



LCLS-II Undulator Segment Measurement Results

HE-SXPS-15081

## SLAC Traveler for LCLS-II HE\_SXPS Measurement Results

This traveler is intended to document checking of the final magnetic measurements of Soft X-Ray beam-line (SXR) Phase Shifters (SXPS) performed on the Kugler 7500 bench in the Magnetic Measurement Facility (MMF) at SLAC after the completion of all tuning activities. It contains basic performance indicators compared against tolerances as well as documentary information both in graphical and textual representation.

|                                  |               |
|----------------------------------|---------------|
| Serial number from magnet label: | HE-SXPS-15081 |
|----------------------------------|---------------|

### Measurement Procedure:

The measurements have been carried out after the undulator segment had been fully tuned according to the “LCLS-II Phase Shifter Test Plan” (LCLS-TN-17-2).

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### Evaluation of Hall Probe Scans: Data Listings A

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|                                                          |                                   |    |
|----------------------------------------------------------|-----------------------------------|----|
| MATLAB function "EvaluatePhaseShifterField" on           | 08/27/2026 12:28                  |    |
| A. SCAN PARAMETERS                                       |                                   |    |
| Serial Number                                            | HE-SXPS-15081                     |    |
| z Scanning Date & Time Range                             | 08/25/2026 12:14—08/25/2026 16:39 |    |
| Phase Shifter Temperature                                | 20.3848±0.0081                    | °C |
| x Axis Position                                          | 0.0446                            | m  |
| y Axis Position                                          | 0.000196                          | m  |
| Scans averaged                                           | 1                                 |    |
| Nominal Device Length                                    | 0.1060                            | m  |
| Total Sampling Distance                                  | 1.450                             | m  |
| Integration Length                                       | 0.900                             | m  |
| Earth Field Correction $B_x$                             | 0.293                             | G  |
| Earth Field Correction $B_y$                             | -0.402                            | G  |
| Nominal Closed Gap Height                                | 10.000                            | mm |
| <b>[PRD0049.4079]</b> Max. Operational Phase Shifter Gap | 35                                | mm |



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## Evaluation of Hall Probe Scans: Data Listings B, C and D

|                                                                 |                             |                         |
|-----------------------------------------------------------------|-----------------------------|-------------------------|
| MATLAB function "EvaluatePhaseShifterField" on                  | 08/27/2026 12:28            |                         |
| B. CORE EVALUATIONS FOR CLOSED GAP                              |                             |                         |
| Closed Gap Scanning Date & Time                                 | 08/25/2026 14:18            |                         |
| Closed Gap Temperature                                          | 20.37± 0.23                 | °C                      |
| <b>[PRD0049.4077]</b> Encoder Gap                               | 9.9985                      | mm                      |
| Encoder Gap Raw                                                 | 396,819                     |                         |
| <b>[PRD0049.4084]</b> Measured $I1X$ (Integration Length Total) | -6.01 (30 % of Tolerance)   | $\mu\text{Tm}$          |
| <b>[PRD0049.4085]</b> Measured $I2X$ (Integration Length Total) | -0.22 (0.37 % of Tolerance) | $\mu\text{Tm}^2$        |
| <b>[PRD0049.4082]</b> Measured $I1Y$ (Integration Length Total) | -3.30 (16 % of Tolerance)   | $\mu\text{Tm}$          |
| <b>[PRD0049.4083]</b> Measured $I2Y$ (Integration Length Total) | -0.42 (0.70 % of Tolerance) | $\mu\text{Tm}^2$        |
| <b>[PRD0049.4089]</b> Phase Shifter Phase Accuracy              | 0.05 (0.85 % of Tolerance)  | degXray                 |
| Measured $PI$ (Integration Length Total)                        | 9,993.8                     | $\text{T}^2\text{mm}^3$ |
| Required min $PI$ (Cell Range Total) at Closed Gap              | 9,500.0                     | $\text{T}^2\text{mm}^3$ |
|                                                                 |                             |                         |
| MATLAB function "EvaluatePhaseShifterField" on                  | 08/27/2026 12:28            |                         |
| C. CORE EVALUATIONS FOR OPEN GAP                                |                             |                         |
| Open Gap Scanning Date & Time                                   | 08/25/2026 15:37            |                         |
| Open Gap Temperature                                            | 20.38± 0.22                 | °C                      |
| <b>[PRD0049.4078]</b> Encoder Gap                               | 100.0004                    | mm                      |
| Encoder Gap Raw                                                 | 2,196,856                   |                         |
| Measured $I1X$ (Integration Length Total)                       | +0.59 (3.0 % of Tolerance)  | $\mu\text{Tm}$          |
| Measured $I2X$ (Integration Length Total)                       | +1.17 (2.0 % of Tolerance)  | $\mu\text{Tm}^2$        |
| Measured $I1Y$ (Integration Length Total)                       | +9.23 (46 % of Tolerance)   | $\mu\text{Tm}$          |
| Measured $I2Y$ (Integration Length Total)                       | +4.11 (6.9 % of Tolerance)  | $\mu\text{Tm}^2$        |
| Measured $PI$ (Integration Length Total)                        | 37.6                        | $\text{T}^2\text{mm}^3$ |
| Max allowed $PI$ (Integration Length Total) at Open Gap         | 200.0                       | $\text{T}^2\text{mm}^3$ |
|                                                                 |                             |                         |
| MATLAB function "EvaluatePhaseShifterField" on                  | 08/27/2026 12:28            |                         |
| D. ENCODER SETTINGS                                             |                             |                         |
| Gap Encoder Offset                                              | 9.8424                      | mm                      |



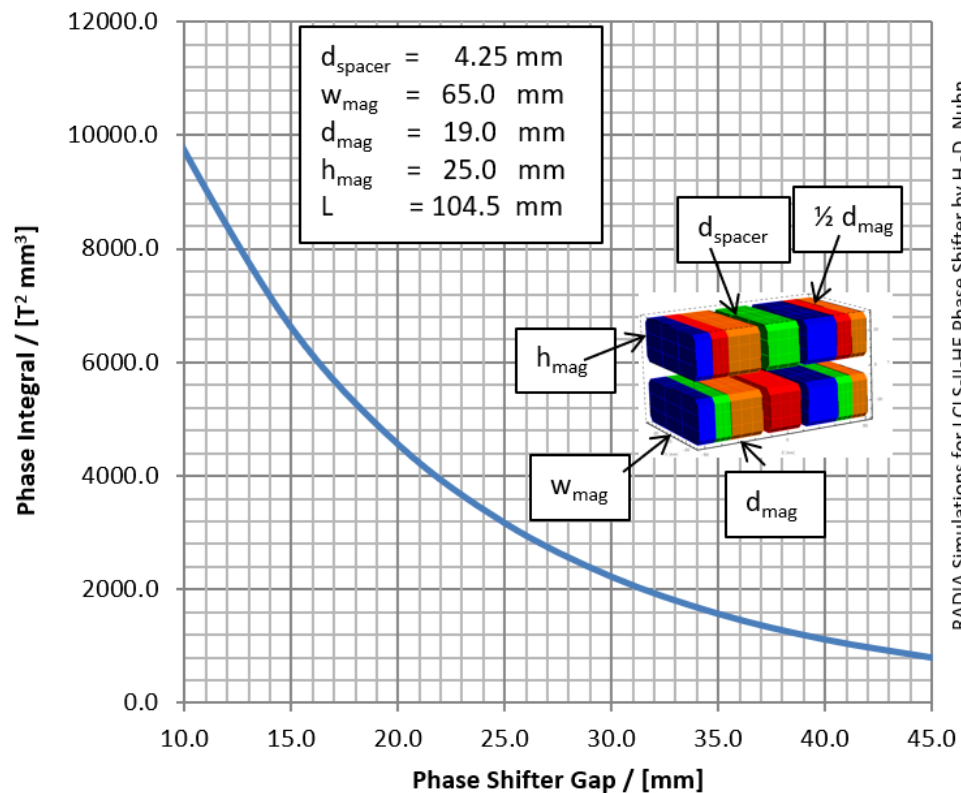
## Capacitive Sensor Measurements: Data Listing E

MATLAB function "EvaluatePhaseShifterField" on

08/27/2026 12:28

### E. CAPACITIVE SENSOR VALUES

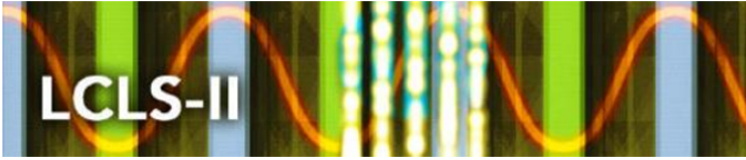
| Date       | Time     | Meas | Enc (mm) | Enc (count) | T <sub>ref</sub> (°C) | Temp (°C) | Dist Up (mm) | Dist Dn (mm) | Gap (mm) |
|------------|----------|------|----------|-------------|-----------------------|-----------|--------------|--------------|----------|
| 08-26-2026 | 16:26:18 | REF  | 14.999   | 14          | 20.43                 | 20.81     | 1.0757       | 0.5928       | 87.0000  |
| 08-26-2026 | 16:26:22 | REF  | 14.999   | 14          | 20.43                 | 20.80     | 1.0757       | 0.5929       | 87.0000  |
| 08-26-2026 | 16:27:18 | PS   | 14.999   | 14          | 20.43                 | 22.42     | 0.6913       | 0.5910       | 86.6138  |
| 08-26-2026 | 16:27:22 | PS   | 14.999   | 14          | 20.43                 | 22.24     | 0.6913       | 0.5910       | 86.6138  |
| 08-26-2026 | 16:27:42 | PS   | 14.999   | 14          | 20.43                 | 23.00     | 0.6912       | 0.5909       | 86.6136  |
| 08-26-2026 | 16:27:47 | PS   | 14.999   | 14          | 20.43                 | 22.74     | 0.6912       | 0.5909       | 86.6136  |
| 08-26-2026 | 16:28:27 | REF  | 14.999   | 14          | 20.44                 | 22.39     | 1.0761       | 0.5922       | 86.9998  |
| 08-26-2026 | 16:28:30 | REF  | 14.999   | 14          | 20.44                 | 22.32     | 1.0761       | 0.5922       | 86.9998  |



LCLS-II-HE Phase Shifter Magnet Array Design by Z. Wolf

The figure shows design parameters for the phaseshifter magnet array.

