TPC Track Residuals

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Summary

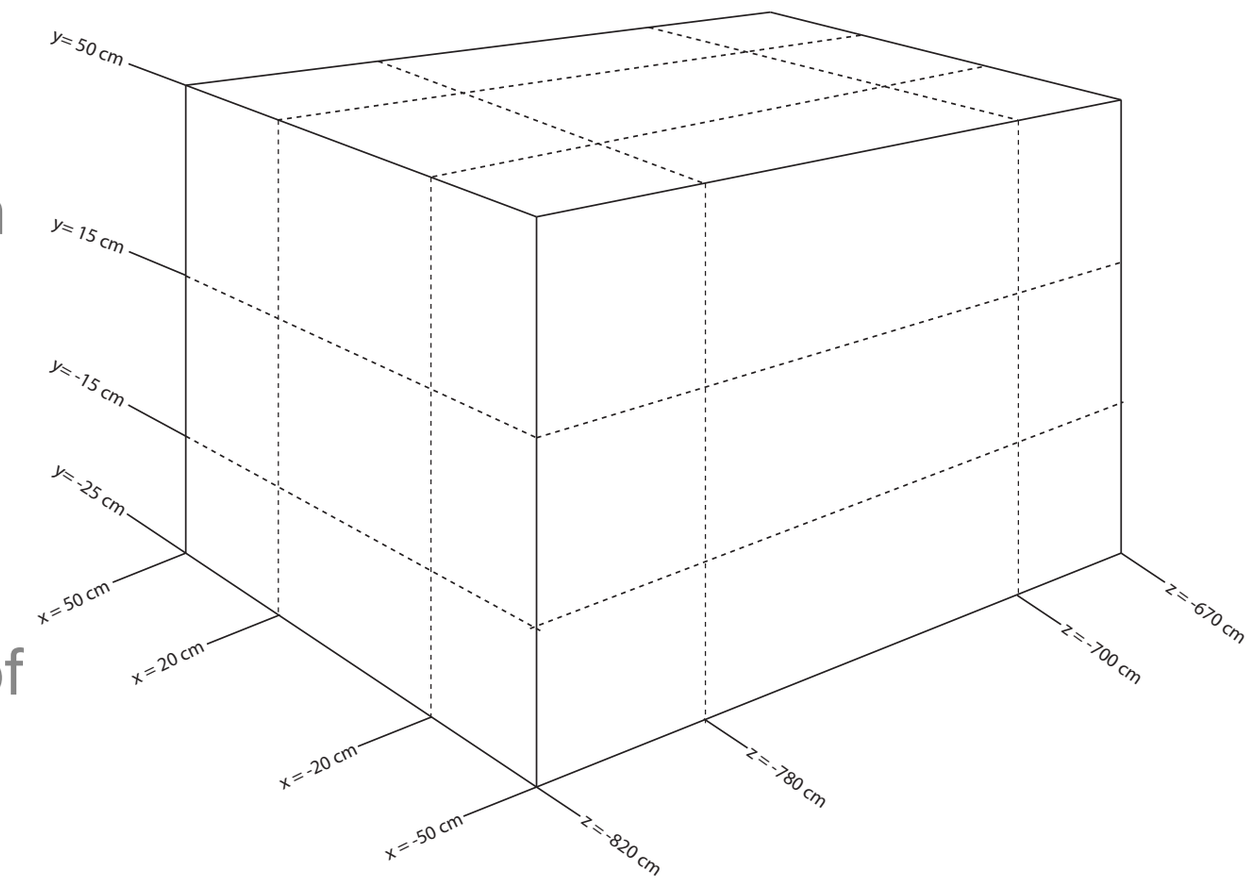
- I have made a systematic study of the TPC residuals as a function of position for 50 groups of runs throughout the full MIPP running period to decide if the TPCResCor corrections are needed
  - I find that there are still systematic biases in the residuals as a function of position in the TPC at the ~1 mm level, (2 mm level in some extreme cases)
  - I think TPCResCor will be required to remove these remaining biases
  - There is weak evidence that the magnet failures affect the TPC hit positions
  - The RMS of TPC residuals is position dependent. We may want to take that into account in the tracking by making the TPC hit location uncertainties position dependent.

