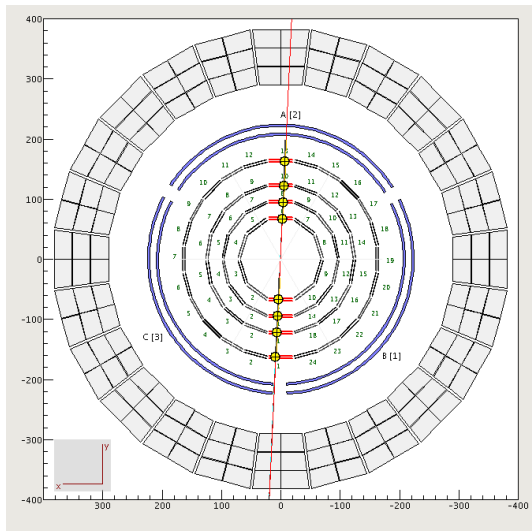


CLAS12 SVT Geometry



- 1 Goal: Correct mis-alignments of SVT to reach design resolution of $\approx 65 \mu m$.
- 2 Use millepede which does linear least-squares for large numbers of global parameters.
- 3 Requires calculation of track residuals with respect to SVT strips.
- 4 Using Type 1 *gemc* tracks.
- 5 Compare results with residuals from clas12-reconstruction.

CLAS12 SVT Geometry

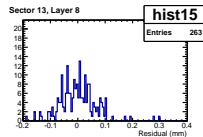
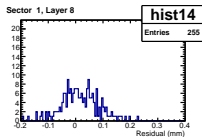
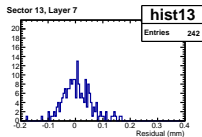
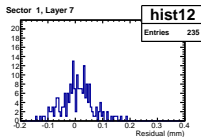
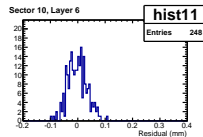
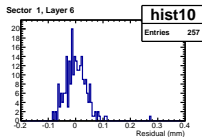
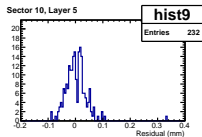
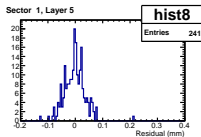
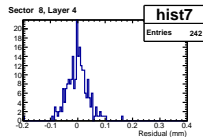
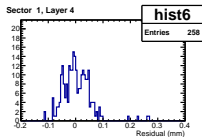
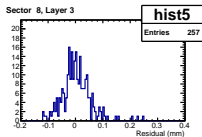
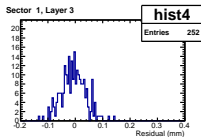
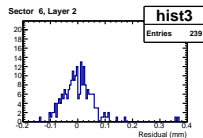
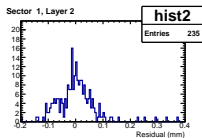
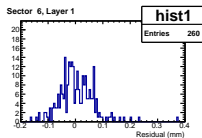
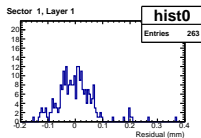
Single event - Type 1 tracks.

Sector	Layer	Strip	r_{VZ} (mm)	r_{jg} (mm)	$r_{VZ} - r_{jg}$ (mm)
1	1	102	-0.04033	-0.0410649	0.0007349
6	1	117	0.07116	0.0699866	0.0011734
1	2	81	0.05748	0.0580858	-0.0006058
6	2	78	-0.02694	-0.0278011	0.0008611
1	3	111	-0.04961	-0.0487493	-0.0008607
8	3	130.5	0.04698*	0.0458676	0.0011124
1	4	76.5	-0.00524*	-0.0094211	0.0041811
8	4	76	0.04837	0.0473646	0.0010054
1	5	120	0.06524	0.0643823	0.0008577
10	5	145.5	0.019595*	0.0240178	-0.0044228
1	6	72	-0.02891	-0.0280761	-0.0008339
10	6	73	-0.01788	-0.0187968	0.0009168
1	7	134	-0.03331	-0.0325396	-0.0007704
13	7	172	-0.09782	-0.0983196	0.0004996
1	8	65.5	0.06391*	0.059367	0.004543
13	8	67.5	-0.16488*	-0.158946	-0.005934

* - Two-strip hit.

