

# Svt Survey Geometry

Per Hansson Adrian – 6/23/2015

- Geometry back-end (common for LCDD and Java converters) relies on building a hierarchical structure of SurveyVolume's
- Each SurveyVolume has an associated AlignmentCorrection
  - Millepede corrections
  - Survey corrections
- Supply reference to the XML with the AlignmentCorrection
  - All SurveyVolume objects built search and applies the survey corrections matching their detector element name

# XML Based Input

```
<detectors>
  <detector id="1" name="Tracker" type="HPSTracker2014v1" readout="TrackerHits">

    <SurveyVolumes>

      <!-- Module support surface survey -->
      <SurveyVolume name="module_L1t" desc="Top L1 pin basis in U-channel fiducial frame:">
        <origin x="-95.2594" y="51.3976" z="-9.5359"/>
        <unitvec name="X" x="1.0000e+00" y="-9.0423e-06" z="1.9487e-04"/>
        <unitvec name="Y" x="-9.0638e-06" y="-1.0000e+00" z="1.1063e-04"/>
        <unitvec name="Z" x="1.9487e-04" y="-1.1063e-04" z="-1.0000e+00"/>
      </SurveyVolume>
      <SurveyVolume name="module_L2t" desc="Top L2 pin basis in U-channel fiducial frame:">
        <origin x="-95.2519" y="52.9069" z="90.4129"/>
        <unitvec name="X" x="1.0000e+00" y="9.3360e-05" z="5.5287e-04"/>
        <unitvec name="Y" x="9.3298e-05" y="-1.0000e+00" z="1.1098e-04"/>
        <unitvec name="Z" x="5.5288e-04" y="-1.1093e-04" z="-1.0000e+00"/>
      </SurveyVolume>

      <!-- Sensor position survey -->
      <SurveyVolume name="module_L1t_halfmodule_stereo" desc="Top L1S sensor basis in pin frame:">
        <origin x="124.125" y="39.2422" z="-13.84"/>
        <unitvec name="X" x="9.9500e-01" y="9.9895e-02" z="-1.3013e-04"/>
        <unitvec name="Y" x="9.9895e-02" y="-9.9500e-01" z="4.4987e-04"/>
        <unitvec name="Z" x="-8.4542e-05" y="-4.6062e-04" z="-1.0000e+00"/>
      </SurveyVolume>
      <SurveyVolume name="module_L1t_halfmodule_axial" desc="Top L1A sensor basis in pin frame:">
        <origin x="124.083" y="39.2023" z="-5.33"/>
        <unitvec name="X" x="1.0000e+00" y="1.4866e-04" z="8.3270e-04"/>
        <unitvec name="Y" x="-1.4826e-04" y="1.0000e+00" z="-4.7996e-04"/>
        <unitvec name="Z" x="-8.3277e-04" y="4.7984e-04" z="1.0000e+00"/>
      </SurveyVolume>
      <SurveyVolume name="module_L2t_halfmodule_stereo" desc="Top L2S sensor basis in pin frame:">
        <origin x="124.0673" y="39.2371" z="-13.7757"/>
        <unitvec name="X" x="9.9501e-01" y="9.9761e-02" z="-1.5964e-04"/>
        <unitvec name="Y" x="9.9759e-02" y="-9.9498e-01" z="7.8574e-03"/>
        <unitvec name="Z" x="6.2502e-04" y="-7.8341e-03" z="-9.9997e-01"/>
      </SurveyVolume>
    </SurveyVolumes>
  </detector>
</detectors>
```