How the TPC residuals are binned

- TPC residuals are calculated in 27 sectors of the TPC (3 slices in x, 3 slices in y, 3 slices in z). Presented in 3x3 grids of x/y slices with 3 curves for the front, middle, and back z

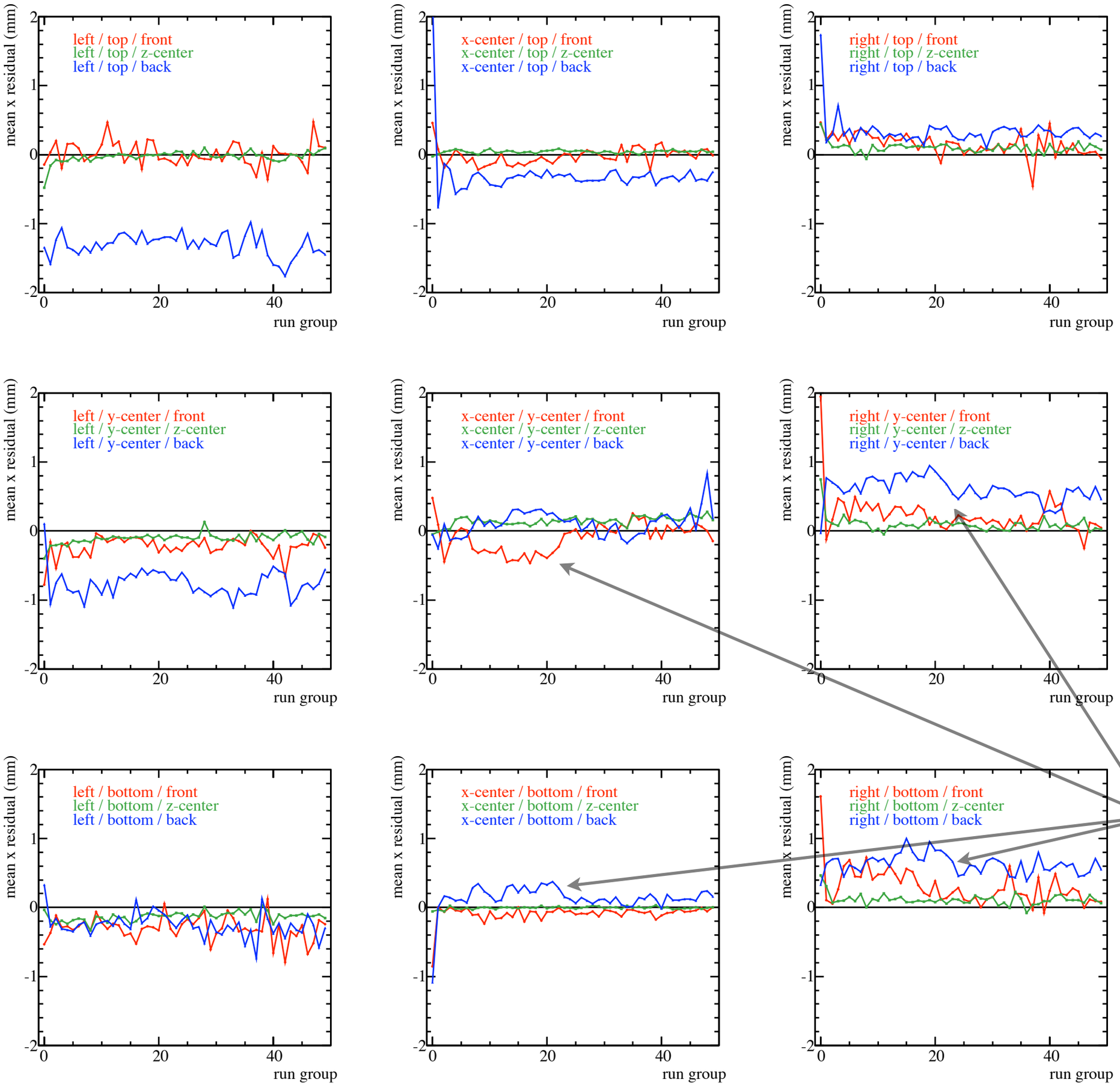
- Residuals calculated in 50 groups of 40 files for runs ranging from 11000 to 17000. Group 22 marks location of first magnet failure.