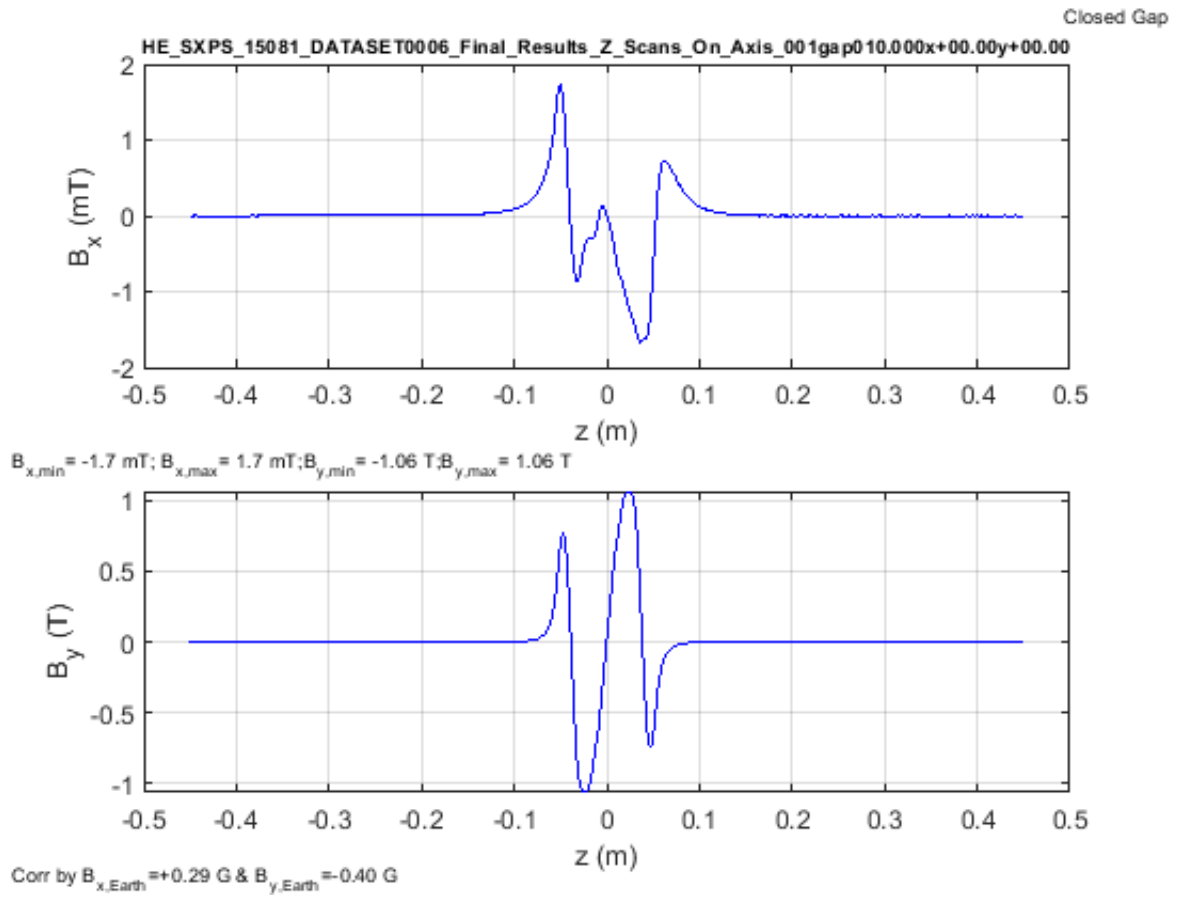
The following figures show results of the field analysis at closed gap.



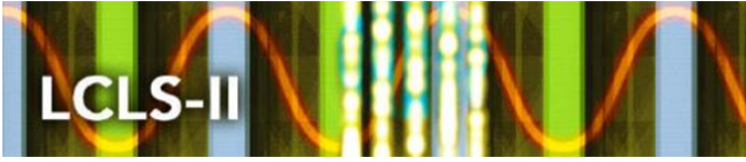
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## Hall Probe Scans at Closed Gap: Horizontal and Vertical Field



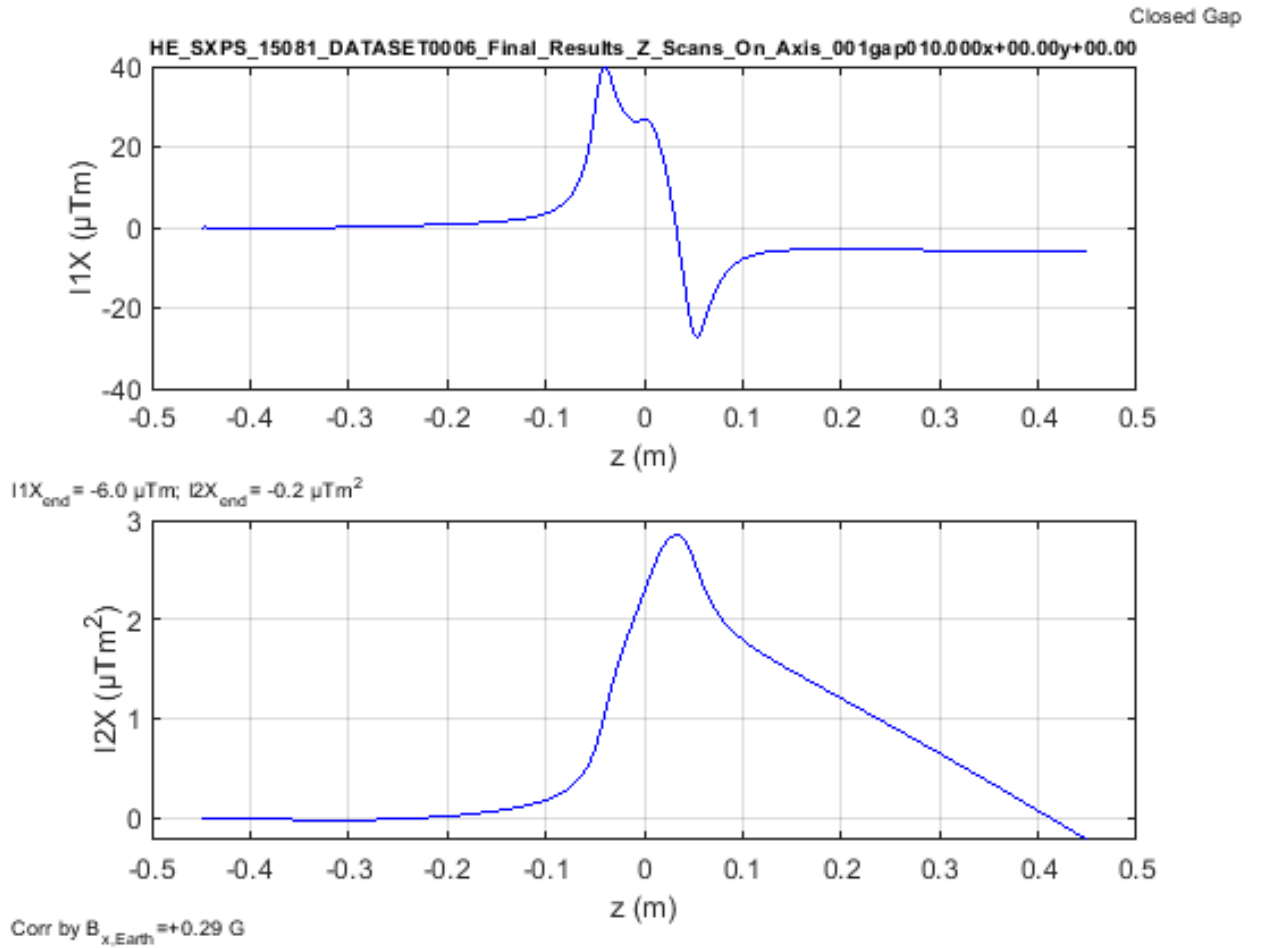
The figures show the  $x$  (upper) and  $y$  (lower) field components along the phase shifter beam axis over the Integration Length for the closed gap. The field extremes are listed on the left hand side between the upper and lower figure. The  $z$ -axis is centered on the phase shifter. The amount of earth field correction applied is shown in the lower left hand side. [Documentary Information]



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## Hall Probe Scans at Closed Gap: Horizontal 1<sup>st</sup> and 2<sup>nd</sup> Field Integrals



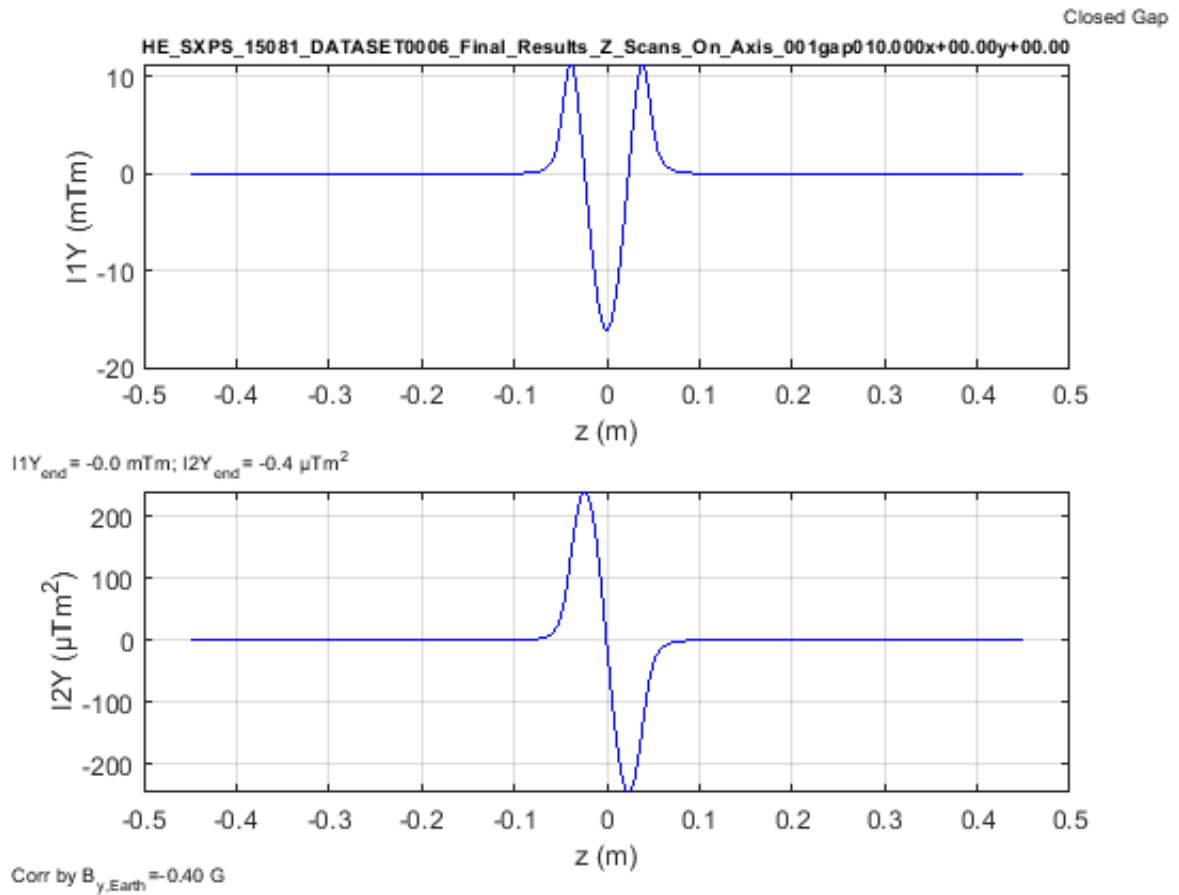
The figures show the horizontal first ( $I1X$ , upper) and second ( $I2X$ , lower) field integrals along the phase shifter beam axis over the Integration Length for the closed gap. The end values are listed on the left hand side between the upper and lower figure. The  $z$ -axis is centered on the phase shifter. The amount of earth field correction applied is shown in the lower left hand side. [Documentary Information]