# Module mount support positions in U-channels

<http://www.slac.stanford.edu/~phansson/files/temp/pinFrameDiff.txt>

1b:	-141.36,	228.75,	-59.858 ->	-141.39,	228.74,	-59.880 (0.0300,0.0100,0.0220)
1t:	-142.43,	263.67,	59.858 ->	-142.44,	263.68,	59.821 (0.0100,-0.0100,0.0370)
2b:	-138.31,	128.80,	-61.358 ->	-138.29,	128.74,	-61.359 (-0.0200,0.0600,0.0010)
2t:	-139.38,	163.72,	61.358 ->	-139.39,	163.78,	61.330 (0.0100,-0.0600,0.0280)
3b:	-135.25,	28.848,	-62.858 ->	-135.29,	28.783,	-62.839 (0.0400,0.0650,-0.0190)
3t:	-136.34,	63.767,	62.858 ->	-136.38,	63.758,	62.823 (0.0400,0.0090,0.0350)
4b:	-154.72,	-171.84,	-61.763 ->	-154.68,	-171.90,	-61.792 (-0.0400,0.0600,0.0290)
4t:	-155.79,	-136.94,	61.763 ->	-155.84,	-136.90,	61.721 (0.0500,-0.0400,0.0420)
5b:	-148.63,	-371.75,	-64.763 ->	-148.56,	-371.81,	-64.774 (-0.0700,0.0600,0.0110)
5t:	-149.69,	-336.84,	64.763 ->	-149.71,	-336.84,	64.776 (0.0200,0.0000,-0.0130)
6b:	-142.53,	-571.66,	-67.763 ->	-142.45,	-571.70,	-67.743 (-0.0800,0.0400,-0.0200)
6t:	-143.60,	-536.75,	67.763 ->	-143.60,	-536.72,	67.747 (0.0000,-0.0300,0.0160)

X- “module length direction”

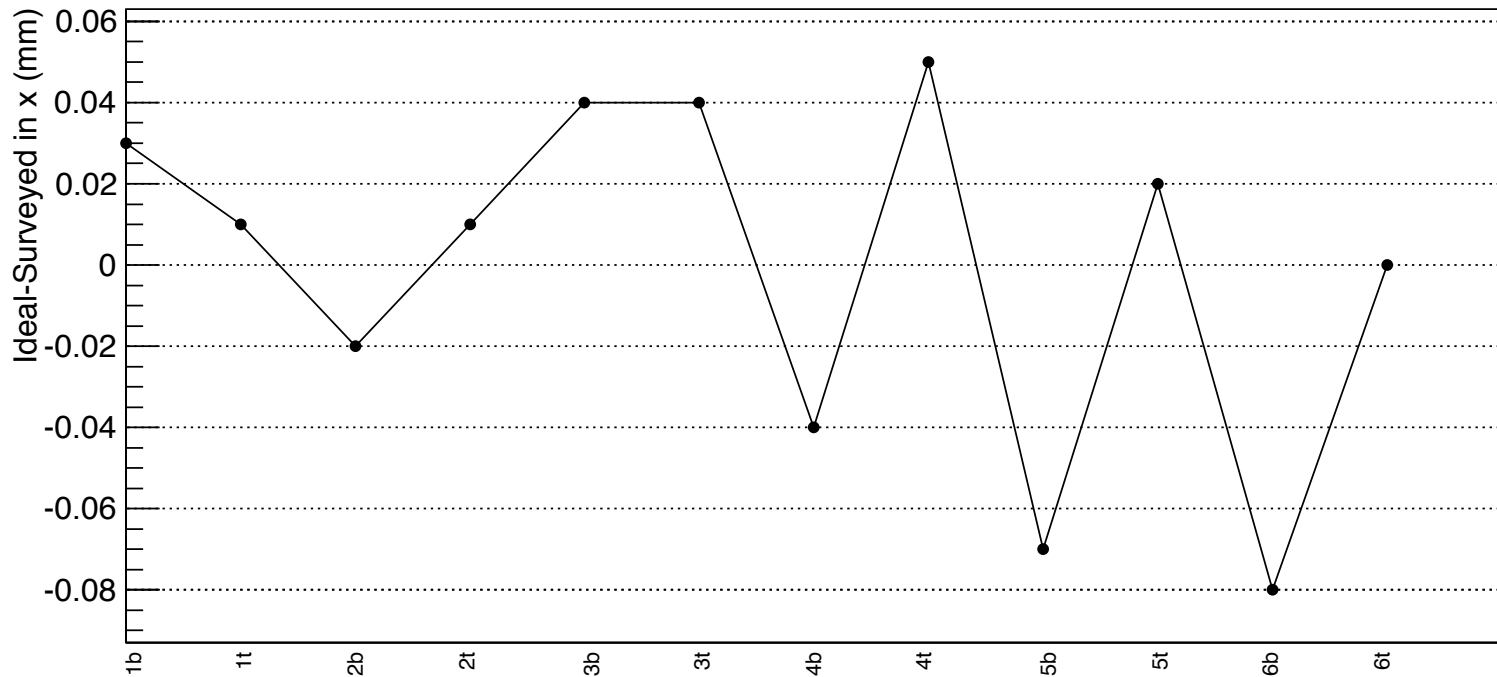
Y- “along support channel”