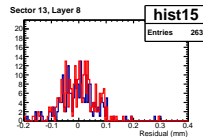
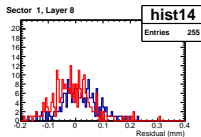
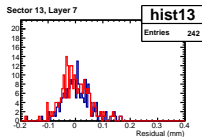
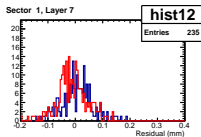
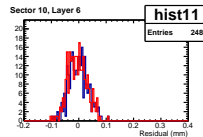
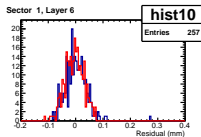
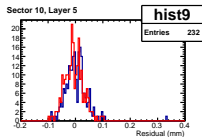
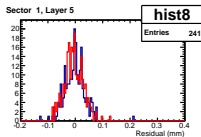
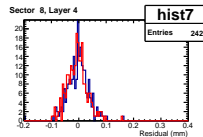
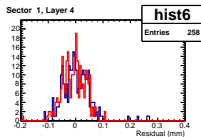
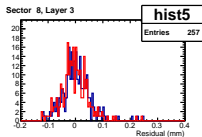
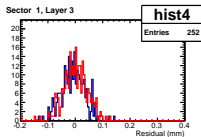
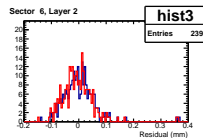
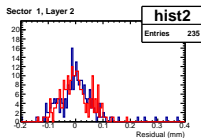
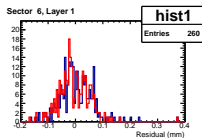
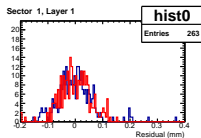
CLAS12 SVT Geometry

Single-strip-cluster residuals for Type 1 tracks: Red - coatjava; Blue - mille.

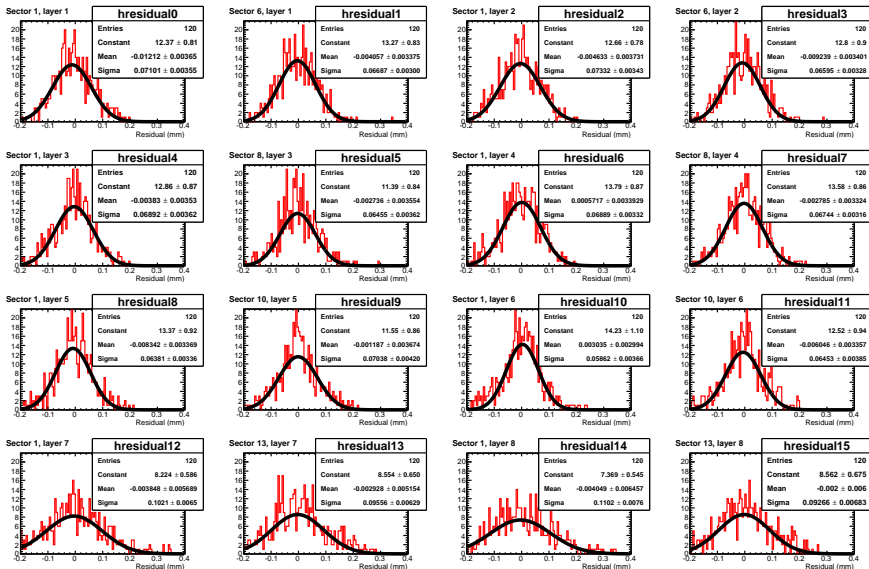


CLAS12 SVT Geometry

Single-strip-cluster residuals for Type 1 tracks: Red - coatjava; Blue - mille.

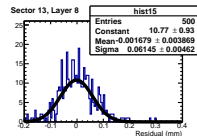
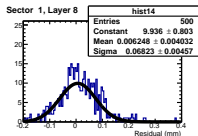
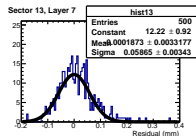
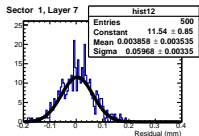
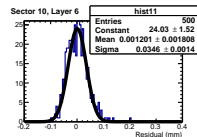
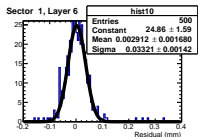
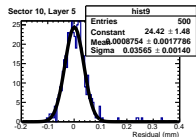
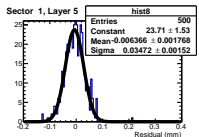
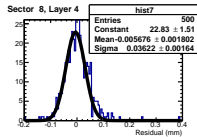
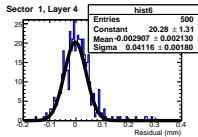
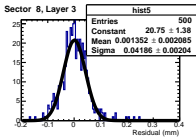
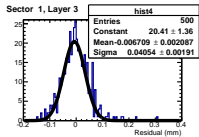
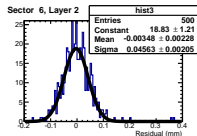
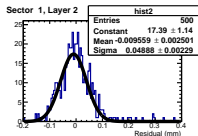
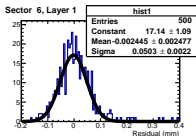
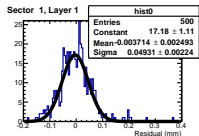


Strip-centroid residuals for Type 1 tracks.



CLAS12 SVT Geometry

Type 1 tracks, Mille results, all clusters.