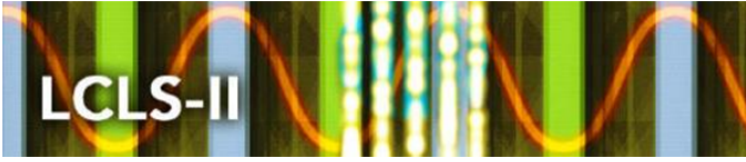
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## Hall Probe Scans at Closed Gap: Vertical 1<sup>st</sup> and 2<sup>nd</sup> Field Integrals



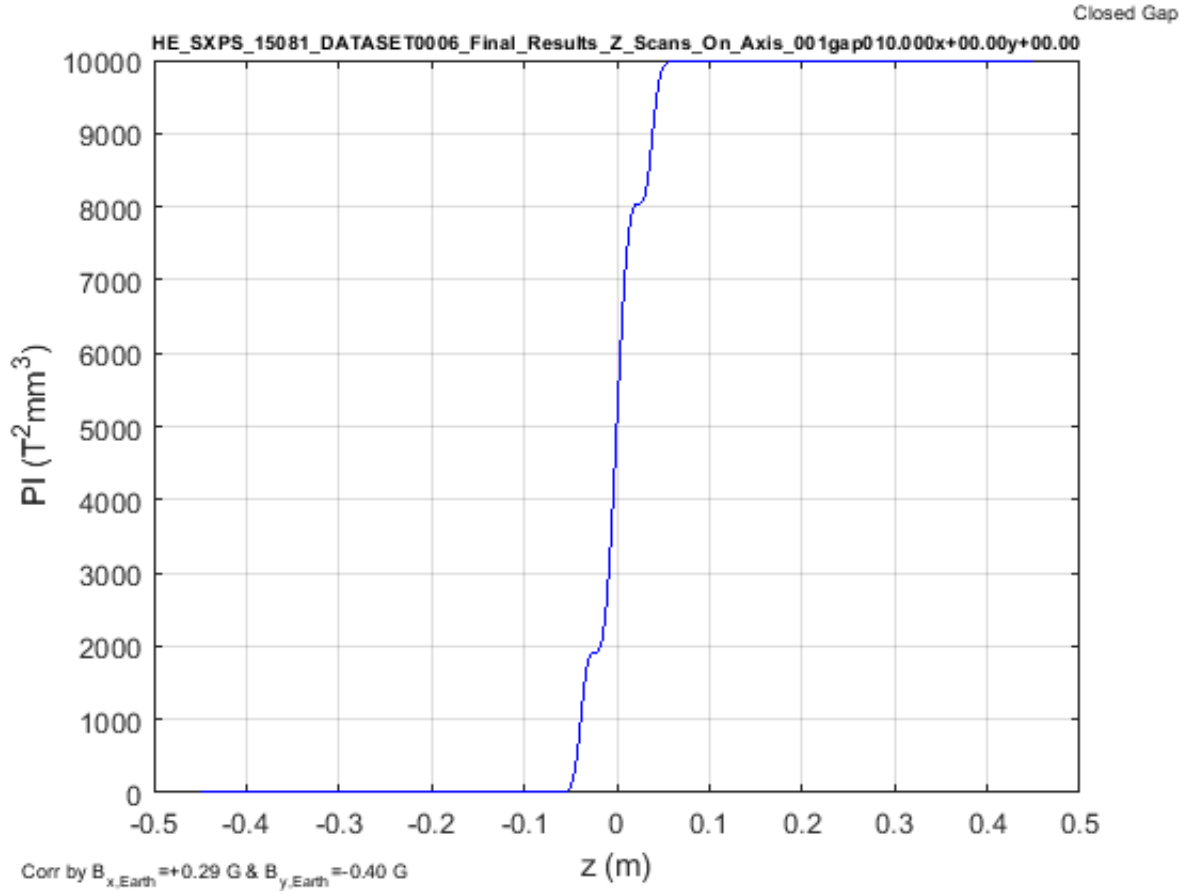
The figures show the vertical first (I1Y, upper) and second (I2Y, lower) field integrals along the phase shifter beam axis over the Integration Length for the closed gap. The end values are listed on the left hand side between the upper and lower figure. The z-axis is centered on the phase shifter. The amount of earth field correction applied is shown in the lower left hand side. [Documentary Information]



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## Evaluation of Hall Probe Scans for Closed Gap: Phase Integral Plot



The figure shows the phase integral,  $PI$ , of an electron calculated from the measured on-axis magnetic field components over the Integration Length for the closed gap:

$$PI(z) = \int_0^z BL_{x1}^2(\hat{z}) d\hat{z} + \int_0^z BL_{y1}^2(\hat{z}) d\hat{z}$$

with

$$BL_{x1,y1}(z) = \int_0^z B_{x,y}(\hat{z}) d\hat{z}.$$

The  $z$ -axis is centered on the phase shifter. The phase integral is proportional to the phase slippage due to the presence of the magnetic field. There is an additional contribution to phase slippage due to the fact that the speed of the electrons is less than the speed of light. This additional contribution is corrected by the undulator segment and does not need to be corrected again for the phase shifters.

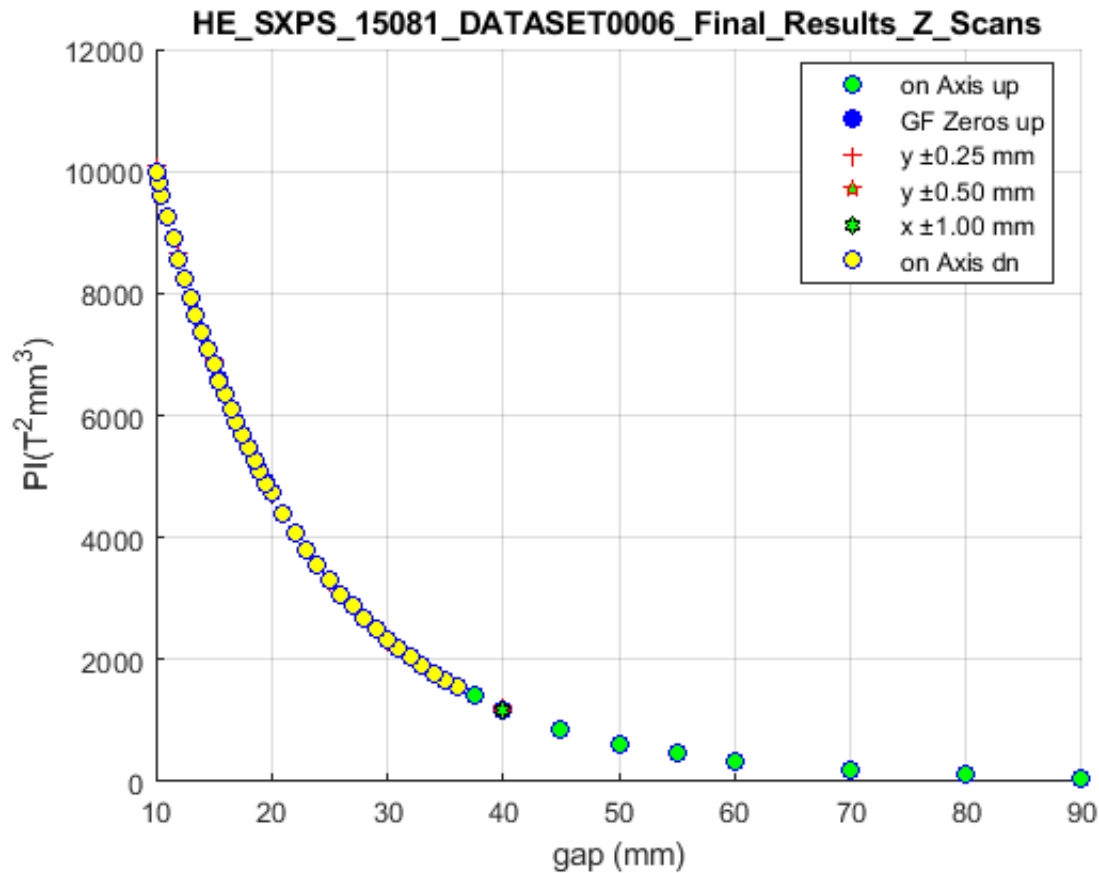
The following figures show the results of the gap dependent analysis.