Z- “vertically from support surface”

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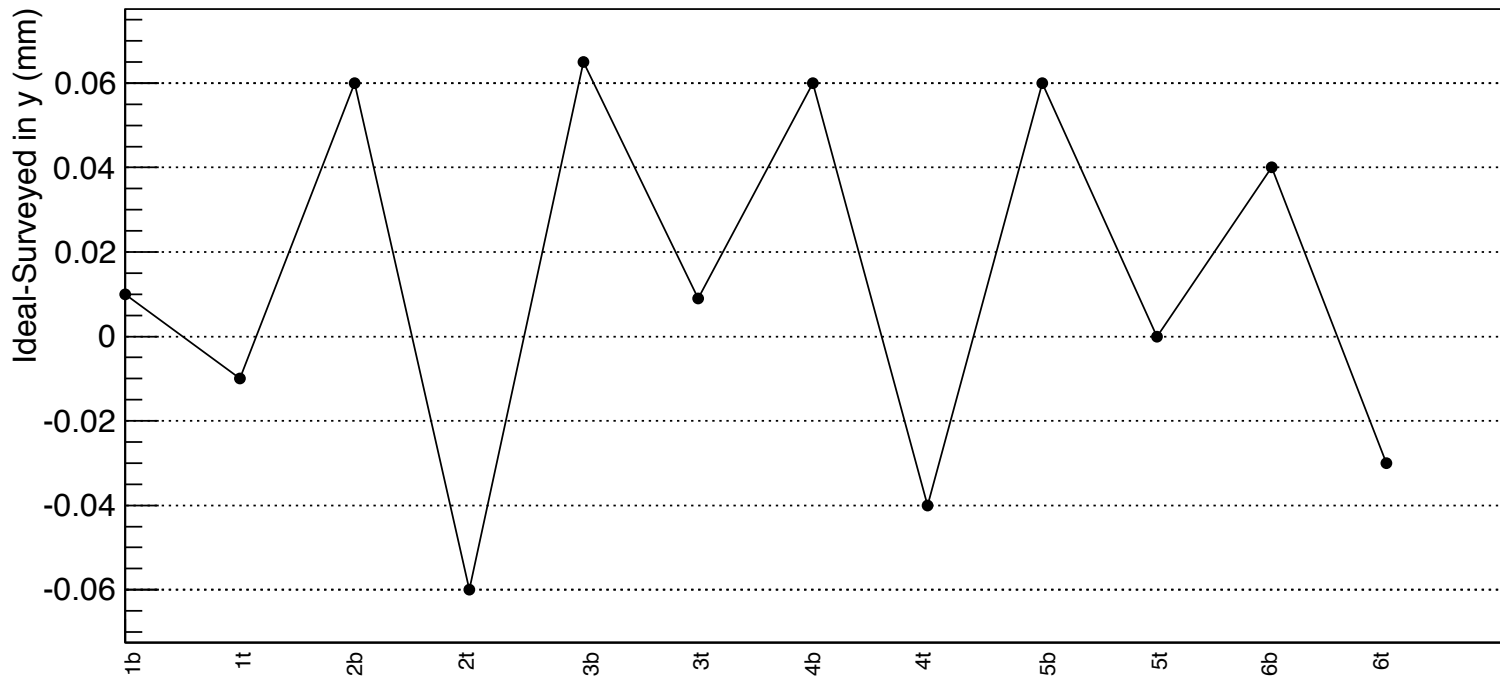
pinFrameDiff survey