- Select tracks associated with vertex near target position containing 3 or more in-time tracks, 10 or more TPC hits. Events required to have >30% of their tracks associated with the primary vertex



Group to run guide:
Groups 0-9: 11000's
Groups 10-19: 12000's
Groups 20-30 13000's
Groups 31-42 14000's
Groups 43-50 16000's

Average x residuals

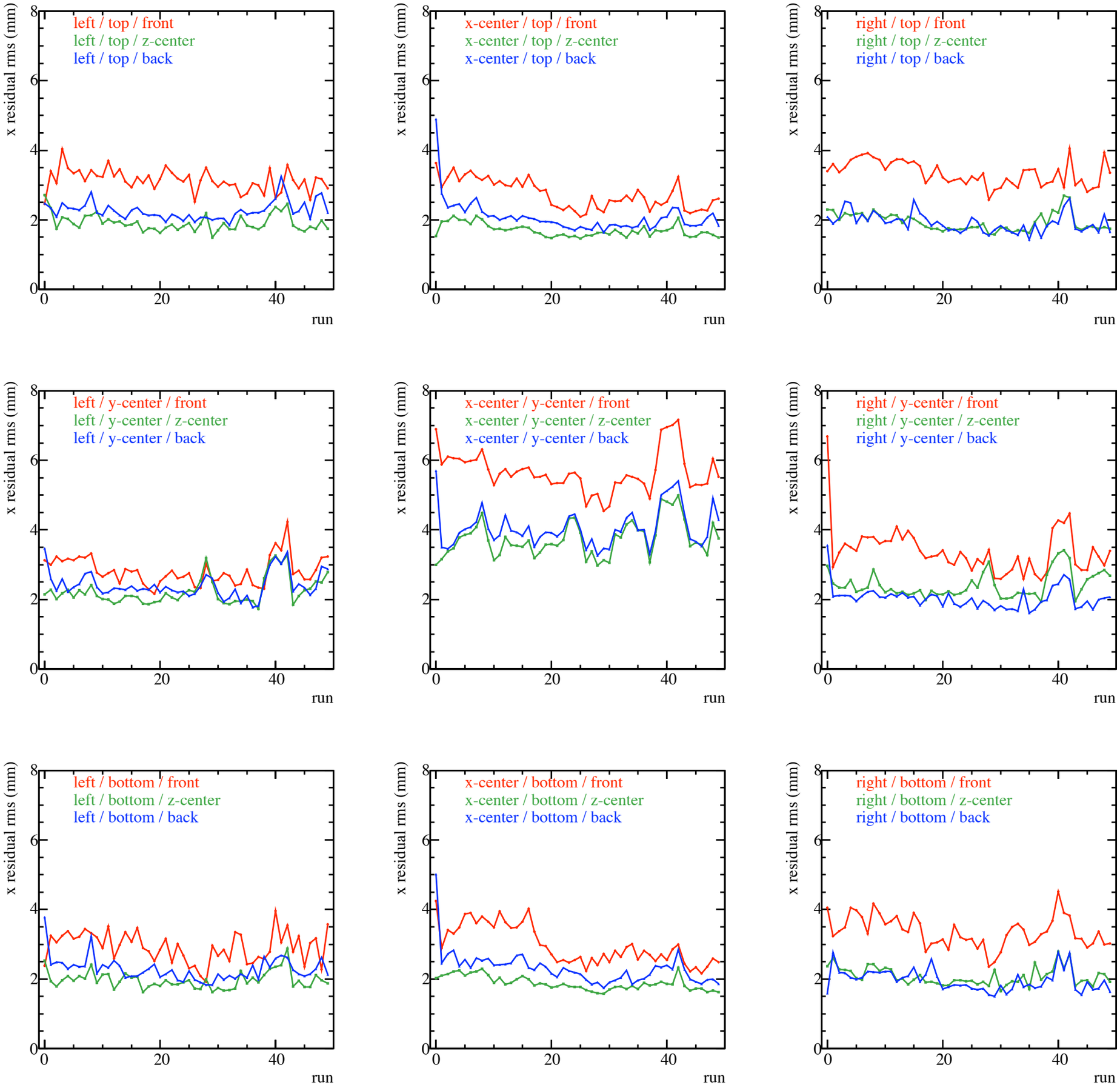


- In general, pulls are << 1 mm
- There are biases at the 1-2 mm level in some regions
- Maybe some shifts occurring at group 22?