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## Evaluation of Hall Probe Scans: $PI$ vs. $gap$

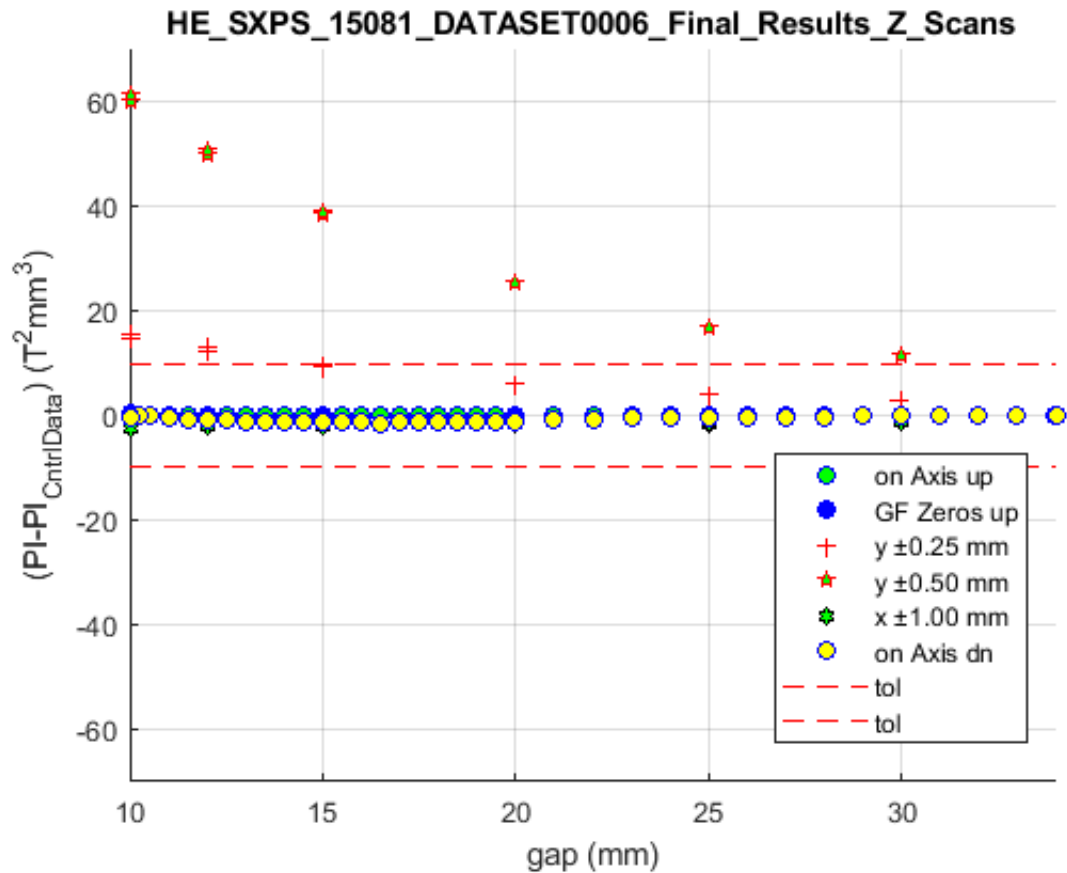


The figure shows phase shifter Phase Integral,  $PI$ , as a function of gap over the 10 mm - 90 mm gap range. The legend shows a number of different cases that will become clearer on page 9 because their effect cannot be observed in this full scale plot. Note: The gap values are derived from the readings of the gap encoder installed on the SXPS. In that sense these are nominal gap numbers that will be close but not identical to each of the individual magnet block separations measured across the phase shifter gap.

The continuous conversion between the two axes (i.e.,  $PI(gap)$  and  $gap(PI)$ ) will be done during operations based on the list of reference data points stored in file `he_sxps_15081_pivsgap_spline.dat` in the Controls Data folder on the V: drive (see final section of this document for file information). From that  $PI(gap)$  and  $gap(PI)$  can be calculated via cubic spline fits or equivalent. [Documentary Information]



## Evaluation of Hall Scans: $PI - PI_{\text{control}}$ vs. $gap$



The figure shows the relative difference between the measured phase shifter Phase Integral,  $PI$ , and a cubic spline fit to the list of reference data points as a function of gap over the 10 mm-30 mm operational range. The cubic spline fit data is stored on the V: drive in the Controls Data folder in file `he_sxps.15081.pivsgap.spline`.

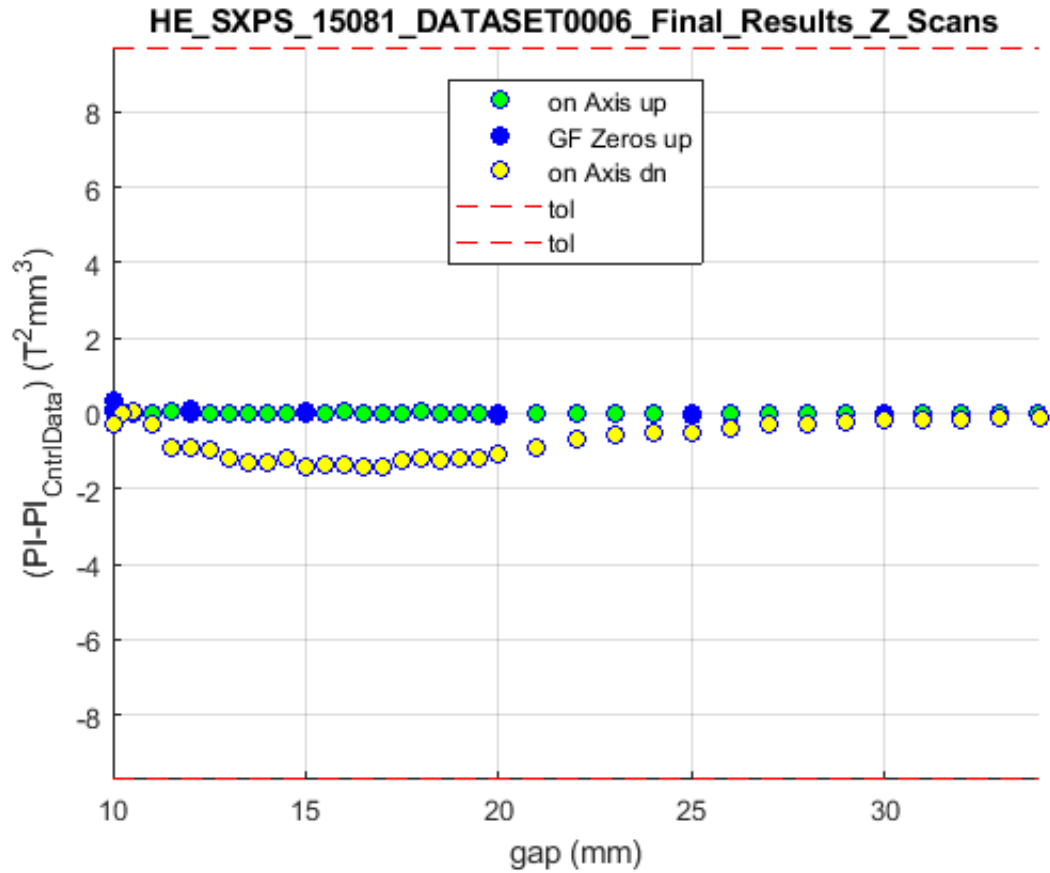
The legend explains the different cases that are shown in the plot: The data shown as green filled circles have been acquired on-axis as the gap was changed from closed to open. The yellow filled circles show data acquired on axis as the gap was changed from open to closed. The horizontal red dashed lines show the tolerance limits. The other symbols shown indicate off-axis measurements that are added for interest only. The tolerance limits apply for on-axis readings, only.



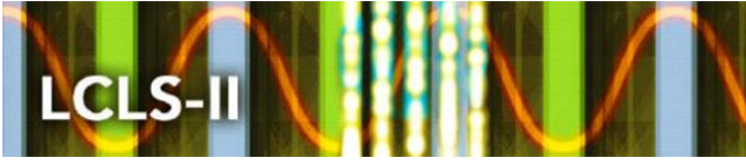
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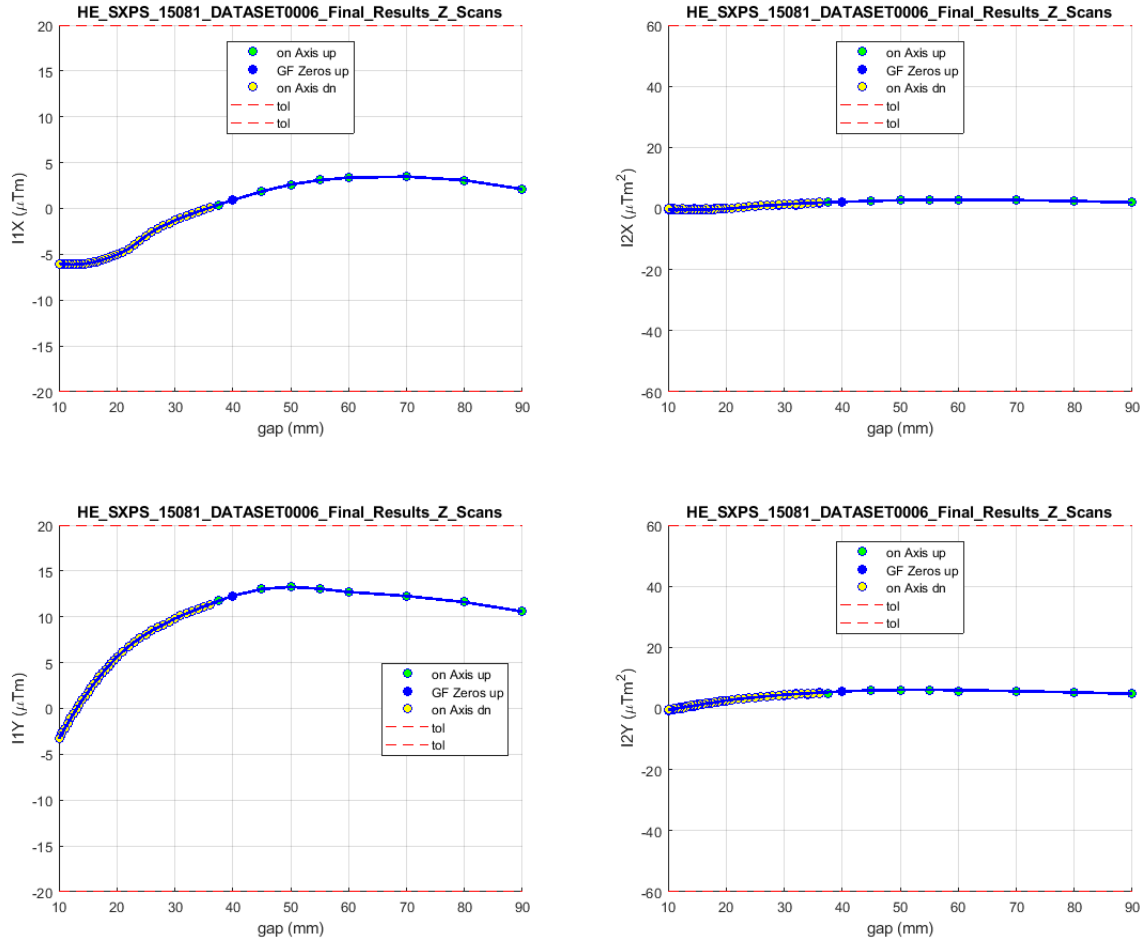
# Evaluation of Hall Scans: $PI - PI_{\text{control}}$ vs. $gap$



The figure shows some of the data shown in the previous figure but with a larger vertical scale that just captures the tolerance range. There is a hysteresis effect visible which is small enough to be acceptable. The off-axis measurements are not shown.