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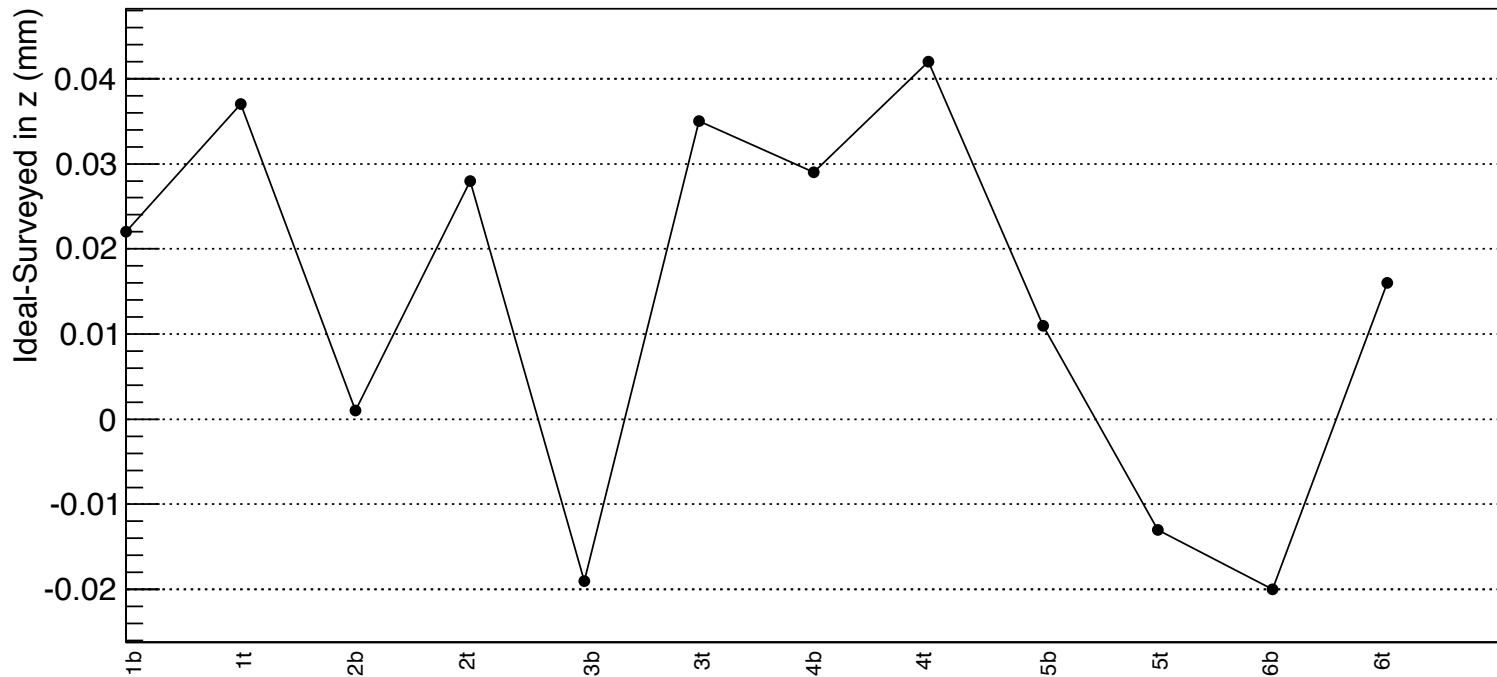
pinFrameDiff survey



