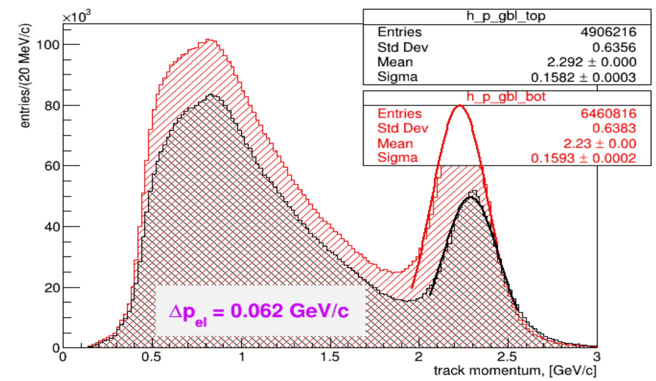
vz is now centered at zero, but vx and vy are not

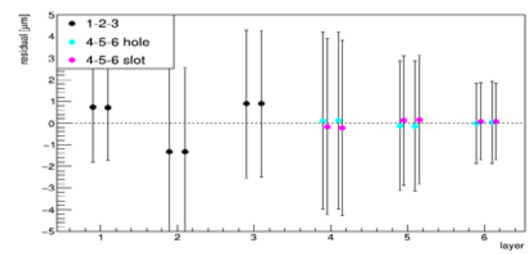
All data, no global alignment, z moved: impact parameters

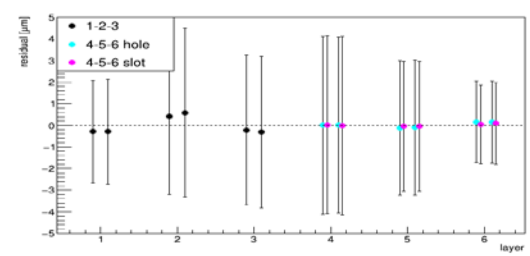




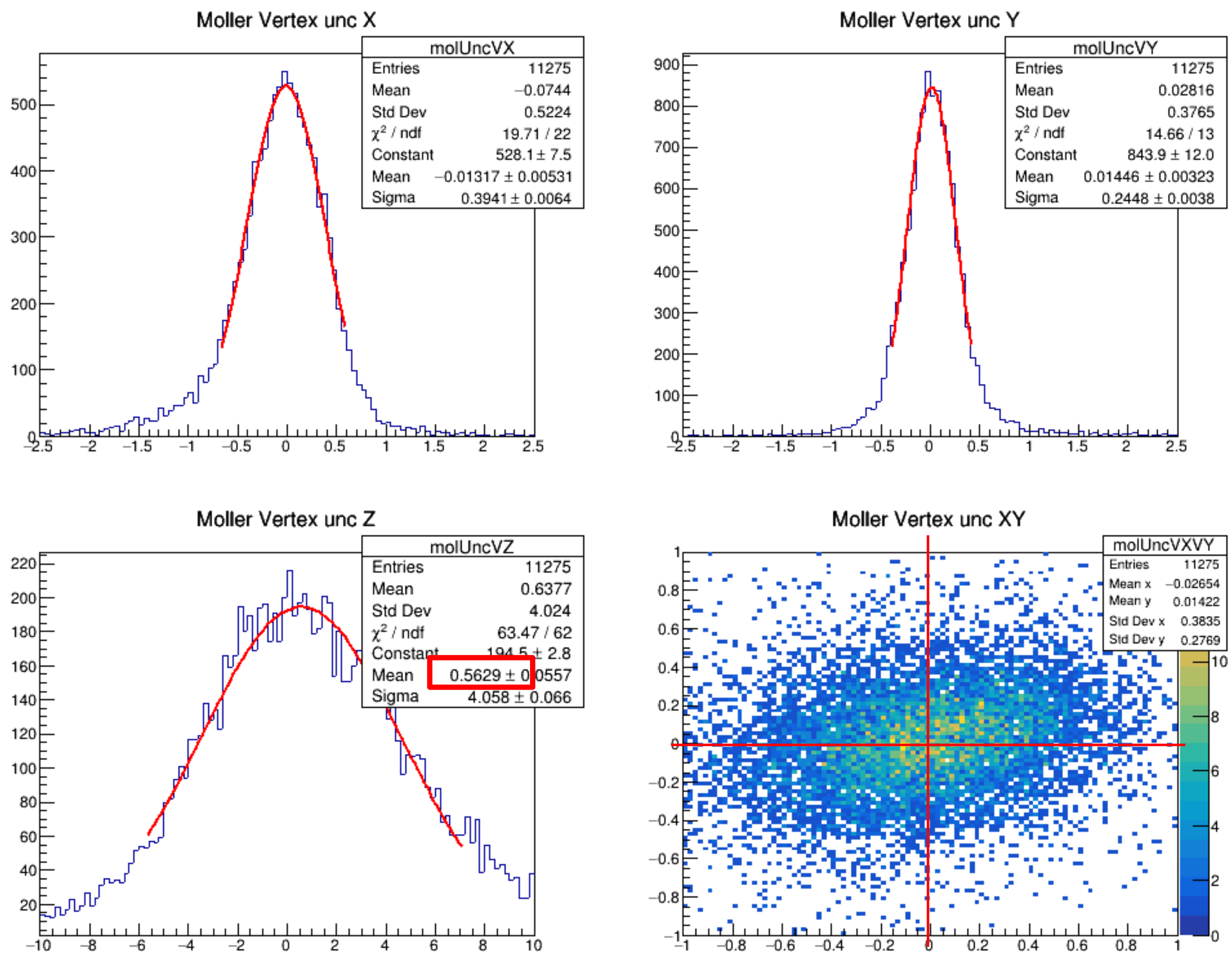
- residuals for internal alignment start jumping: a new internal alignment is needed
- Impact parameters are displaced (OK)







