RG-D Initial Analysis and Alignment Status

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CLAS Collaboration Meeting

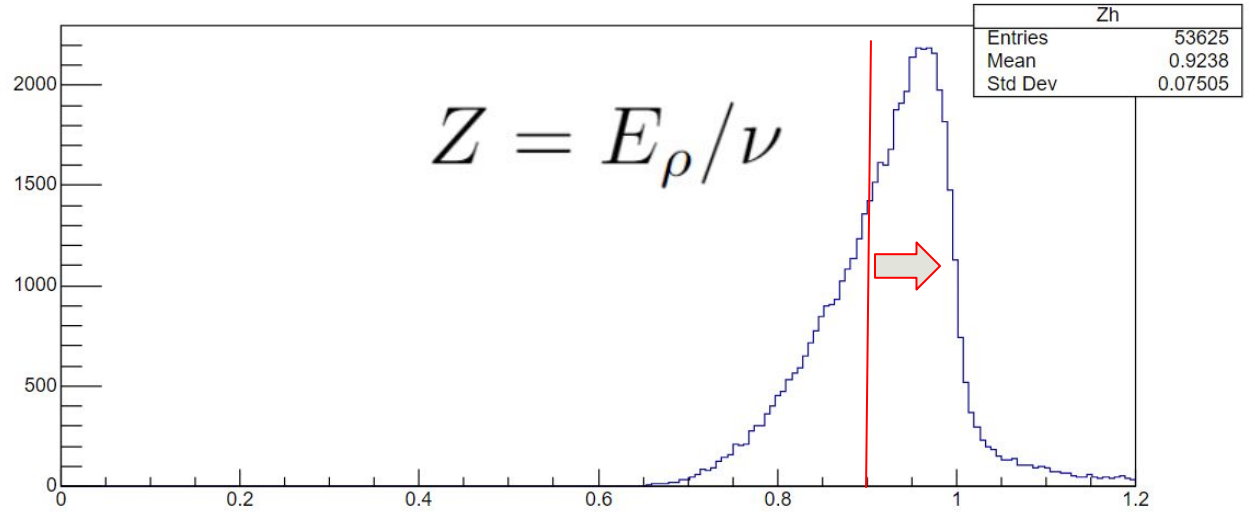
November 8th, 2023

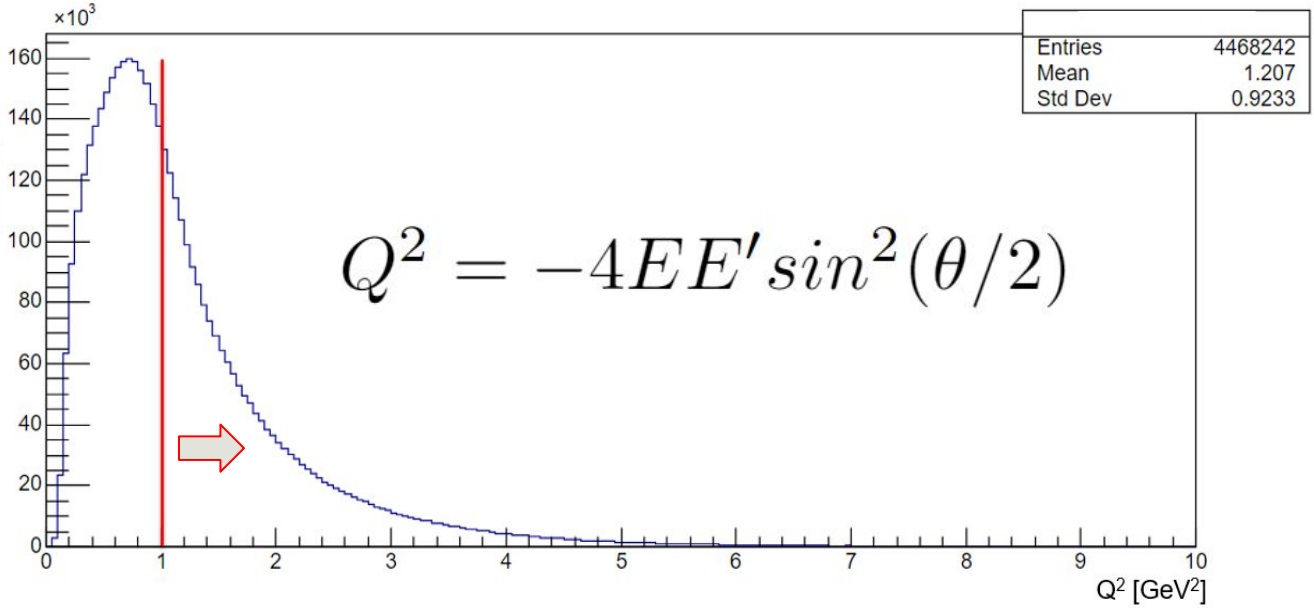
Outline

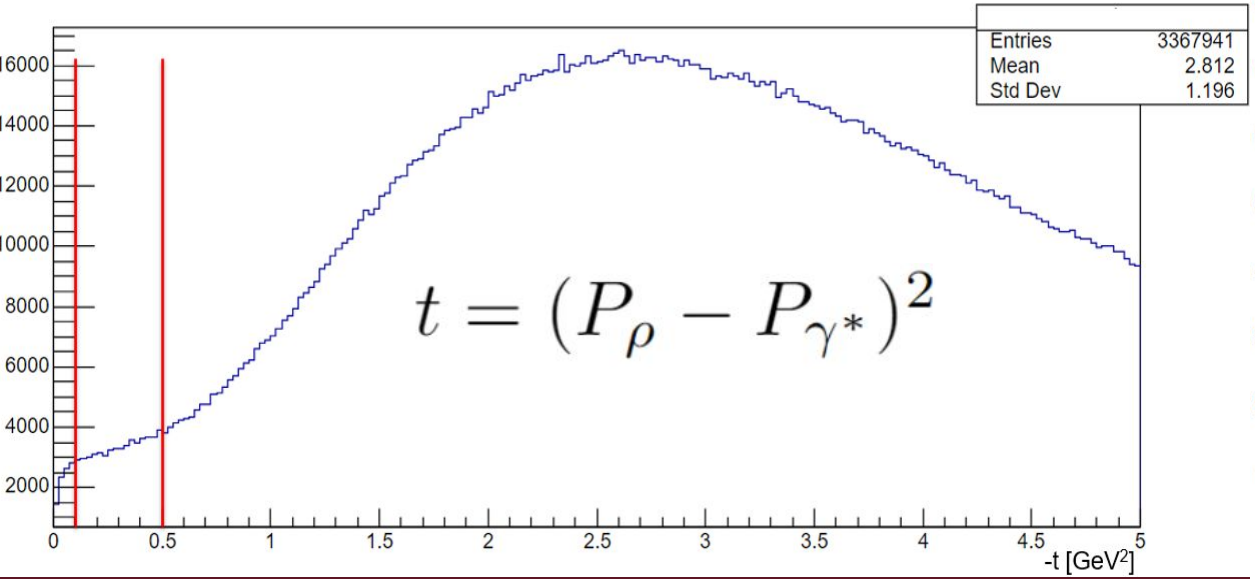
- First look at RG-D data:
  - ρ^0 Electro-production Kinematics
- Alignment Status