# Module mount support positions in U-channels

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pinFrameDiff survey



# Sensor survey

<http://www.slac.stanford.edu/~phanpson/files/temp/sensorFrameDiff.txt>

```
1b_axial: -39.192, 123.65, -5.8420 -> -39.205, 124.21, -5.5944 (0.0130,-0.5600,-0.2476)
 1b_stereo: -39.192, 123.65, -13.208 -> -39.251, 124.16, -13.660 (0.0590,-0.5100,0.4520)
 1t_axial: -39.192, 123.65, -5.8420 -> -39.202, 124.08, -5.4900 (0.0100,-0.4300,-0.3520)
 1t_stereo: -39.192, 123.65, -13.208 -> -39.242, 124.13, -13.680 (0.0500,-0.4800,0.4720)
 2b_axial: -39.192, 123.65, -5.8420 -> -39.205, 124.12, -5.4189 (0.0130,-0.4700,-0.4231)
 2b_stereo: -39.192, 123.65, -13.208 -> -39.251, 124.26, -13.473 (0.0590,-0.6100,0.2650)
 2t_axial: -39.192, 123.65, -5.8420 -> -39.205, 124.08, -5.6159 (0.0130,-0.4300,-0.2261)
 2t_stereo: -39.192, 123.65, -13.208 -> -39.238, 124.07, -13.616 (0.0460,-0.4200,0.4080)
 3b_axial: -39.192, 123.65, -5.8420 -> -39.200, 124.09, -5.6042 (0.0080,-0.4400,-0.2378)
 3b_stereo: -39.192, 123.65, -13.208 -> -39.247, 124.10, -13.475 (0.0550,-0.4500,0.2670)
 3t_axial: -39.192, 123.65, -5.8420 -> -39.204, 124.07, -5.5975 (0.0120,-0.4200,-0.2445)
 3t_stereo: -39.192, 123.65, -13.208 -> -39.233, 124.07, -13.589 (0.0410,-0.4200,0.3810)
4b_axial_hole: -35.103, 98.730, -5.8420 -> -35.079, 98.850, -5.7514 (-0.0240,-0.1200,-0.0906)
4b_axial_slot: -35.103, 199.72, -5.8420 -> -35.074, 199.70, -5.7511 (-0.0290,0.0200,-0.0909)
4b_stereo_hole: -32.563, 98.781, -13.208 -> -32.551, 98.840, -13.259 (-0.0120,-0.0590,0.0510)
4b_stereo_slot: -37.617, 199.67, -13.208 -> -37.580, 199.76, -13.256 (-0.0370,-0.0900,0.0480)
4t_axial_hole: -35.103, 98.730, -5.8420 -> -35.063, 98.873, -5.7833 (-0.0400,-0.1430,-0.0587)
4t_axial_slot: -35.103, 199.72, -5.8420 -> -35.073, 199.80, -5.7063 (-0.0300,-0.0800,-0.1357)
4t_stereo_hole: -32.563, 98.781, -13.208 -> -32.569, 98.941, -13.255 (0.0060,-0.1600,0.0470)
4t_stereo_slot: -37.617, 199.67, -13.208 -> -37.589, 199.74, -13.190 (-0.0280,-0.0700,-0.0180)
5b_axial_hole: -35.103, 98.730, -5.8420 -> -35.068, 98.807, -5.6851 (-0.0350,-0.0770,-0.1569)
5b_axial_slot: -35.103, 199.72, -5.8420 -> -35.065, 199.73, -5.6756 (-0.0380,-0.0100,-0.1664)
5b_stereo_hole: -32.563, 98.781, -13.208 -> -32.558, 98.872, -13.286 (-0.0050,-0.0910,0.0780)
5b_stereo_slot: -37.617, 199.67, -13.208 -> -37.588, 199.71, -13.283 (-0.0290,-0.0400,0.0750)
5t_axial_hole: -35.103, 98.730, -5.8420 -> -35.064, 98.847, -5.6994 (-0.0390,-0.1170,-0.1426)
5t_axial_slot: -35.103, 199.72, -5.8420 -> -35.070, 199.73, -5.6592 (-0.0330,-0.0100,-0.1828)
5t_stereo_hole: -32.563, 98.781, -13.208 -> -32.578, 98.970, -13.315 (0.0150,-0.1890,0.1070)
5t_stereo_slot: -37.617, 199.67, -13.208 -> -37.607, 199.79, -13.233 (-0.0100,-0.1200,0.0250)
6b_axial_hole: -35.103, 98.730, -5.8420 -> -35.069, 98.822, -5.7311 (-0.0340,-0.0920,-0.1109)
6b_axial_slot: -35.103, 199.72, -5.8420 -> -35.073, 199.75, -5.5877 (-0.0300,-0.0300,-0.2543)
6b_stereo_hole: -32.563, 98.781, -13.208 -> -32.582, 98.965, -13.275 (0.0190,-0.1840,0.0670)
6b_stereo_slot: -37.617, 199.67, -13.208 -> -37.600, 199.76, -13.230 (-0.0170,-0.0900,0.0220)
6t_axial_hole: -35.103, 98.730, -5.8420 -> -35.051, 98.965, -5.8049 (-0.0520,-0.2350,-0.0371)
6t_axial_slot: -35.103, 199.72, -5.8420 -> -35.077, 199.74, -5.8627 (-0.0260,-0.0200,0.0207)
6t_stereo_hole: -32.563, 98.781, -13.208 -> -32.570, 99.088, -13.266 (0.0070,-0.3070,0.0580)
6t_stereo_slot: -37.617, 199.67, -13.208 -> -37.570, 199.76, -13.292 (-0.0470,-0.0900,0.0840)
```