Moller sample, internal alignment ok, z_{tar} moved -> move d_0 & z_0 to 0

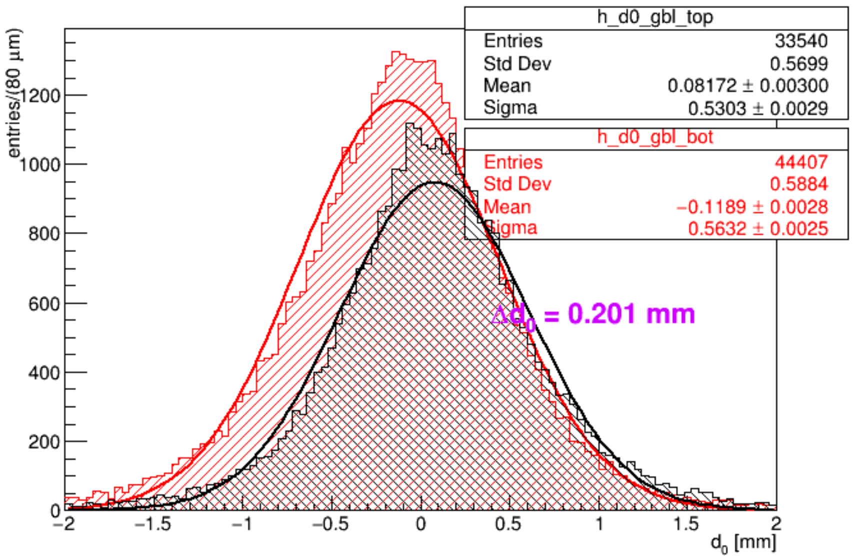


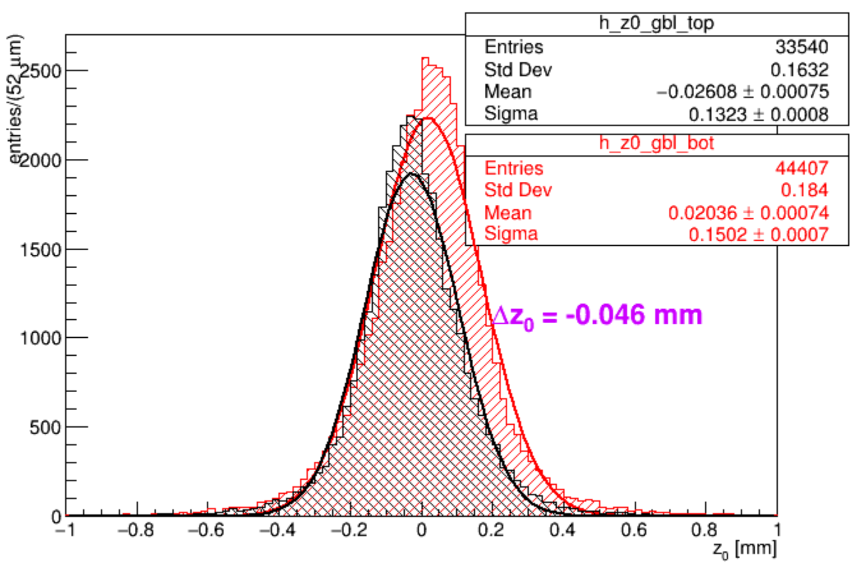
- Usual recipe for d0 and z0 (t&b) global alignment
- Use the values obtained when z=-1.022 mm (first step, slide #4)
- These d0 and z0 impact parameters are obtained with ALL tracks (no topological selection)