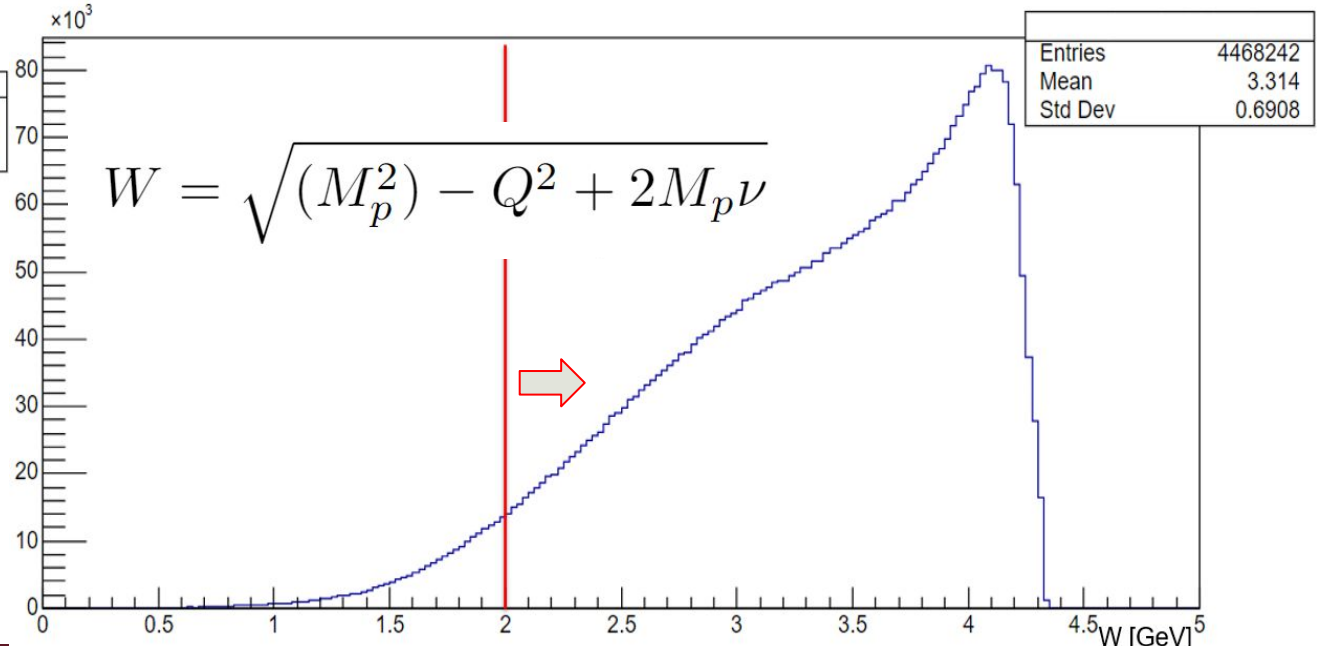
ρ^0 Production Kinematics

- Kinematics using an outbending CxC run (18454) for exclusive diffractive ρ^0 electroproduction off nuclei.