## Evaluation of Hall Probe: Field Integrals vs. gap



The figures show the field integrals ( $I1X$ ,  $I2X$ ,  $I1Y$ ,  $I2Y$ ) at the end of the integration range as function of the closed gap. The integrals were taken along a  $z$ -distance of 0.900 m (integration range) centered on the phaseshifter. The proximity of the green and yellow circles shows that the field integrals are not sensitive to the hysteresis like the phase integral as seen on page 10. The blue curves are the spline fits found in files

```

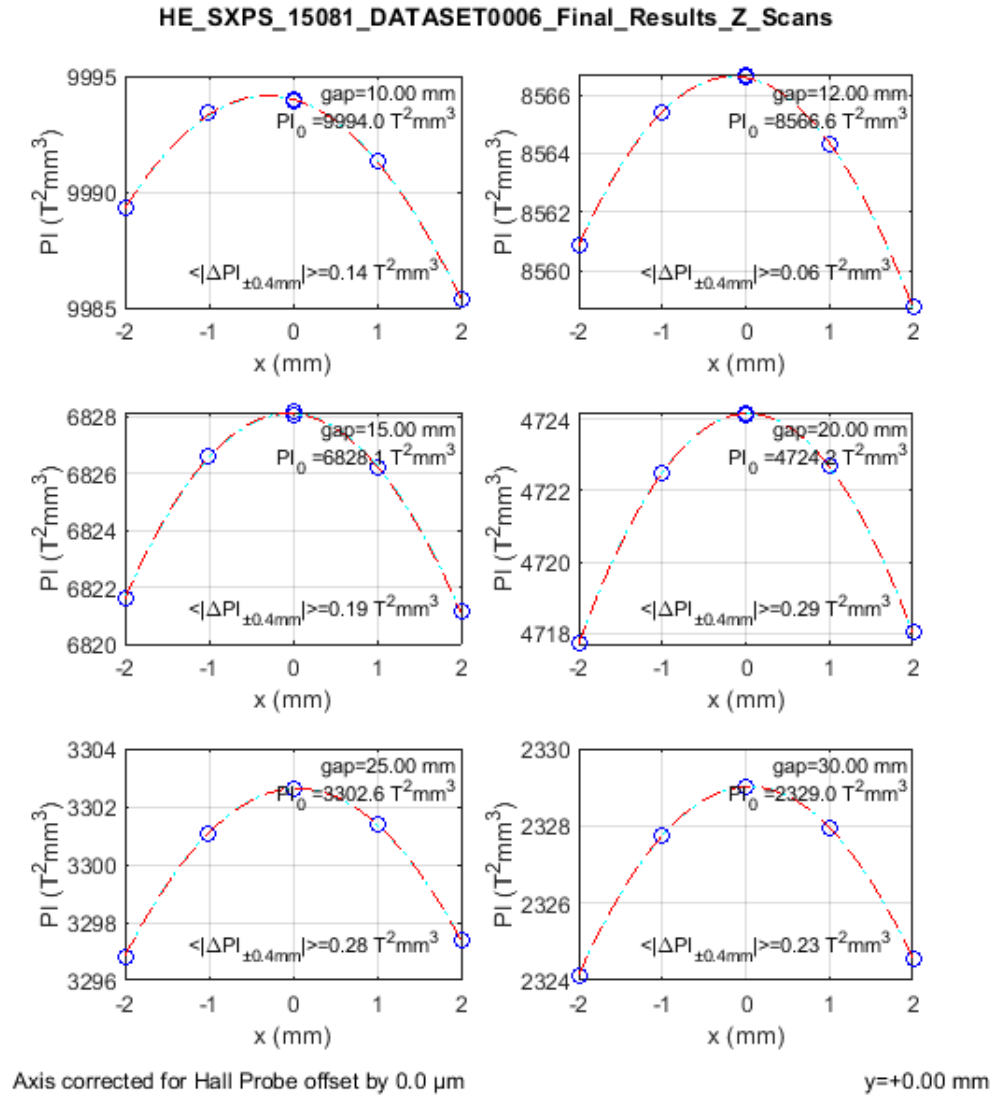
"...i1x_vs_gap_spline.dat",
"...i2x_vs_gap_spline.dat",
"...i1y_vs_gap_spline.dat",
"...i2y_vs_gap_spline.dat",

```

and demonstrate how the controls representations of the field integrals relate to the actual measurements (see final section of this document for file information).



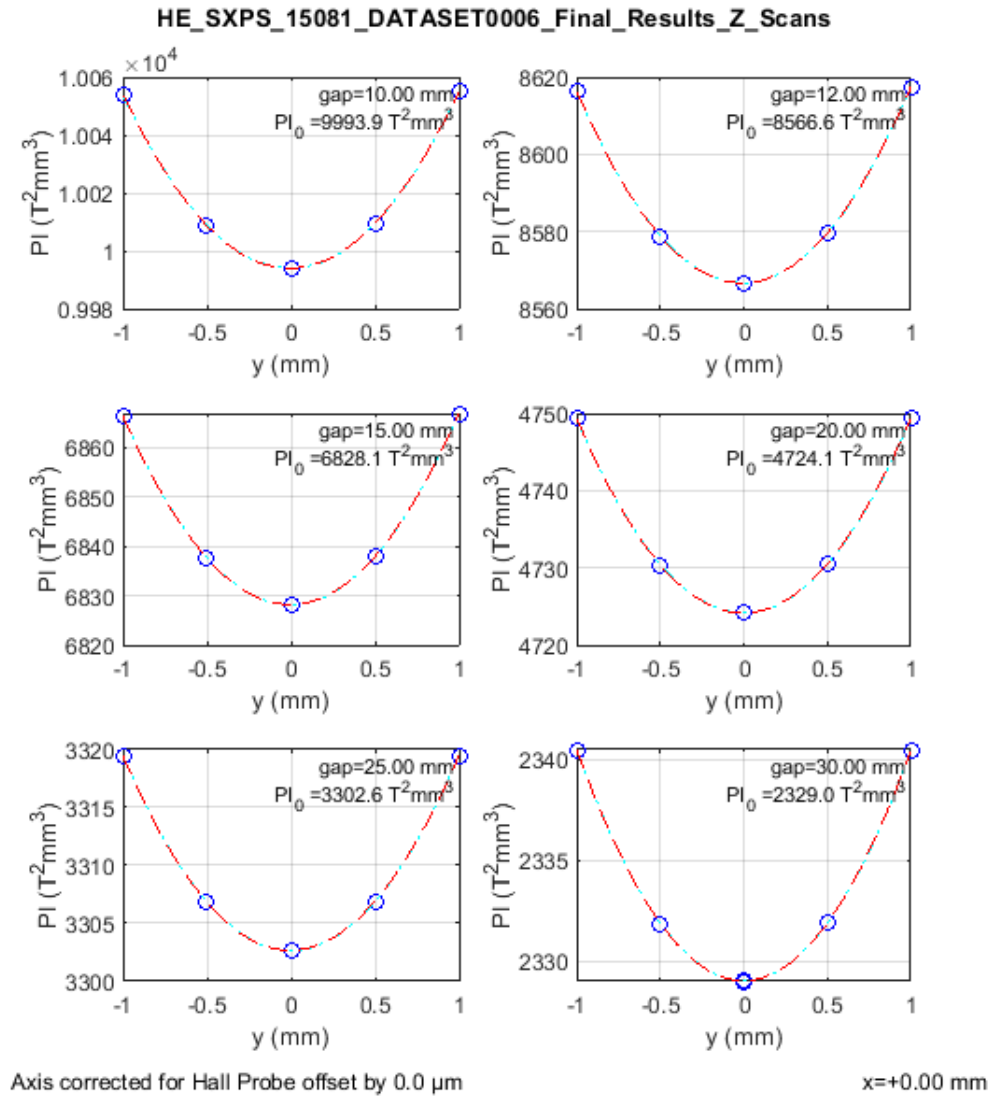
## Evaluation of Hall Scans: $PI$ vs. $x$ dependence



The figure shows the deviation of the phase integral,  $PI$ , from the off-axis value,  $PI_0$ , as function of  $x$  at a number of operational gaps. The average deviation at  $z = \pm 0.4$  mm is printed at the lower part of each plot. [Documentary Information]



## Evaluation of Hall Scans: $PI$ vs. $y$ dependence



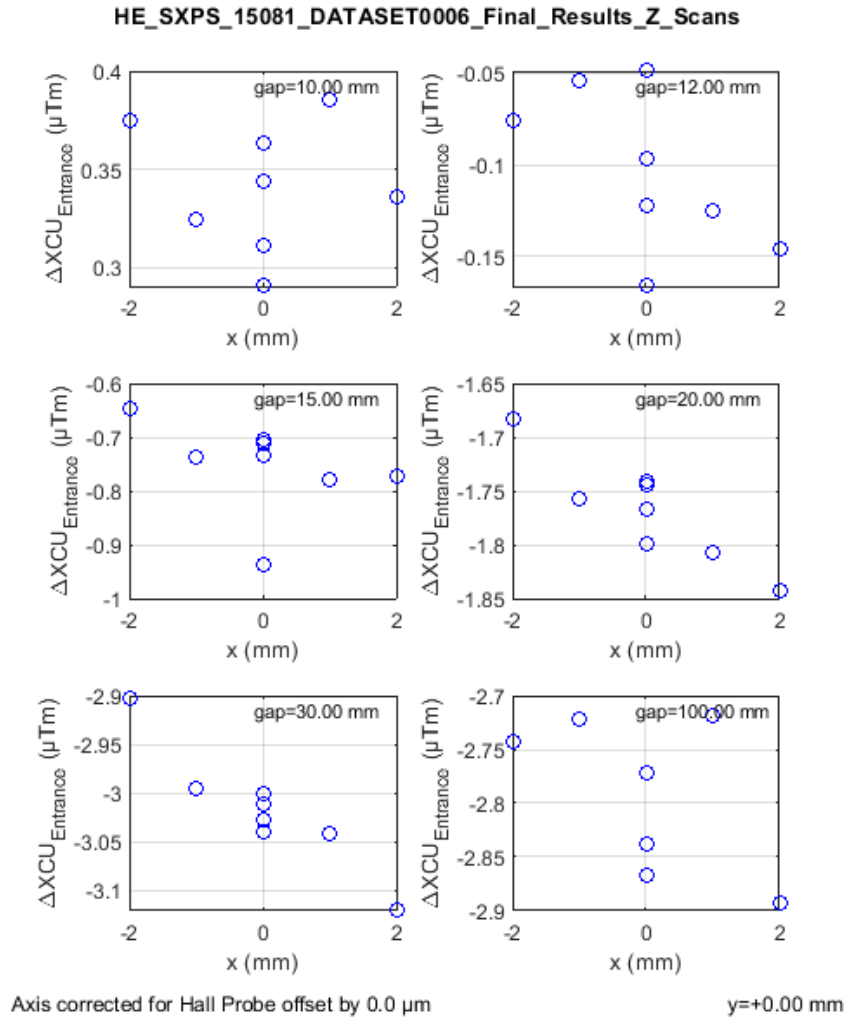
The figure shows the deviation of the phase integral,  $PI$ , value from the on-axis value,  $PI_0$ , as function of  $y$  at a number of operational gaps. [Documentary Information]



