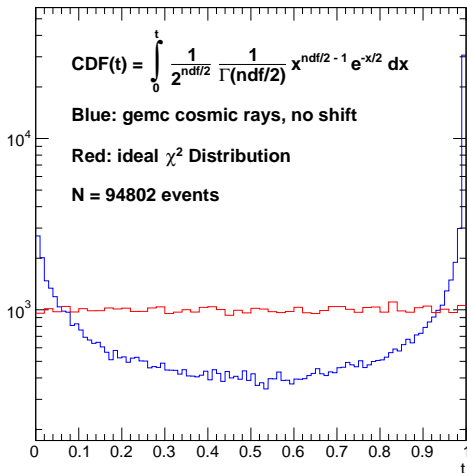
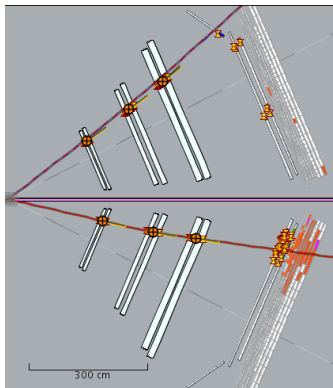


# CLAS12 SVT Geometry Alignment



- 1 millepede algorithm assumes the residuals follow a  $\chi^2$  distribution.
- 2 Extract the Cumulative Distribution Function (CDF) from the data and compare it to the expectation from a CDF for a  $\chi^2$  distribution.
- 3 To calculate the CDF from the data (1) take the  $\chi^2$  for each event  $\chi_i^2$ , (2) integrate the  $\chi^2$  PDF from zero to  $\chi_i^2$  and (3) histogram (blue histogram).
- 4 The red histogram is what you obtain when you generate random numbers with a  $\chi^2$  PDF and follow the same procedure.
- 5 Too many events at high AND low  $\chi^2$ .
- 6 The high- $\chi^2$  events are probably due to bad tracks that can be removed with a  $\chi^2$  cut.
- 7 Where do the low  $\chi^2$  events come from?

# CLAS12 Tracking fix



- 1 Study of quasi-elastic scattering off protons in deuterium showed NO events out of about 30 with two time-based tracks even though each track had three time-based crosses.
- 2 Sometimes the proton track was missing in the TimeBasedTrkg::Tracks bank, sometimes the electron.
- 3 See event 89. TimeBasedTrkg::Tracks bank shown below labeled 'Before'.
- 4 Fixed by VZ. See TimeBasedTrkg::Tracks bank shown below labeled 'After'.

p	q	pathlength	p0_z	fitChisq	p0_y	p0_x	ID	sector
3.09966	1	482.85499	2.52707	0.01848	-0.13656	1.78974	0	1

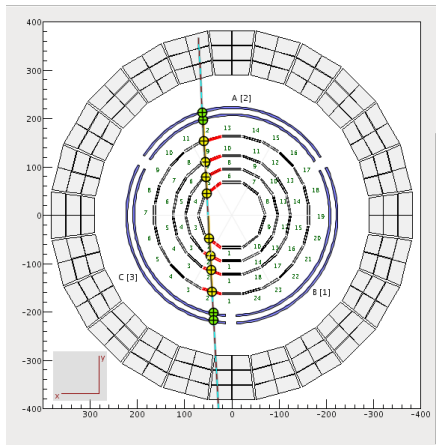
Before

p	q	pathlength	p0_z	fitChisq	p0_y	p0_x	ID	sector
3.07782	1	502.20751	2.50938	0.00047	-0.13430	1.77707	0	1
8.76166	-1	503.57903	8.57160	0.00230	0.10763	-1.81181	1	4

After

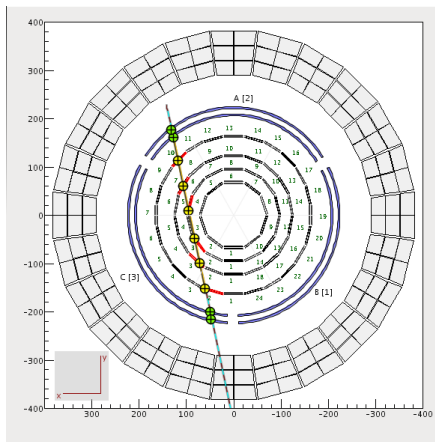
# CVT Type !=1 Events

- How to select non-Type 1 events for track-based alignment?
  - SVT only (no micromegas)?
  - How many hits? 16? 8?
  - Angle cuts in  $\theta$  and  $\phi$ ?
  - Cuts on CDF?
  - No double crosses!
- Software choice - ROOT for transforming between lab and local coordinates.



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