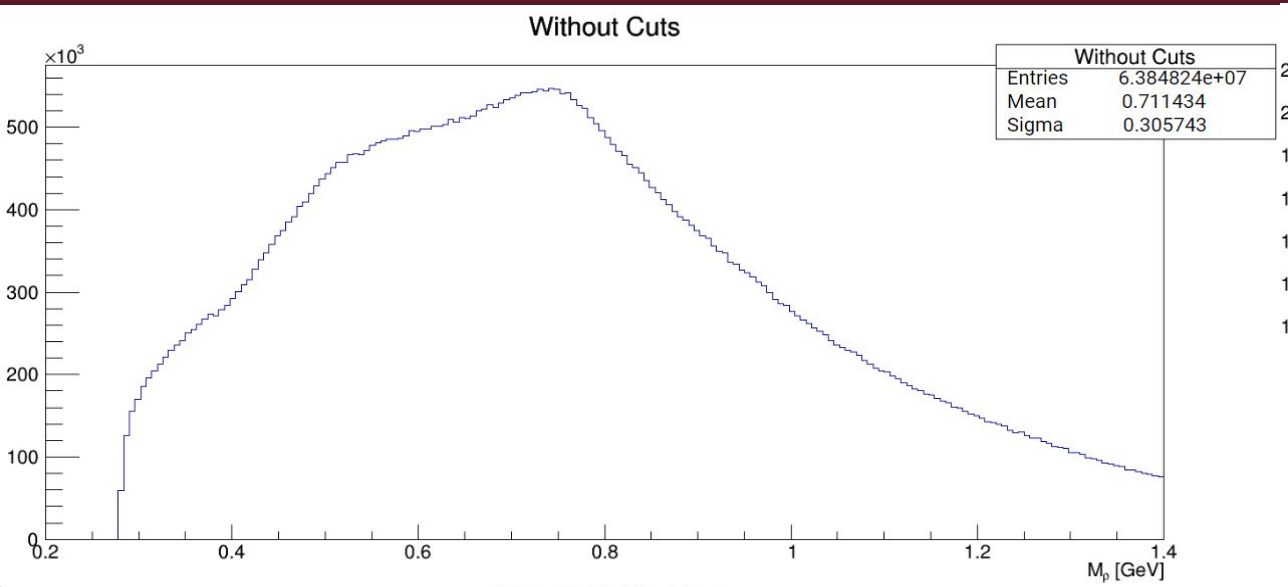


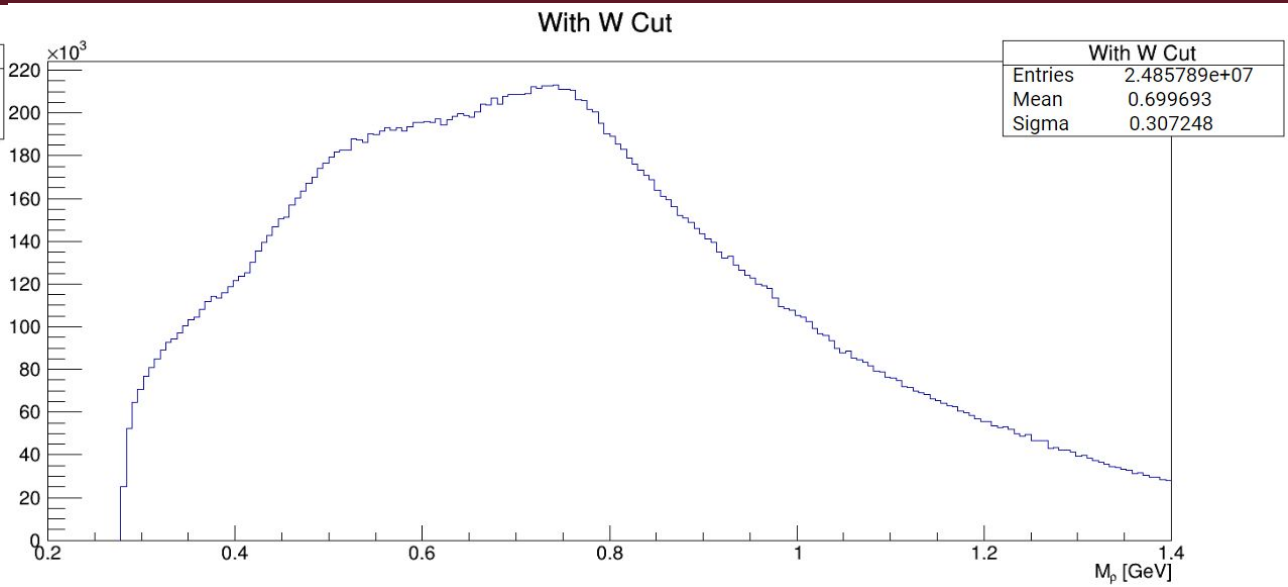


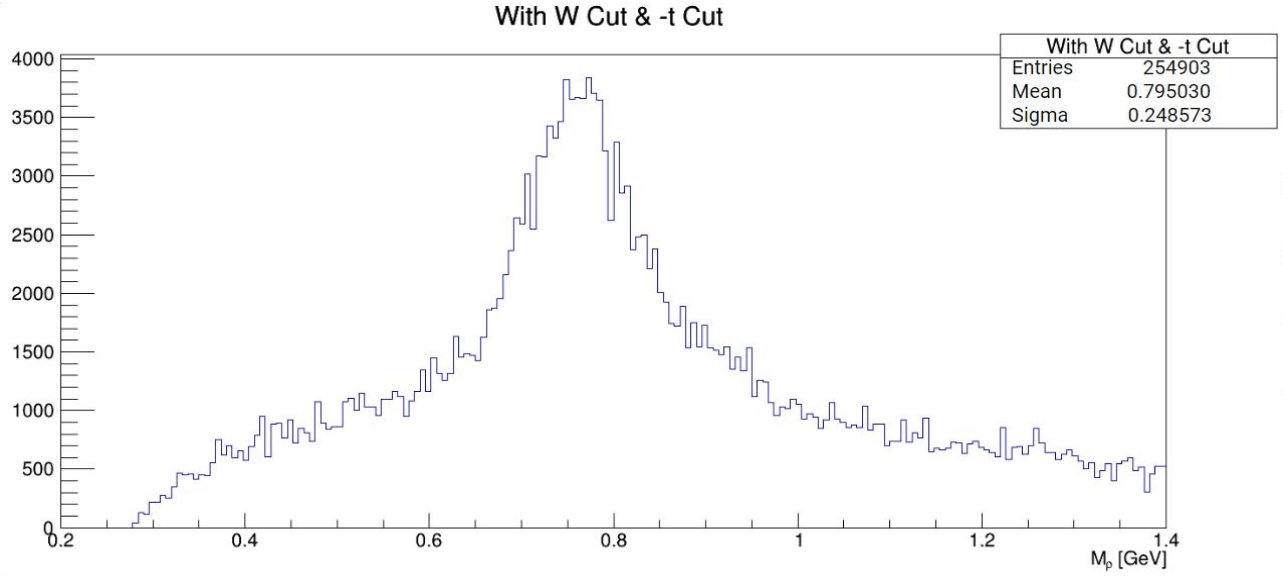


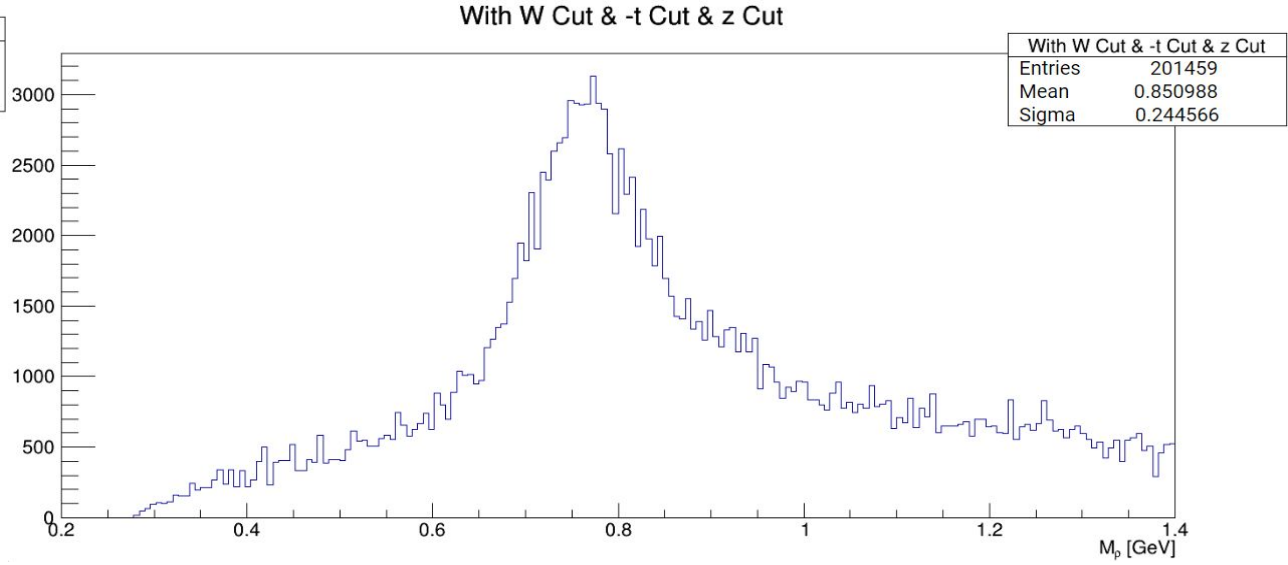


$\pi^+\pi^-$ Invariant Mass



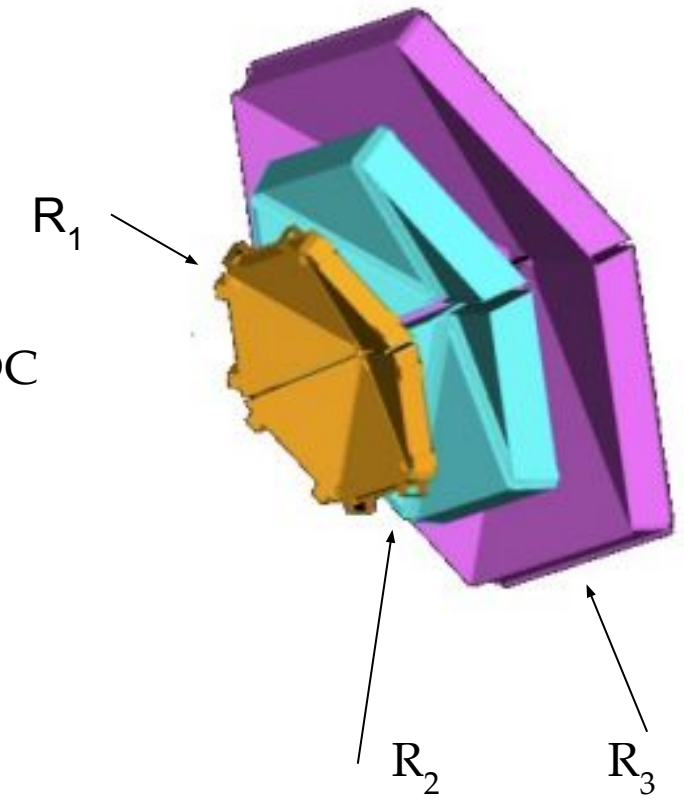






DC Alignment Status

- The Clas12 Drift Chamber System is made of 3 regions R_1, R_2 and R_3:
  - Each Region contains 2 superlayers.
  - Each superlayer is made of 6 layers of sense wires.
- Alignment is done by a series of translations and rotation to align the DC regions as designed in the nominal geometry:
  - 3 translations of all 3 regions range from 0.1 to 0.8 cm;
  - 2 rotations for all 3 regions at 0.2 degrees.