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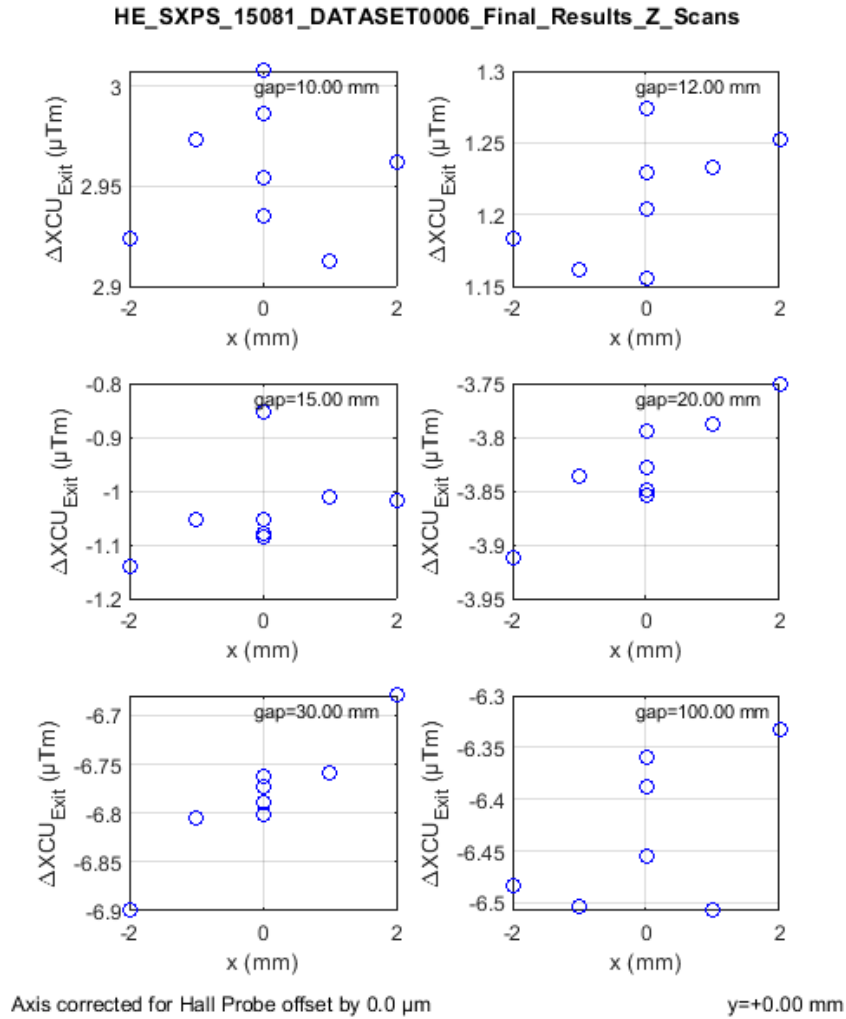
## Estimated Upstream Horizontal Corrector Strength Requirement vs. $x$



The figure shows the required strength of the upstream horizontal corrector to remove the second vertical phase shifter field integral at the downstream BPM for a number of phase shifter gaps. The analysis was done at a number of off-axis locations in the  $x$ - $z$  plane. All values are very small.



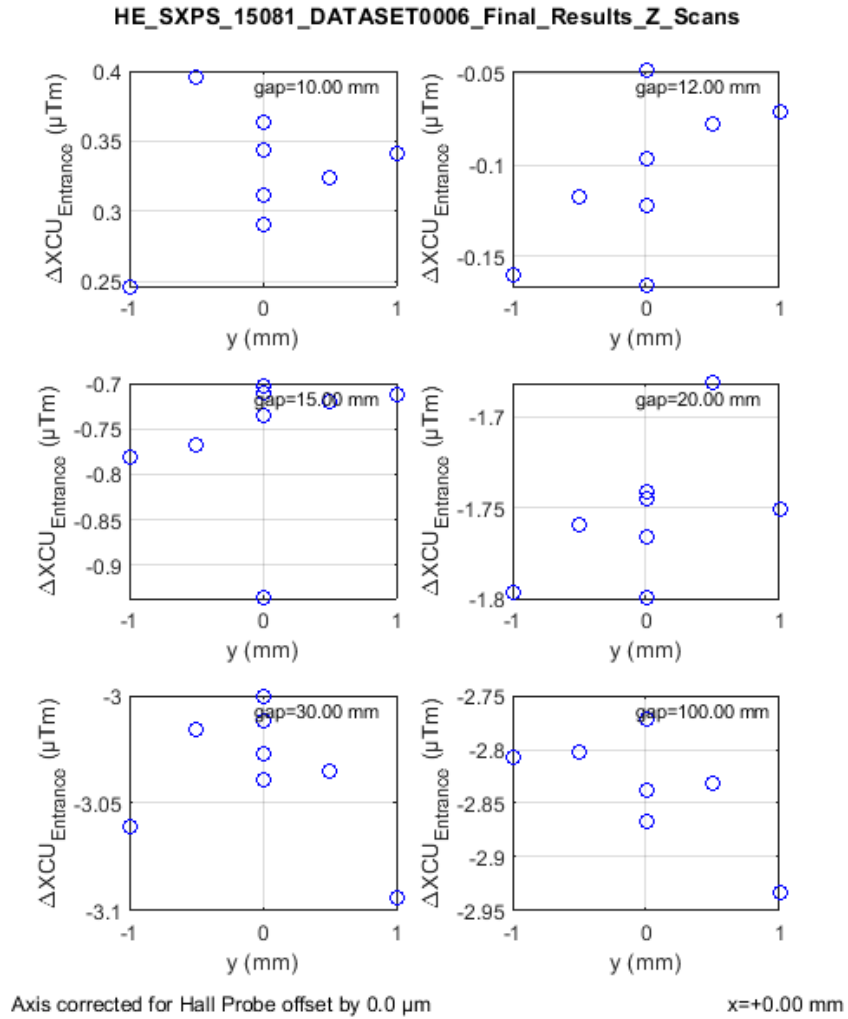
## Estimated Downstream Horizontal Corrector Strength Requirement vs. $x$



The figure shows the required strength of the downstream horizontal corrector to remove the first vertical phase shifter field integral and upstream corrector field integral at the downstream BPM for a number of operational phase shifter gaps. The analysis was done at a number of off-axis locations in the  $x$ - $z$  plane. All values are very small.



## Estimated Upstream Horizontal Corrector Strength Requirement vs. $y$



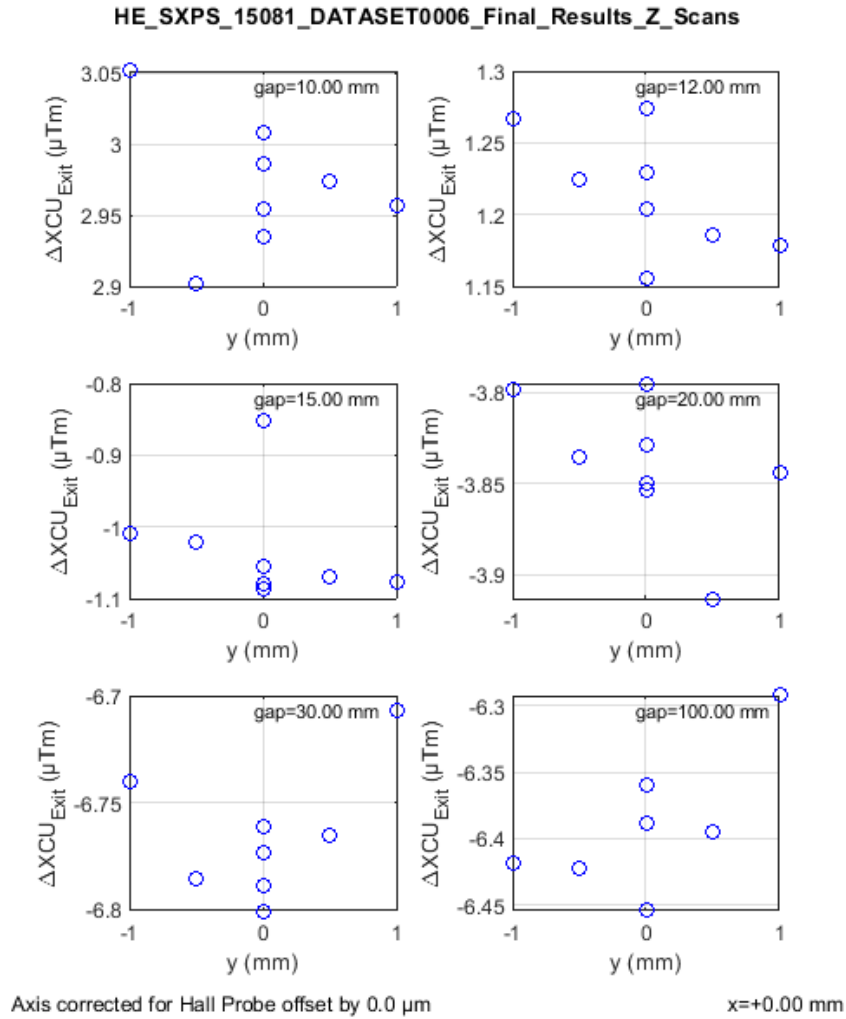
The figure shows the required strength of the upstream horizontal corrector to remove the second vertical phase shifter field integral at the downstream BPM for a number of operational phase shifter gaps. The analysis was done at a number of off-axis locations in the  $y$ - $z$  plane. All values are very small.