- Reconstruction with (0,0,0) as beamspot
- Test with reduced statistics

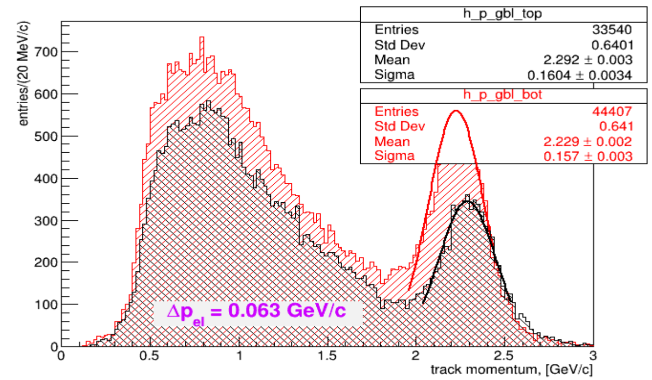
If (x,y) are centered, z flies away again…

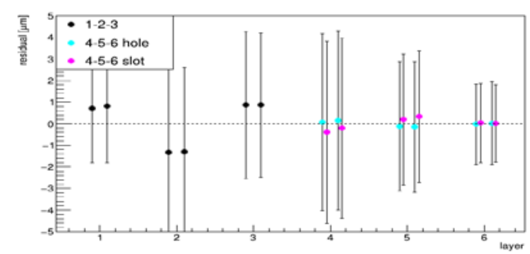
All data, z moved + global alignment: impact parameters & residuals