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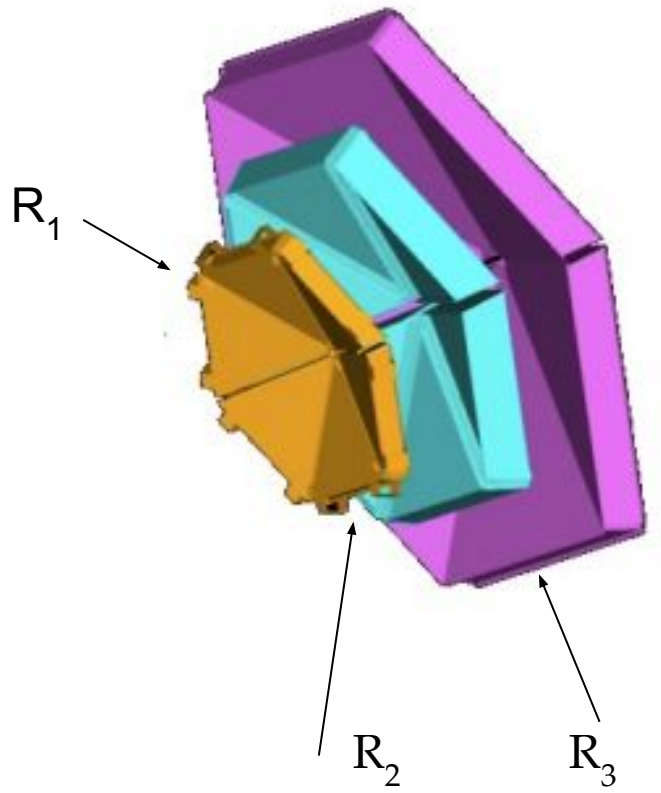
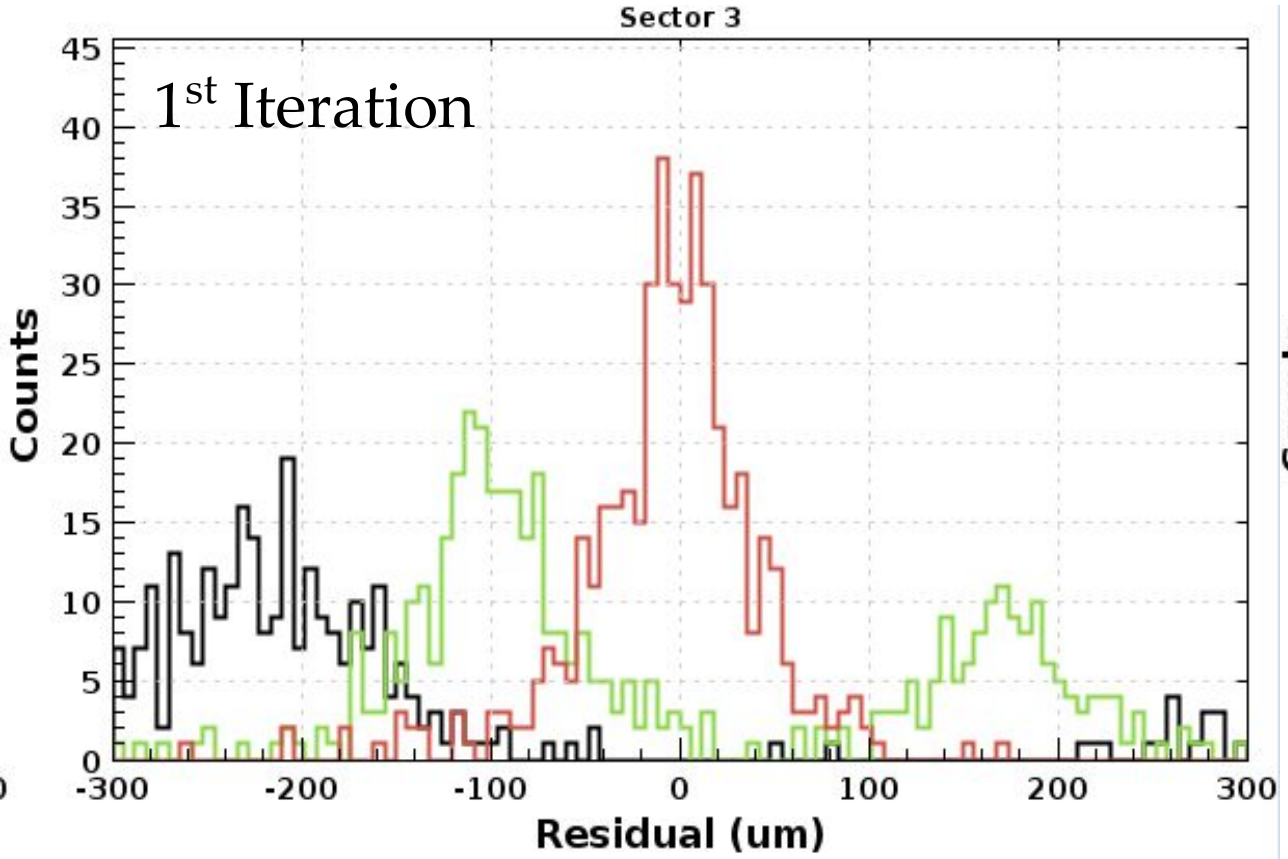
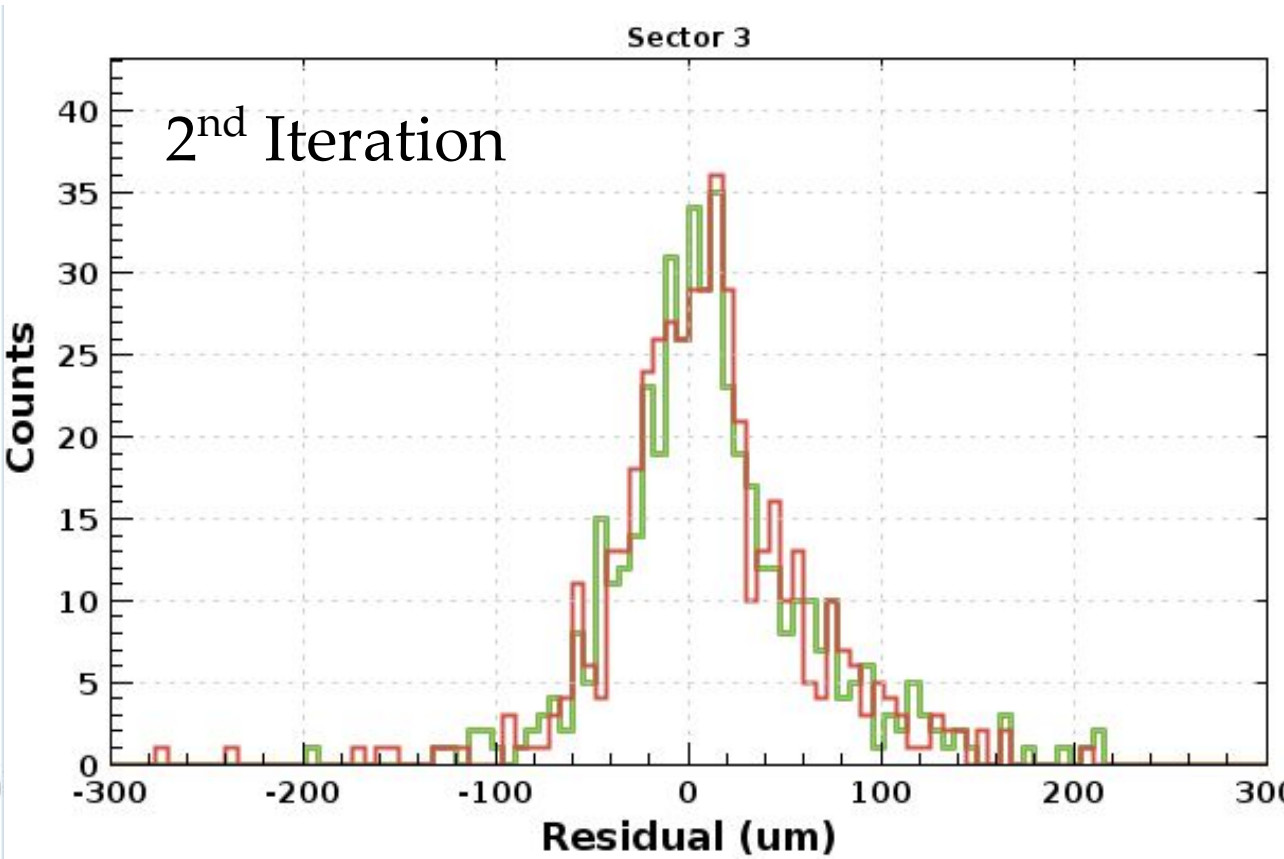
- The RG-D alignment was performed using a 1 nA, zero field, empty target run.