X- “normal to sensor”  
Y- “strip length direction”  
Z- “vertically from support surface”



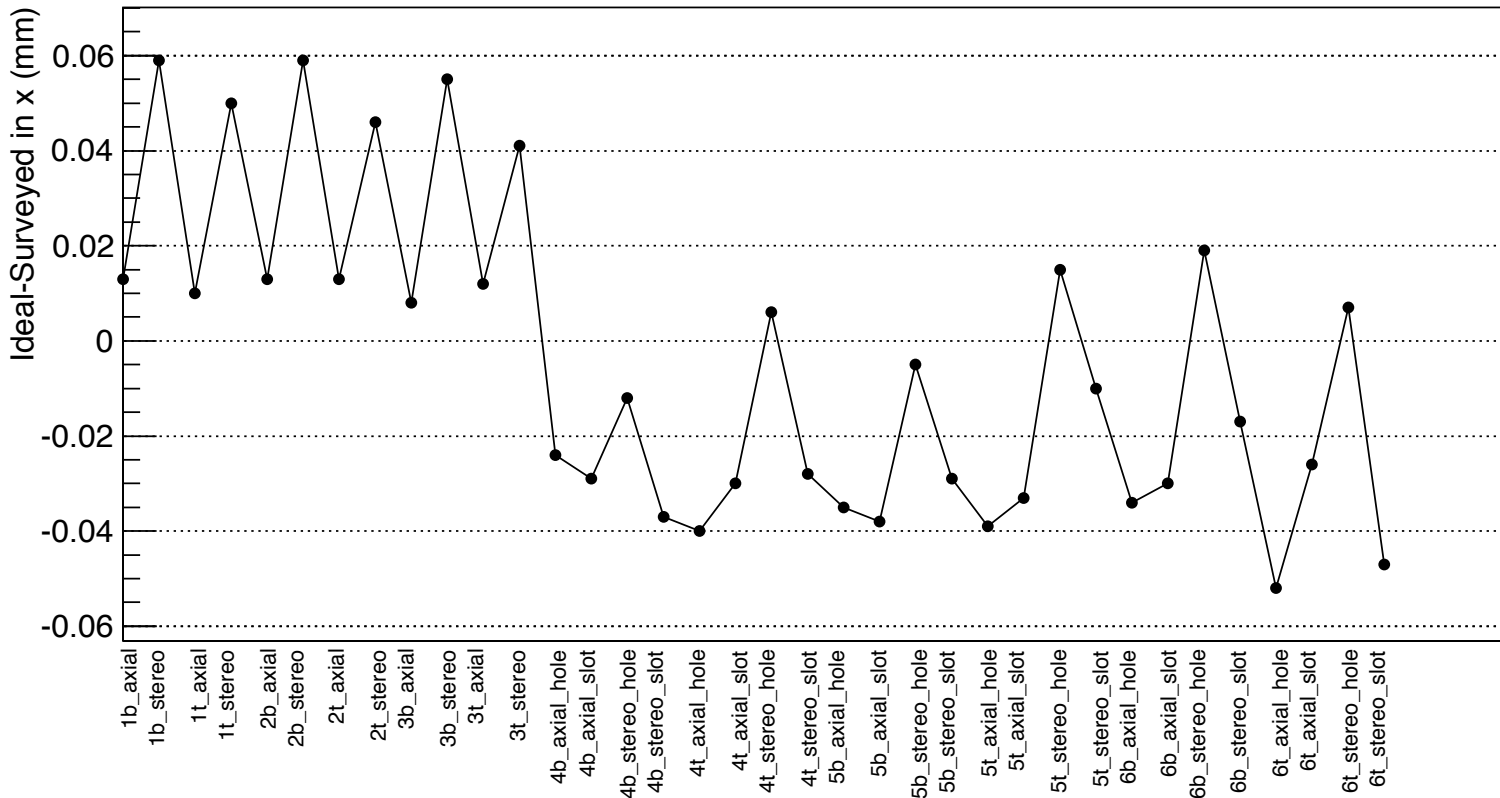
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sensorFrameDiff survey



