Goal: Align the SVT to reach the resolution design specification of $\approx 65 \mu m$.

Build accurate and complete representation of the SVT geometry and materials as part of the CLAS12 Common Tools.

Provide the geometry for the gemc simulation and the CLAS12 reconstruction from a common set of parameters.

Develop algorithms to measure and correct misalignments in the SVT.

Document it.
Status of SVT alignment study

1. Type 2 code written and being tested. Using Type-1 events.
2. Comparison of Type-1 events analyzed with Type-2 code useful for identifying bugs, picking signs of derivatives, etc.
3. `gemc` version 4a.1.0 in use, Java/Groovy scripts at coatjava 4a.5.5.
4. Applied to simulated, Type-1 cosmic rays with the ideal geometry.
5. Misalignments extracted from `millepede` close to zero within uncertainties (blue points in plot).
6. Misalignments extracted from `millepede` using old Type-1 code show clear bias. Effect of new geometry in `gemc`?
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1. Apply known shift to region 1 in gemc - \( \Delta x = 50 \, \mu m \).

2. gemc syntax:

   <detector name="region1">
   <position x="0.050*mm" y="0*cm" z="0*cm" />
   </detector>

3. Change in definition of residual sign in BSTRec::Hits bank?

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Type 1, Shifted geometry

\[ \Delta R_1 = 20 \, \mu m \]

June, 2016

Type 1 events test

\[ \Delta R_1 = 50 \, \mu m \]
Residuals for Type-1 Events, 50-micron shift
Status of SVT alignment study

1. First application of code to Type-2 events.
2. Type-1 events have small residuals in BSTRec::Hits bank.
3. Type-2 events have large residuals in BSTRec::Hits bank even for horizontal modules.

Type 1

Type 2
Visualization

Blue – cosmic ray track
Red – single strip

Green point – track-layer intersection
DOCA - distance of closest approach, \( myz \) - slope in \( y-z \) plane.

\[ d \text{DOCA} = \text{distance of closest approach}, \quad \text{myz} = \text{slope in } y-z \text{ plane.} \]