Some Results after First & Second Iterations

- Red line is the result of the first iteration.
- Green line is the result with the RG-C alignment setting.
- Black line represents the nominal geometry.

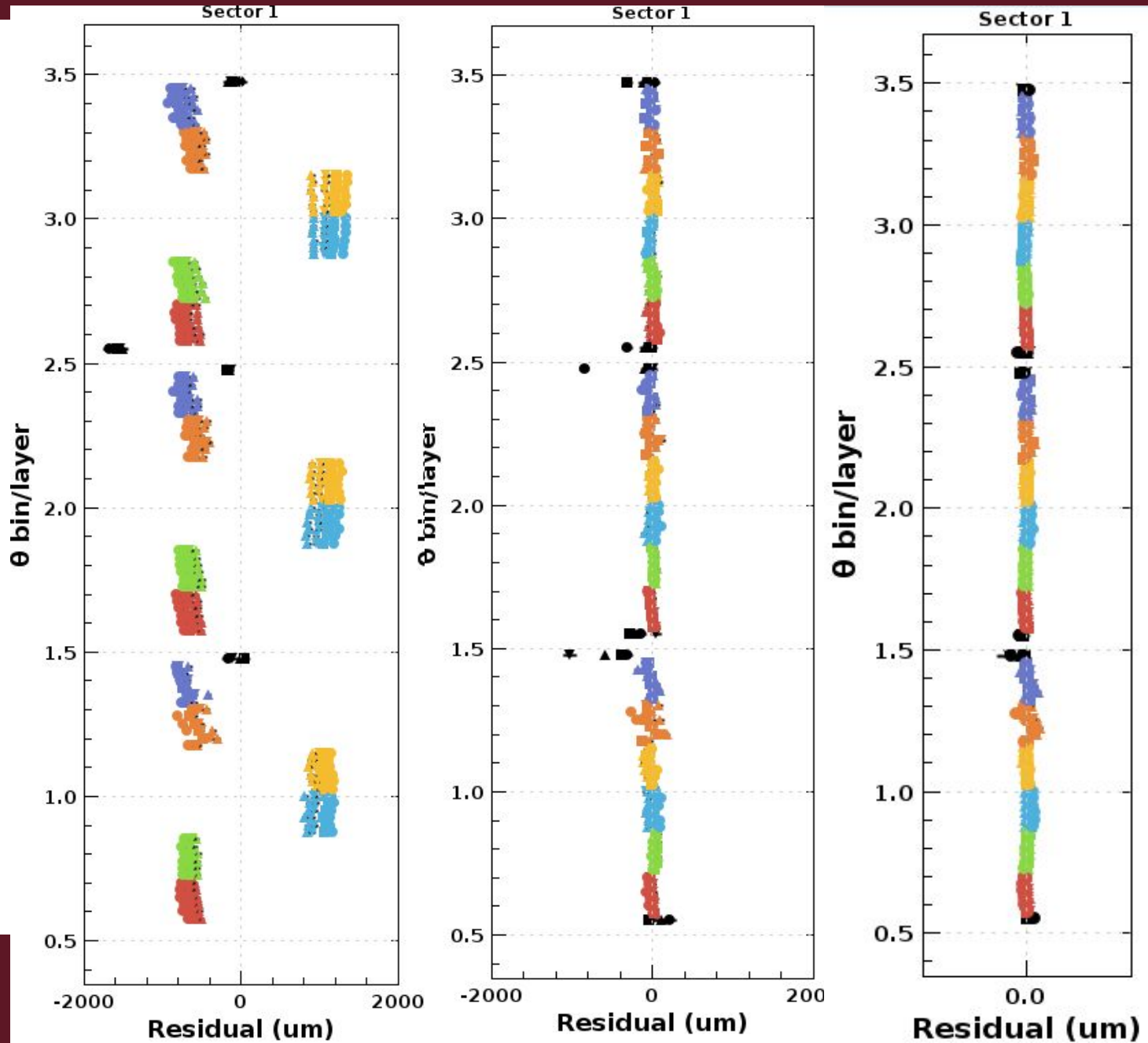




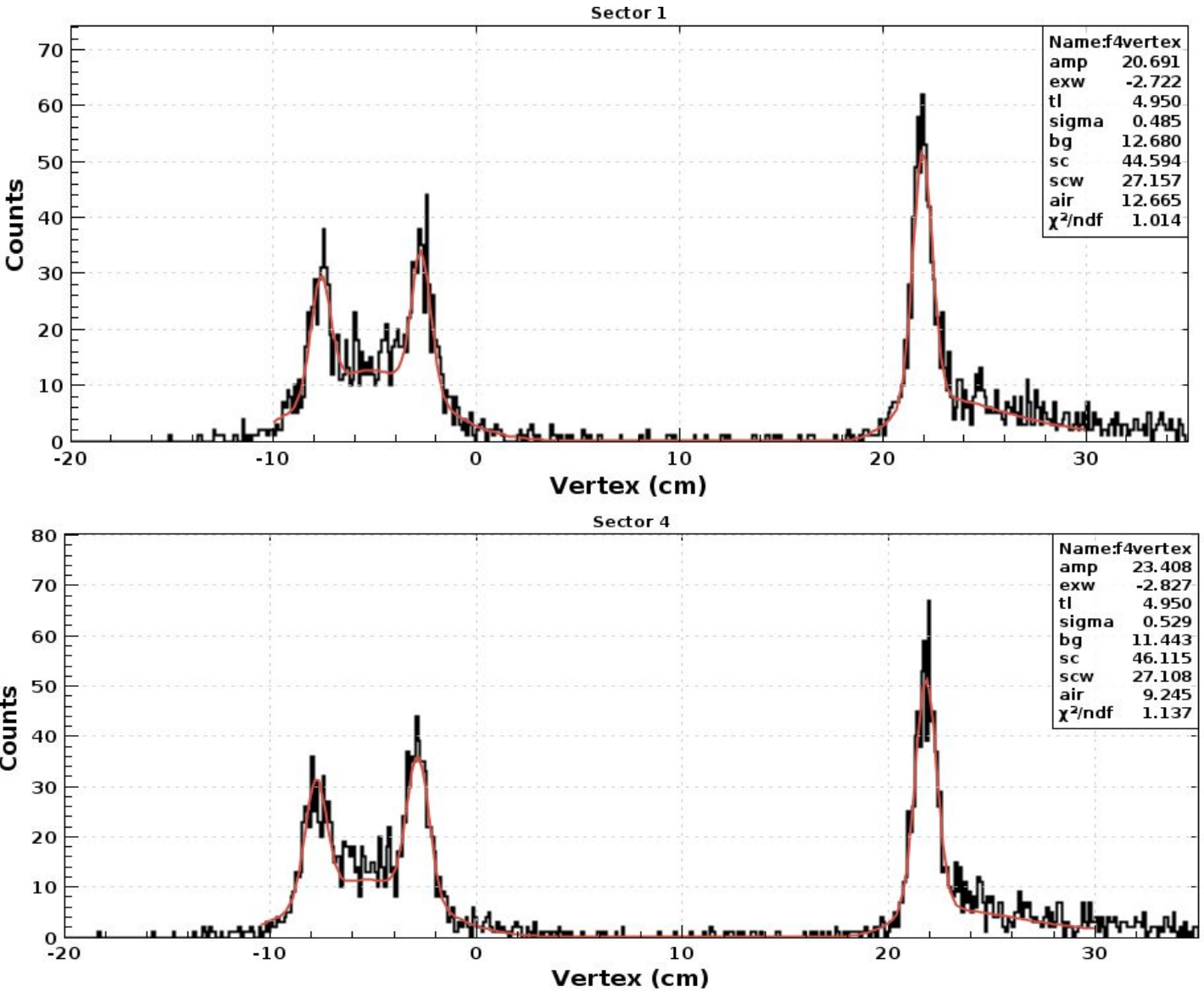
Residuals Dependencies

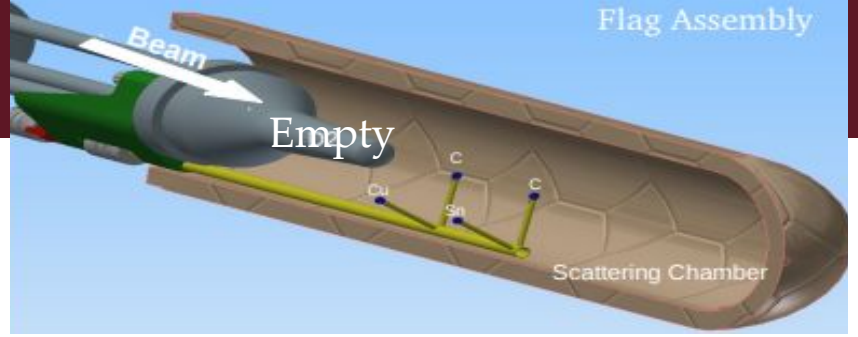
- Colorful dots represent the polar θ_e angle bins.
- Black dots represents the vertex shifts in tens of microns.
  - The shift is with regard to a known target position.
- Different symbols shows the ϕ_e angle bins.