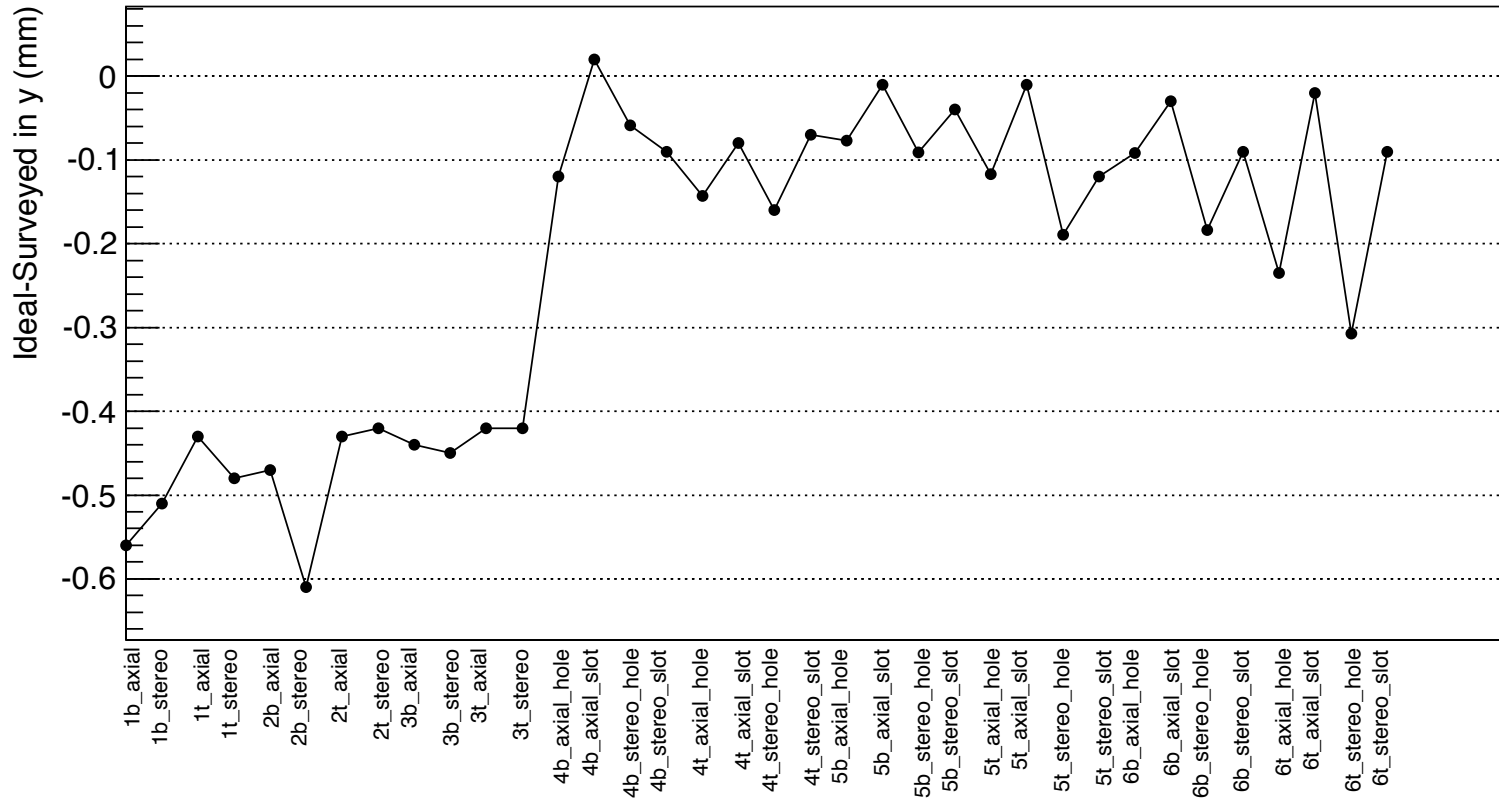
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