Average y residuals

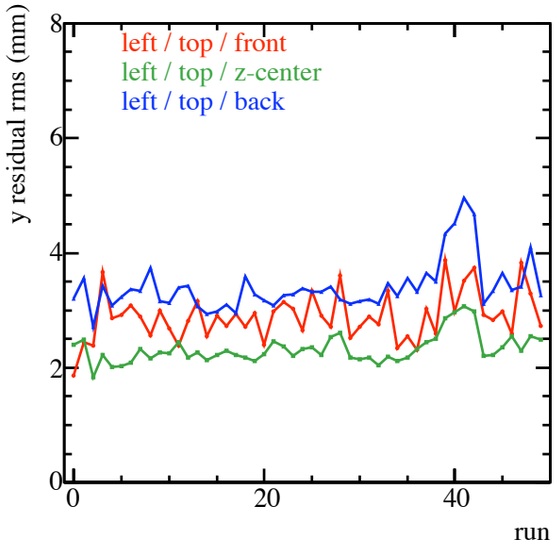
- As in x, most systematic biases are < 1 mm, but some regions are worse and could be corrected.
- I don't think I see any changes starting with group 22

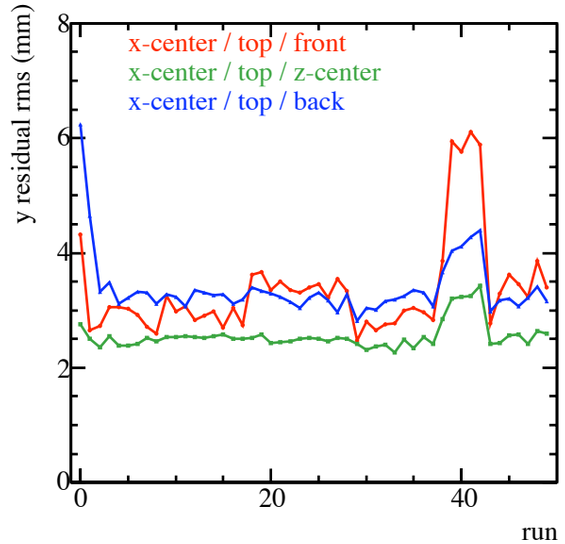
RMS of x residuals

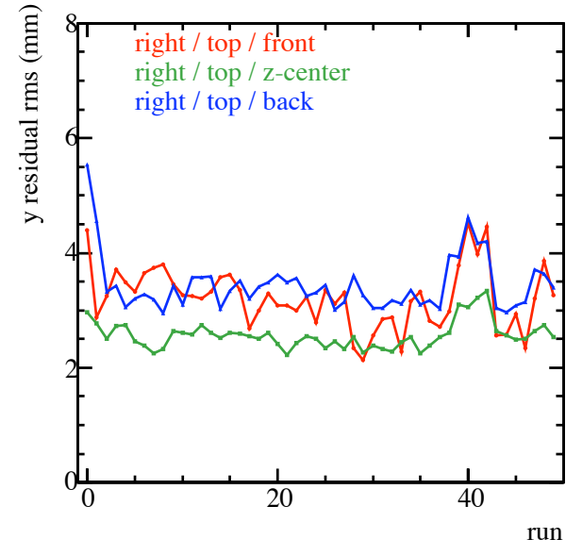


- Pretty stable throughout the run
- 1-2 mm differences region-to-region