Before Alignment | First Iteration | Second Iteration



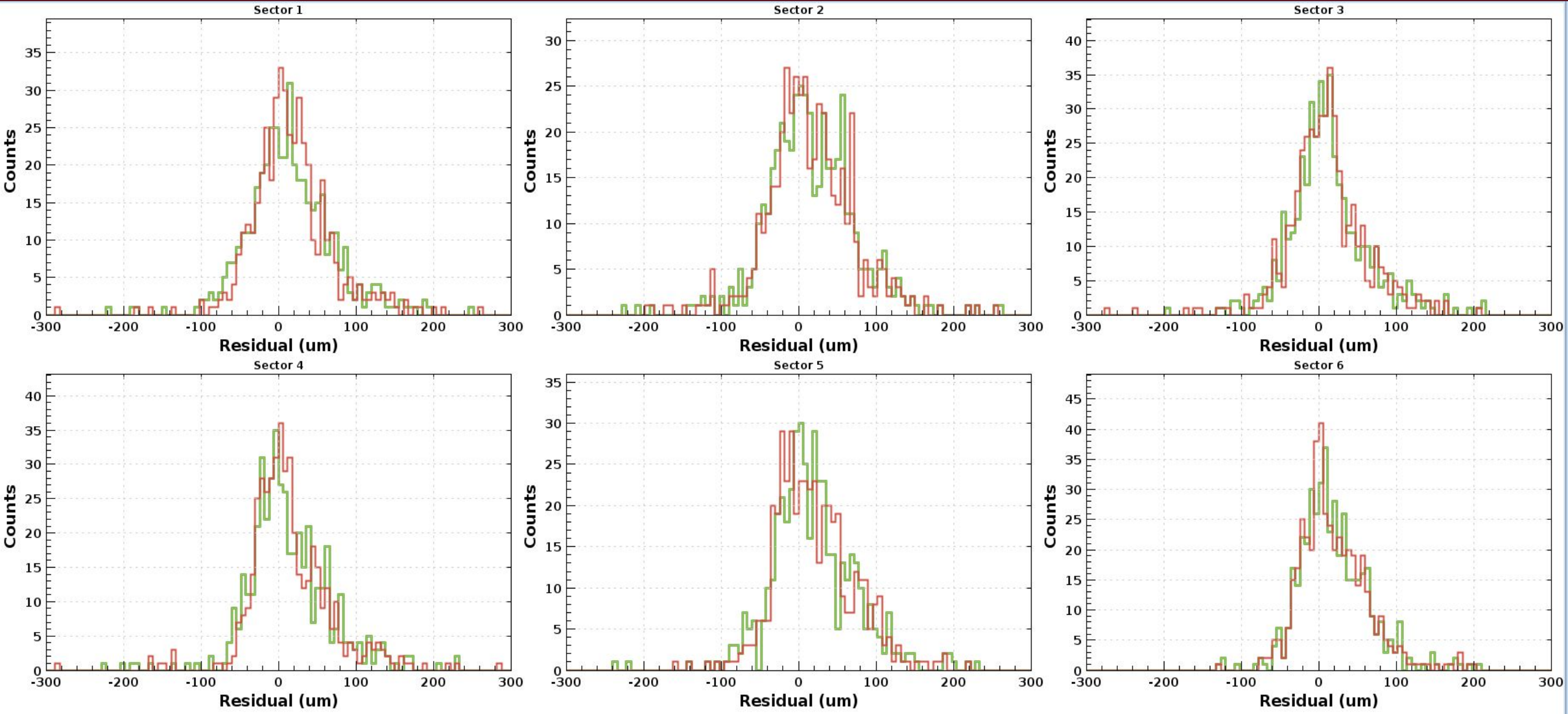
Electron z-Vertex Distributions

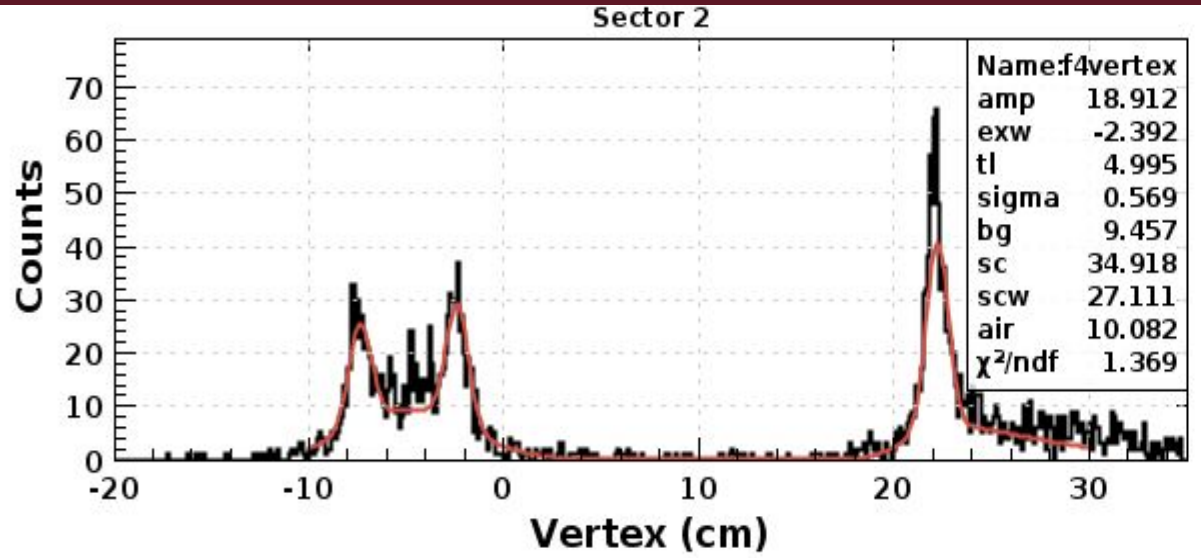


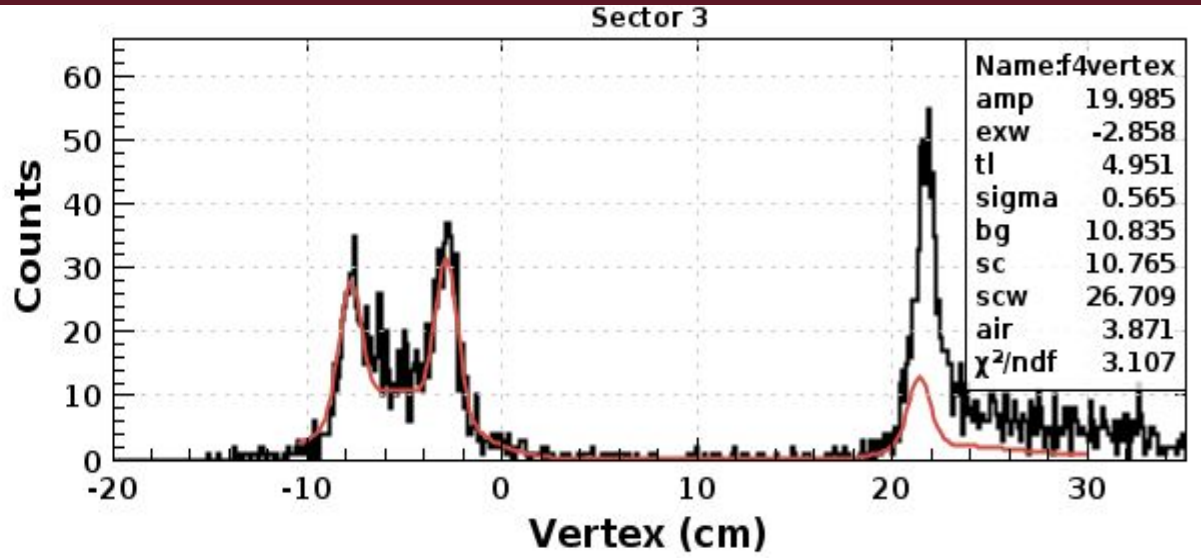


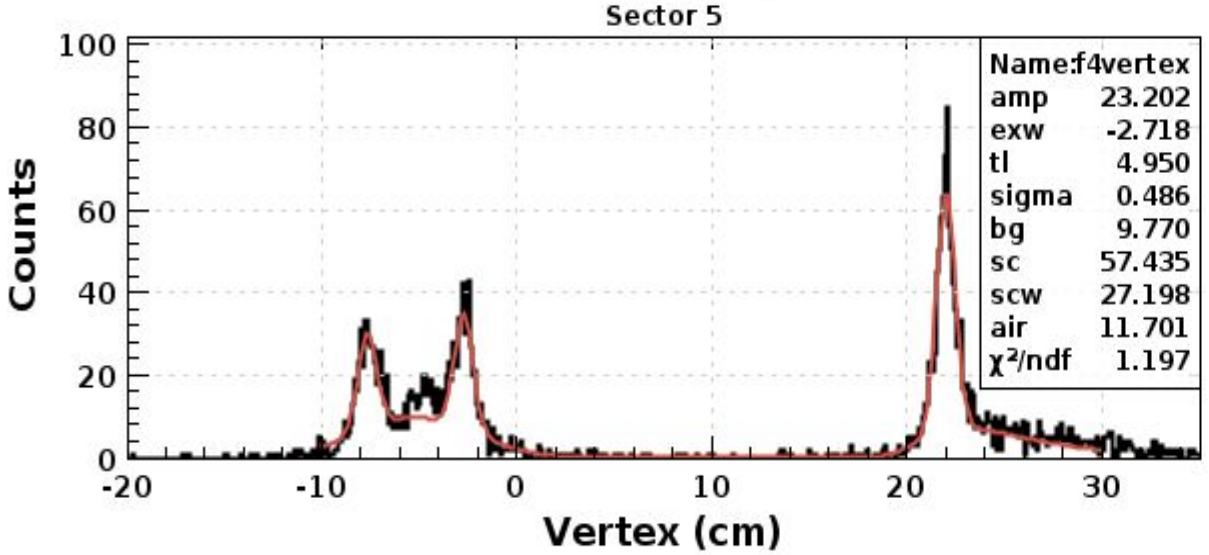
- From left to right along the beamline:
  - The first peak corresponds to the upstream window of empty cryogenic cell.
  - The second peak corresponds to the downstream window of empty cryogenic cell.
- The downstream peak represents the scattering chamber exit window.