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## Estimated Downstream Horizontal Corrector Strength Requirement vs. $y$



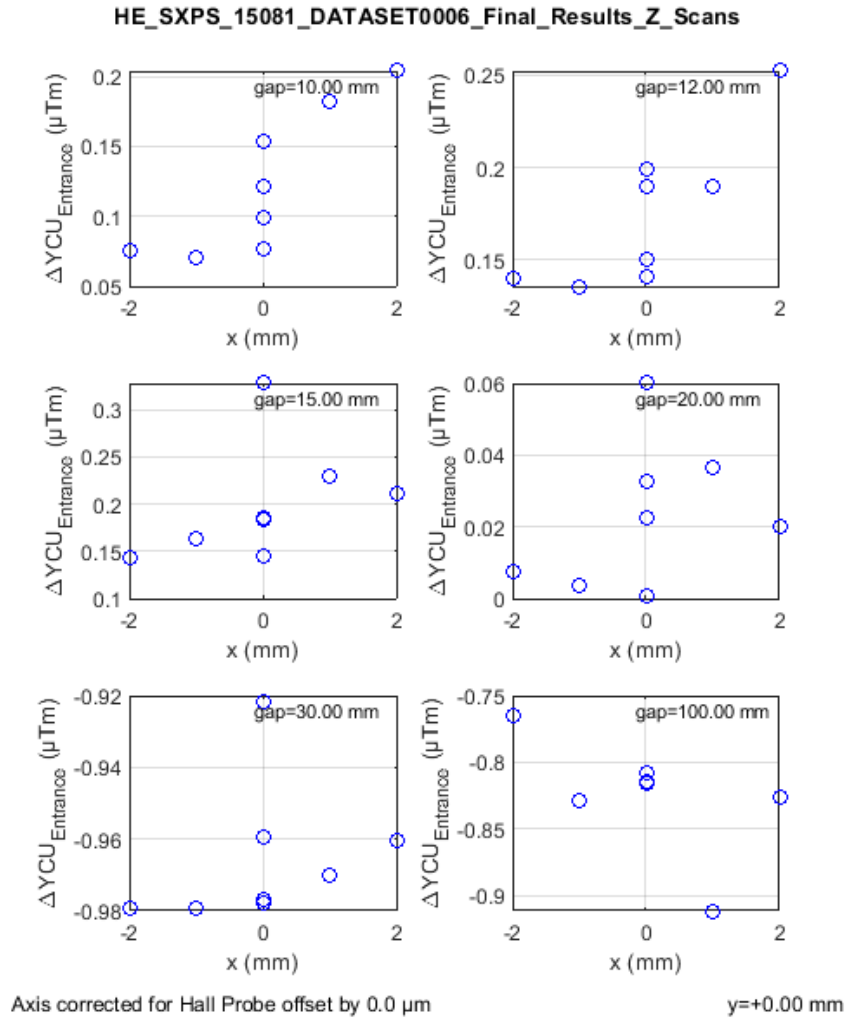
The figure shows the required strength of the upstream horizontal corrector to remove the first vertical phase shifter and upstream corrector field integral at the downstream BPM for a number of operational undulator gaps. The analysis was done at a number of off-axis locations in the  $y$ - $z$  plane. All values are very small.



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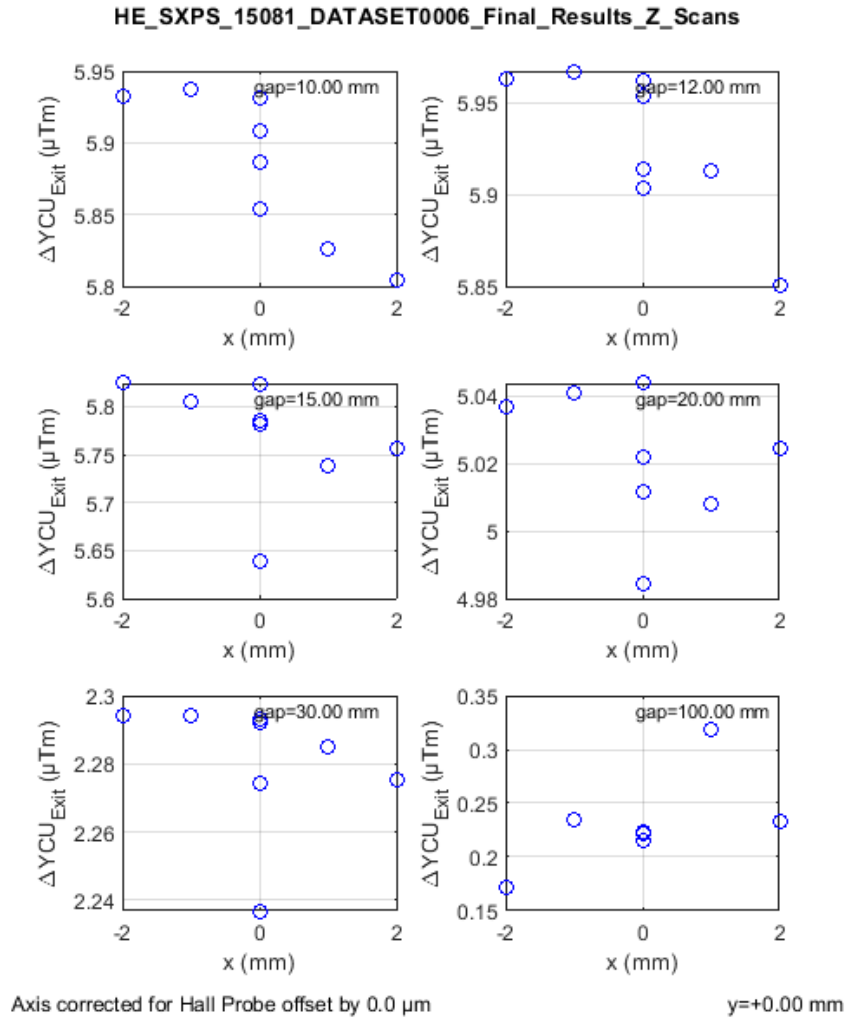
## Estimated Upstream Vertical Corrector Strength Requirement vs. $x$



The figure shows the required strength of the upstream horizontal corrector to remove the second horizontal phase shifter field integral at the downstream BPM for a number of operational phase shifter gaps. The analysis was done at a number of off-axis locations in the  $x$ - $z$  plane. All values are very small.



## Estimated Downstream Vertical Corrector Strength Requirement vs. $x$



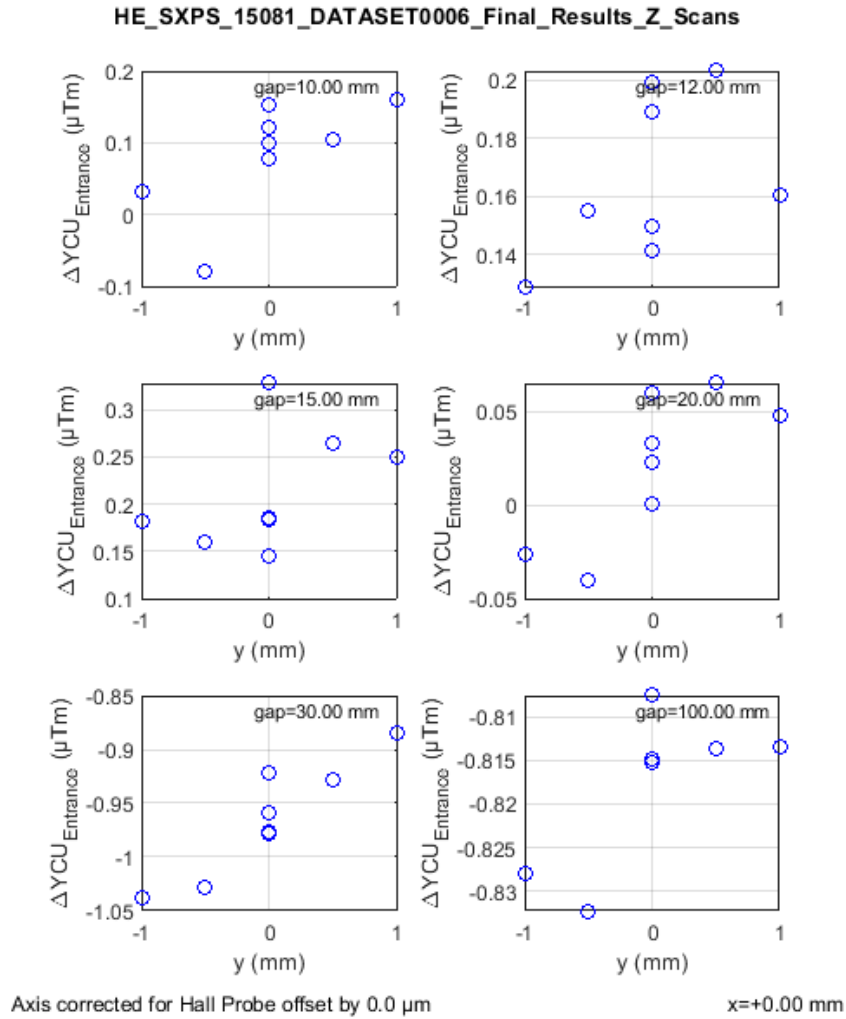
The figure shows the required strength of the downstream vertical corrector to remove the first horizontal phase shifter field integral and upstream corrector fields integral at the downstream BPM for a number of operational phase shifter gaps. The analysis was done at a number of off-axis locations in the  $x$ - $z$  plane. All values are very small.



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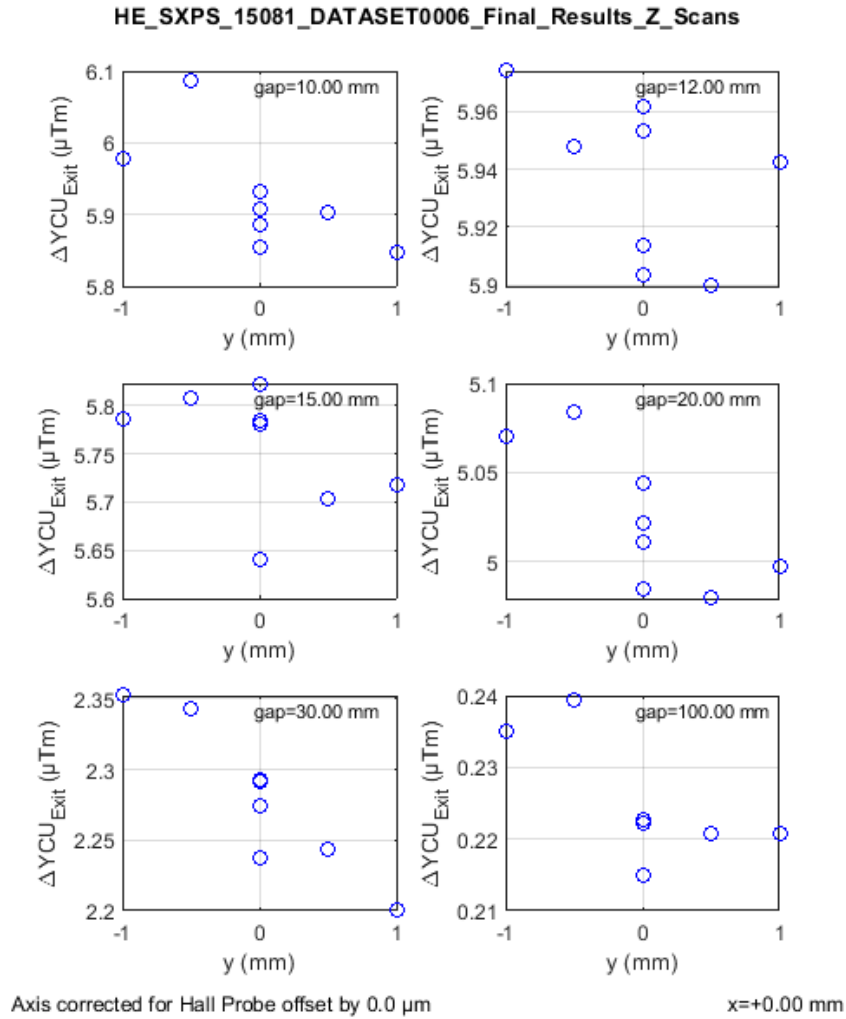
## Estimated Upstream Vertical Corrector Strength Requirement vs. $y$



The figure shows the required strength of the upstream vertical corrector to remove the second horizontal phase shifter field integral at the downstream BPM for a number of operational phase shifter gaps. The analysis was done at a number of off-axis locations in the  $y$ - $z$  plane. All values are very small.