CLAS12 SVT Geometry

$$\begin{aligned}
 & x0t - x0w - xshiftL - \left((-x0w + x1w) \left(-\left(-z0w + \frac{(-x0t + x1t)(x0t - x0w - xshiftL)}{z1t} + \frac{(y0t - y0w)(-y0t + y1t)}{z1t} \right) \right. \right. \\
 & \quad \left. \left(-z0w + \frac{(-x0t + x1t)(-x0w + x1w)}{z1t} + \frac{(-y0t + y1t)(-y0w + y1w)}{z1t} + z1w \right) + \left(1 + \frac{(-x0t + x1t)^2}{z1t^2} + \frac{(-y0t + y1t)^2}{z1t^2} \right) \right. \\
 & \quad \left. \left. \left((-x0w + x1w)(x0t - x0w - xshiftL) + (y0t - y0w)(-y0w + y1w) - z0w(-z0w + z1w) \right) \right) \right) / \\
 & \quad \left(-\left(-z0w + \frac{(-x0t + x1t)(-x0w + x1w)}{z1t} + \frac{(-y0t + y1t)(-y0w + y1w)}{z1t} + z1w \right)^2 + \right. \\
 & \quad \left. \left(1 + \frac{(-x0t + x1t)^2}{z1t^2} + \frac{(-y0t + y1t)^2}{z1t^2} \right) \left((-x0w + x1w)^2 + (-y0w + y1w)^2 + (-z0w + z1w)^2 \right) \right) + \\
 DOCA_x = & \quad \left((-x0t + x1t) \left(\left(-z0w + \frac{(-x0t + x1t)(-x0w + x1w)}{z1t} + \frac{(-y0t + y1t)(-y0w + y1w)}{z1t} + z1w \right) \right. \right. \\
 & \quad \left. \left((-x0w + x1w)(x0t - x0w - xshiftL) + (y0t - y0w)(-y0w + y1w) - z0w(-z0w + z1w) \right) - \right. \\
 & \quad \left. \left(-z0w + \frac{(-x0t + x1t)(x0t - x0w - xshiftL)}{z1t} + \frac{(y0t - y0w)(-y0t + y1t)}{z1t} \right) \right. \\
 & \quad \left. \left. \left((-x0w + x1w)^2 + (-y0w + y1w)^2 + (-z0w + z1w)^2 \right) \right) \right) / \\
 & \quad \left(z1t \left(-\left(-z0w + \frac{(-x0t + x1t)(-x0w + x1w)}{z1t} + \frac{(-y0t + y1t)(-y0w + y1w)}{z1t} + z1w \right)^2 + \right. \right. \\
 & \quad \left. \left. \left(1 + \frac{(-x0t + x1t)^2}{z1t^2} + \frac{(-y0t + y1t)^2}{z1t^2} \right) \left((-x0w + x1w)^2 + (-y0w + y1w)^2 + (-z0w + z1w)^2 \right) \right) \right)
 \end{aligned}$$

Strip end points: $(x0w, y0w, z0w)$, $(x1w, y1x, z1w)$

Track fit end points: $(x0t, y0t, z0t)$, $(x1t, y1t, z1t)$

Geometry parameters: $xshiftL$

$$\frac{\partial DOCA_x}{\partial xshiftL} =$$

$$-1 - \left((-x0w + x1w) \left((x0w - x1w) \left(1 + \frac{(-x0t + x1t)^2}{z1t^2} + \frac{(-y0t + y1t)^2}{z1t^2} \right) + \frac{(-x0t + x1t) \left(-z0w + \frac{(-x0t + x1t) (-x0w + x1w)}{z1t} + \frac{(-y0t + y1t) (-y0w + y1w)}{z1t} + z1w \right)}{z1t} \right) \right) /$$

$$\left(-z0w + \frac{(-x0t + x1t) (-x0w + x1w)}{z1t} + \frac{(-y0t + y1t) (-y0w + y1w)}{z1t} + z1w \right)^2 + \left(1 + \frac{(-x0t + x1t)^2}{z1t^2} + \frac{(-y0t + y1t)^2}{z1t^2} \right) \left((-x0w + x1w)^2 + (-y0w + y1w)^2 + (-z0w + z1w)^2 \right) + \left((-x0t + x1t) \left((x0w - x1w) \left(-z0w + \frac{(-x0t + x1t) (-x0w + x1w)}{z1t} + \frac{(-y0t + y1t) (-y0w + y1w)}{z1t} + z1w \right) + \frac{(-x0t + x1t) \left((-x0w + x1w)^2 + (-y0w + y1w)^2 + (-z0w + z1w)^2 \right)}{z1t} \right) \right) /$$

$$\left(z1t \left(-z0w + \frac{(-x0t + x1t) (-x0w + x1w)}{z1t} + \frac{(-y0t + y1t) (-y0w + y1w)}{z1t} + z1w \right)^2 + \left(1 + \frac{(-x0t + x1t)^2}{z1t^2} + \frac{(-y0t + y1t)^2}{z1t^2} \right) \left((-x0w + x1w)^2 + (-y0w + y1w)^2 + (-z0w + z1w)^2 \right) \right)$$

Strip end points: $(x0w, y0w, z0w)$, $(x1w, y1x, z1w)$

Track fit end points: $(x0t, y0t, z0t)$, $(x1t, y1t, z1t)$

Geometry parameters: $xshiftL$