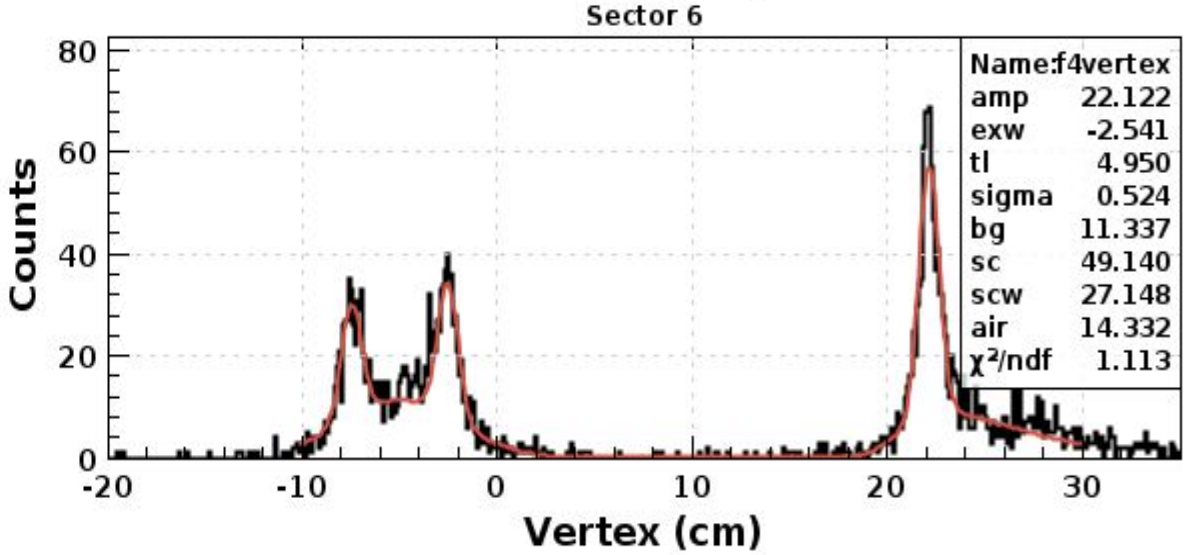
Backup Slides


Sector 1
Counts
Residual (um)
Sector 2
Counts
Residual (um)
Sector 3
Counts
Residual (um)
Sector 4
Counts
Residual (um)
Sector 5
Counts
Residual (um)
Sector 6
Counts
Residual (um)


Sector 2
Counts
Vertex (cm)
Name:f4vertex
amp 18.912
exw -2.392
tl 4.995
sigma 0.569
bg 9.457
sc 34.918
scw 27.111
air 10.082
χ²/ndf 1.369


Sector 3
Counts
Vertex (cm)
Name:f4vertex
amp 19.985
exw -2.858
tl 4.951
sigma 0.565
bg 10.835
sc 10.765
scw 26.709
air 3.871
χ²/ndf 3.107


Sector 5
Counts
Vertex (cm)
Name:f4vertex
amp 23.202
exw -2.718
tl 4.950
sigma 0.486
bg 9.770
sc 57.435
scw 27.198
air 11.701
χ²/ndf 1.197


Sector 6
Counts
Vertex (cm)
Name:f4vertex
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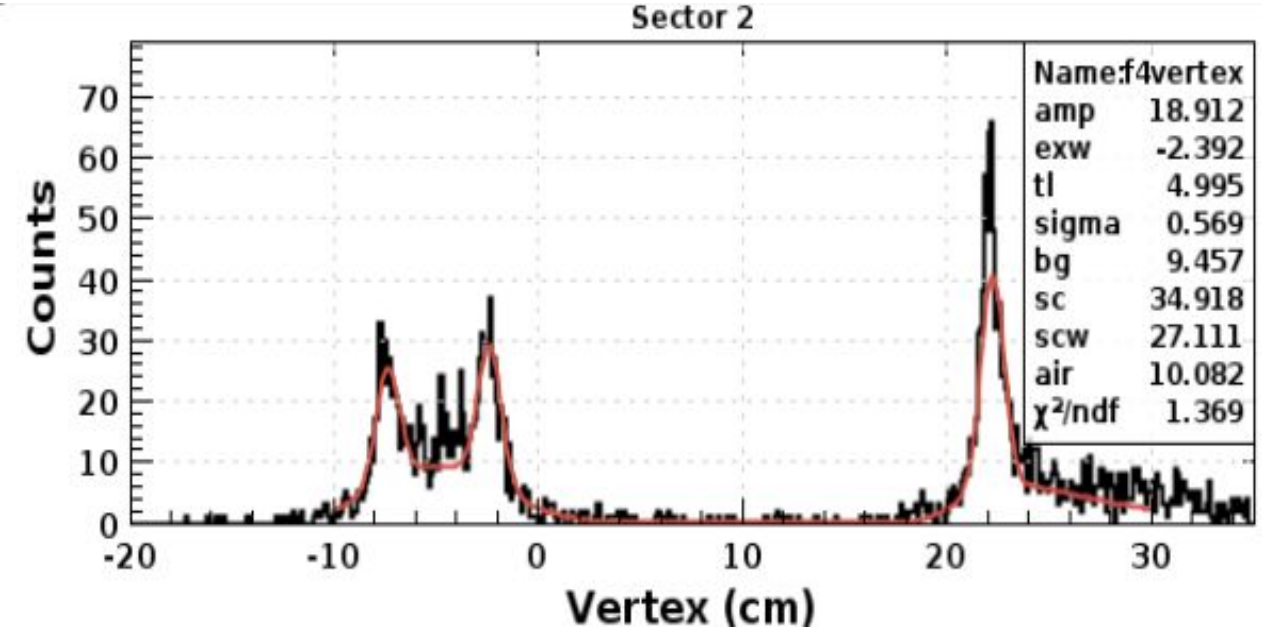
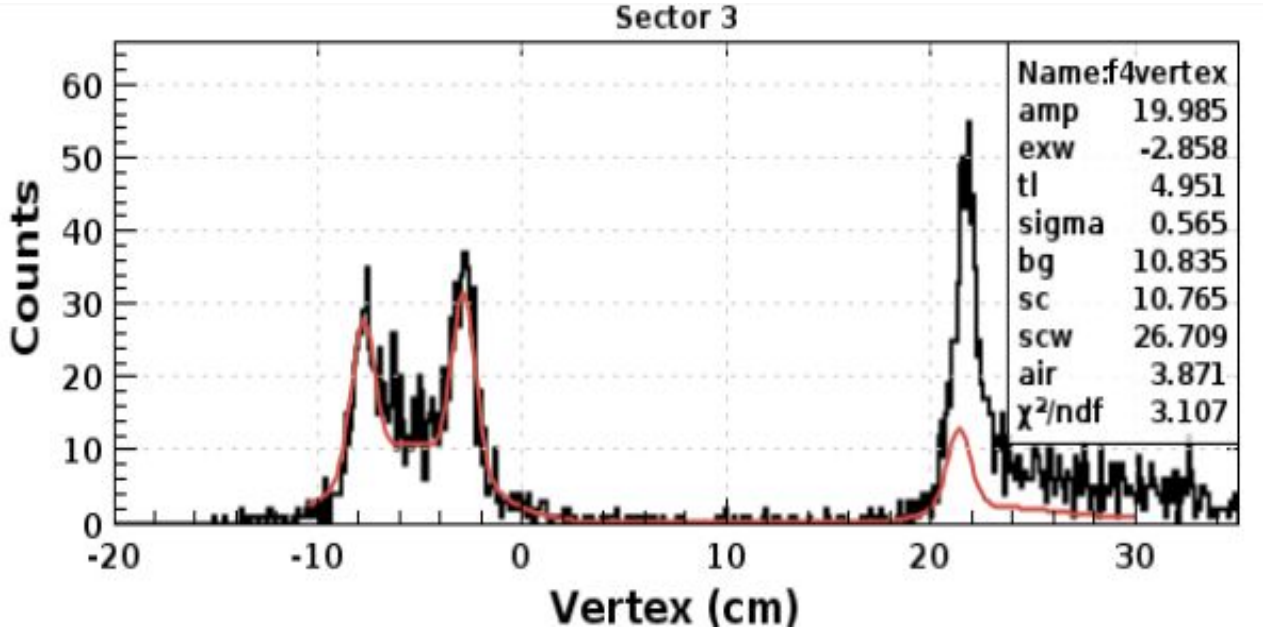
exw -2.541
tl 4.950
sigma 0.524
bg 11.337
sc 49.140
scw 27.148
air 14.332
χ²/ndf 1.113

- The amplitudes of the final peak failed as a result of the final translation. These results will be corrected in the final alignment.