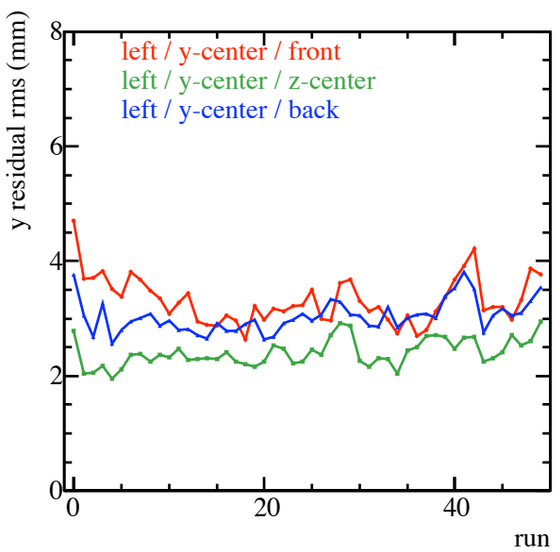
RMS y residuals

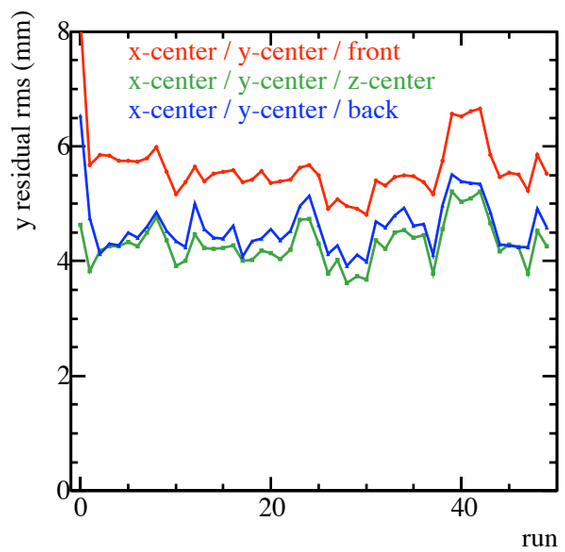


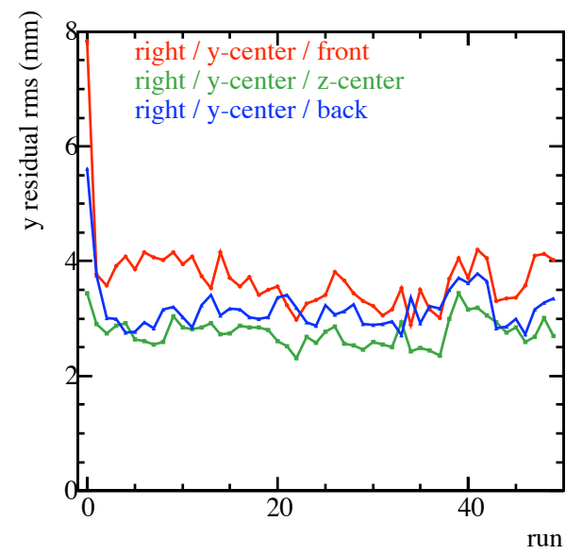
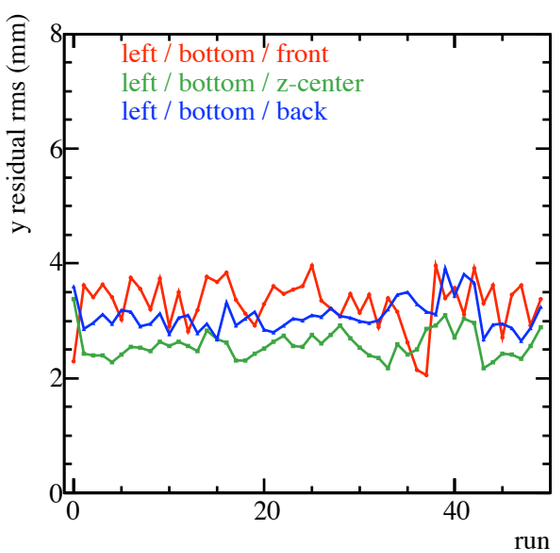
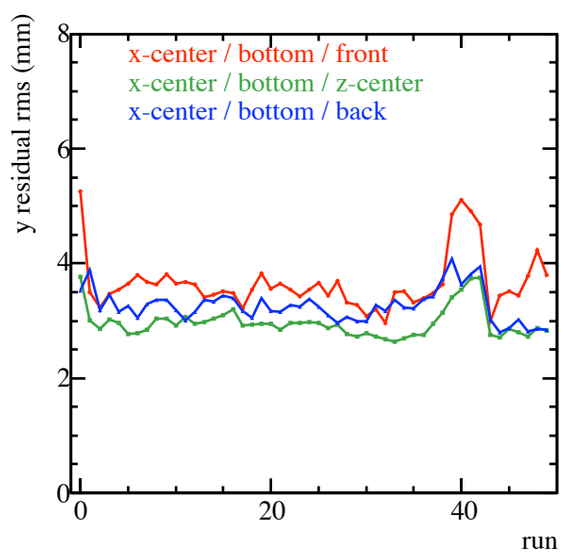
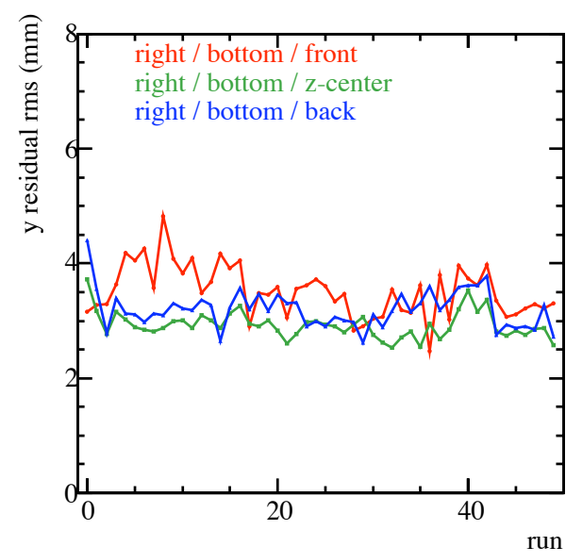




- Pretty stable







- Results in center of TPC relative to other regions surprises me