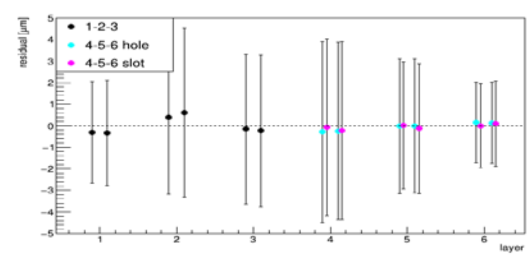




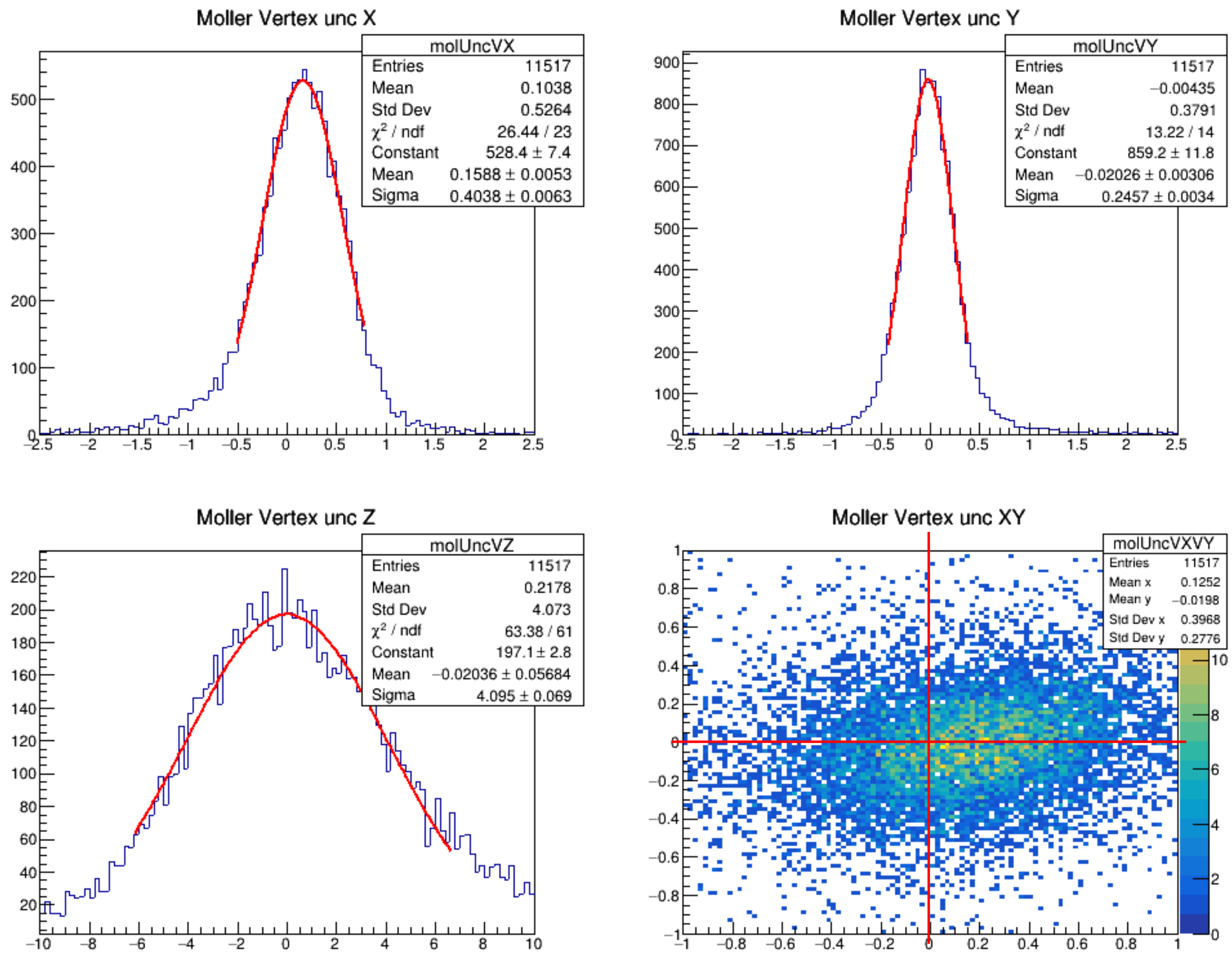
- residuals for internal alignment: bad
- Impact parameters could be converging better (but a second iteration would be enough to fix this)







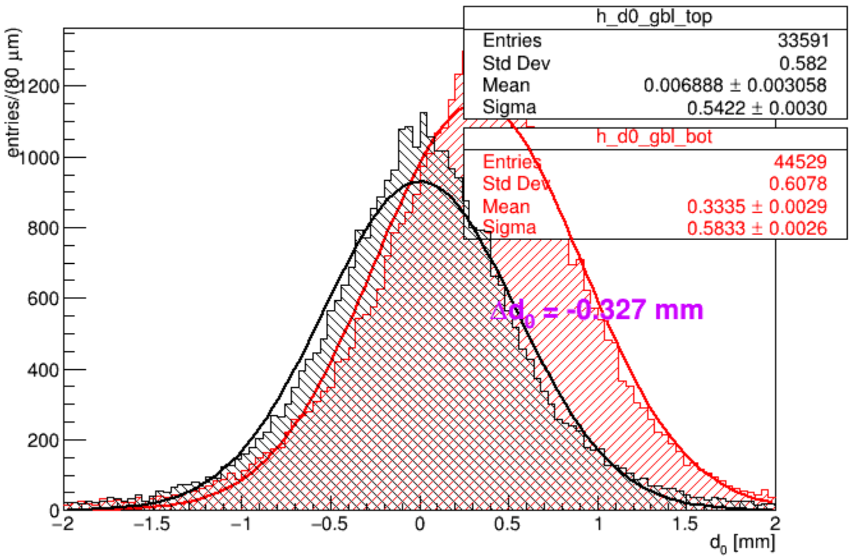
Moller sample, new internal alignment, z_{tar} moved + global align.

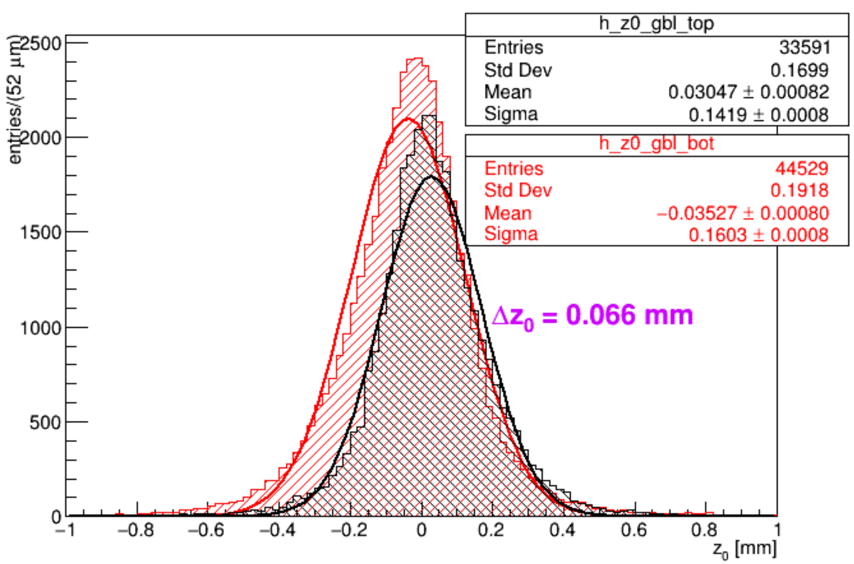


- New alignment: sensors 1-2-3 top/bottom tu released
- Unconstrained vertex distributions
  - X coordinate
    - μ = 160 μm
    - σ = 0.4 mm
  - Y coordinate
    - μ = -0.020 μm
    - σ = 0.25 mm
  - Z coordinate
    - μ = -0.02 mm
    - σ = 4.09 mm
- Reconstruction with (0,0,0) as beamspot
- Test with reduced statistics

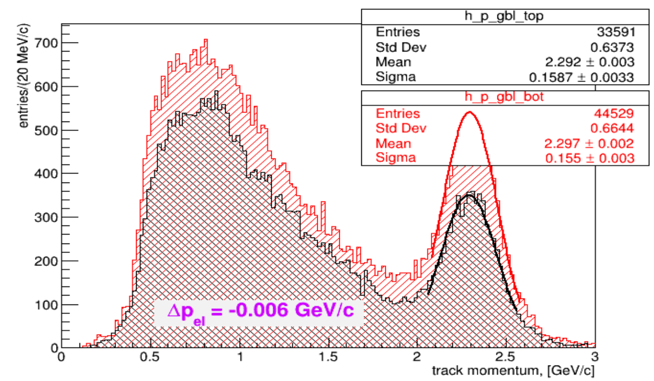
If (z,y) are centered, x flies away…

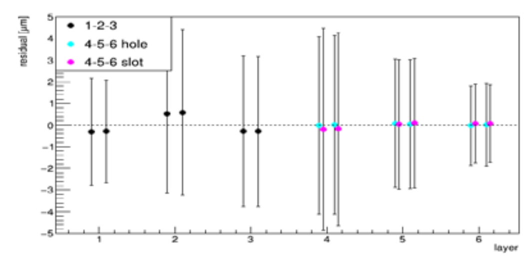
All data, new alignment,
z moved + global alignment

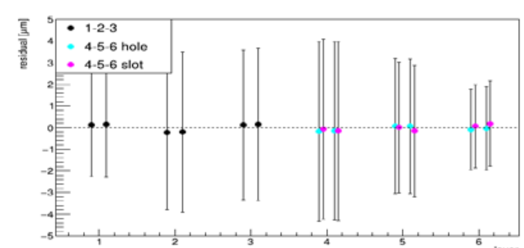




- residuals for internal alignment: OK
- Impact parameters could be converging better (they move to opposite parts)







Next steps

- Issues to be understood:
  - Applying the zTar offset as an additive parameter to all sensors (at the level of mp) offsets disrupts the internal alignment
    - It should be a simple rigid translation… but it is not
    - needs to be checked: error? sign flip not properly considered? some rotation? Something else more subtle?
  - The d0, z0 offsets found for all tracks are different from those found from the Moller sample only: which one to choose?

- In this situation, a new internal alignment version is required
  - Adjust the first three layers
  - Repeat the procedure until it converges (at the moment, it doesn't… Moller vertex coordinates swip away)
  - Elastic momentum peak calibration improves