## Estimated Upstream Vertical Corrector Strength Requirement vs. $y$



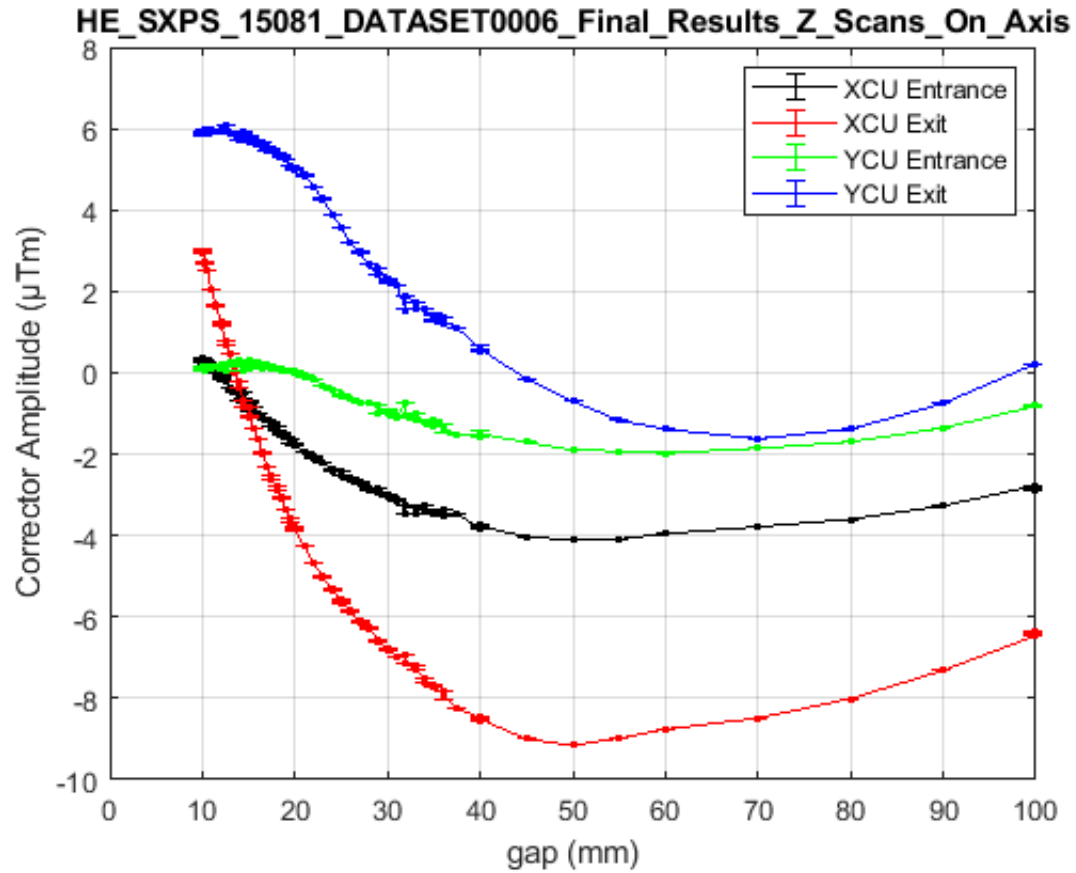
The figure shows the required strength of the downstream vertical corrector to remove the first horizontal phase shifter field integral and the upstream corrector fields integral at the downstream BPM for a number of operational phase shifter gaps. The analysis was done at a number of off-axis locations in the  $y$ - $z$  plane. All values are very small.



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## Estimated Corrector Strengths Requirement vs. gap



The figure shows as a function of phase shifter gap the required strengths of the upstream and downstream horizontal and vertical correctors to remove the effect of undulator field integrals at the downstream BPM over the entire available gap range. All values are very small.



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## Measurement Results are stored:

### At V-Drive:

☒ V:\MET\MagServe\MagData\LCLS-II-HE\Phase Shifter\  
☐ \_\_\_\_\_

### In Folder

☒ HE\_SXPS\_15081\DATASET0006\Final Results\  
☐ \_\_\_\_\_

## Confirmation of File Locations:

The following tables list all required data files documenting the tuning results. An existence check was done and the result is indicated next to each filename as “exists” or “missing”.

Sub folder: **Z Scans\Good Field Region** exists

|                                       |        |
|---------------------------------------|--------|
| 001gap010.000x-02.00y+00.00\zscan.dat | exists |
| 002gap010.000x-01.00y+00.00\zscan.dat | exists |
| 003gap010.000x+00.00y+00.00\zscan.dat | exists |
| 004gap010.000x+01.00y+00.00\zscan.dat | exists |
| 005gap010.000x+02.00y+00.00\zscan.dat | exists |
| 007gap010.000x+00.00y-00.50\zscan.dat | exists |
| 003gap010.000x+00.00y+00.00\zscan.dat | exists |
| 009gap010.000x+00.00y+00.50\zscan.dat | exists |
| 011gap012.000x-02.00y+00.00\zscan.dat | exists |
| 012gap012.000x-01.00y+00.00\zscan.dat | exists |
| 013gap012.000x+00.00y+00.00\zscan.dat | exists |
| 014gap012.000x+01.00y+00.00\zscan.dat | exists |
| 015gap012.000x+02.00y+00.00\zscan.dat | exists |
| 017gap012.000x+00.00y-00.50\zscan.dat | exists |
| 013gap012.000x+00.00y+00.00\zscan.dat | exists |
| 019gap012.000x+00.00y+00.50\zscan.dat | exists |
| 021gap015.000x-02.00y+00.00\zscan.dat | exists |
| 022gap015.000x-01.00y+00.00\zscan.dat | exists |
| 023gap015.000x+00.00y+00.00\zscan.dat | exists |



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|                                       |        |
|---------------------------------------|--------|
| 024gap015.000x+01.00y+00.00\zscan.dat | exists |
| 025gap015.000x+02.00y+00.00\zscan.dat | exists |
| 027gap015.000x+00.00y-00.50\zscan.dat | exists |
| 023gap015.000x+00.00y+00.00\zscan.dat | exists |
| 029gap015.000x+00.00y+00.50\zscan.dat | exists |
| 031gap020.000x-02.00y+00.00\zscan.dat | exists |
| 032gap020.000x-01.00y+00.00\zscan.dat | exists |
| 033gap020.000x+00.00y+00.00\zscan.dat | exists |
| 034gap020.000x+01.00y+00.00\zscan.dat | exists |
| 035gap020.000x+02.00y+00.00\zscan.dat | exists |
| 037gap020.000x+00.00y-00.50\zscan.dat | exists |
| 033gap020.000x+00.00y+00.00\zscan.dat | exists |
| 039gap020.000x+00.00y+00.50\zscan.dat | exists |
| 051gap030.000x-02.00y+00.00\zscan.dat | exists |
| 052gap030.000x-01.00y+00.00\zscan.dat | exists |
| 053gap030.000x+00.00y+00.00\zscan.dat | exists |
| 054gap030.000x+01.00y+00.00\zscan.dat | exists |
| 055gap030.000x+02.00y+00.00\zscan.dat | exists |
| 057gap030.000x+00.00y-00.50\zscan.dat | exists |
| 053gap030.000x+00.00y+00.00\zscan.dat | exists |
| 059gap030.000x+00.00y+00.50\zscan.dat | exists |
| 081gap100.000x-02.00y+00.00\zscan.dat | exists |
| 082gap100.000x-01.00y+00.00\zscan.dat | exists |
| 083gap100.000x+00.00y+00.00\zscan.dat | exists |
| 084gap100.000x+01.00y+00.00\zscan.dat | exists |
| 085gap100.000x+02.00y+00.00\zscan.dat | exists |
| 087gap100.000x+00.00y-00.50\zscan.dat | exists |
| 083gap100.000x+00.00y+00.00\zscan.dat | exists |
| 089gap100.000x+00.00y+00.50\zscan.dat | exists |

Sub folder: Z Scans\On Axis exists

|                                       |        |
|---------------------------------------|--------|
| 001gap010.000x+00.00y+00.00\zscan.dat | exists |
| 004gap011.000x+00.00y+00.00\zscan.dat | exists |
| 006gap012.000x+00.00y+00.00\zscan.dat | exists |



LCLS-II Undulator Segment Measurement Results

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|                                       |        |
|---------------------------------------|--------|
| 008gap013.000x+00.00y+00.00\zscan.dat | exists |
| 010gap014.000x+00.00y+00.00\zscan.dat | exists |
| 012gap015.000x+00.00y+00.00\zscan.dat | exists |
| 014gap016.000x+00.00y+00.00\zscan.dat | exists |
| 016gap017.000x+00.00y+00.00\zscan.dat | exists |
| 018gap018.000x+00.00y+00.00\zscan.dat | exists |
| 020gap019.000x+00.00y+00.00\zscan.dat | exists |
| 022gap020.000x+00.00y+00.00\zscan.dat | exists |
| 023gap021.000x+00.00y+00.00\zscan.dat | exists |
| 024gap022.000x+00.00y+00.00\zscan.dat | exists |
| 025gap023.000x+00.00y+00.00\zscan.dat | exists |
| 026gap024.000x+00.00y+00.00\zscan.dat | exists |
| 027gap025.000x+00.00y+00.00\zscan.dat | exists |
| 028gap026.000x+00.00y+00.00\zscan.dat | exists |
| 029gap027.000x+00.00y+00.00\zscan.dat | exists |
| 030gap028.000x+00.00y+00.00\zscan.dat | exists |
| 031gap029.000x+00.00y+00.00\zscan.dat | exists |
| 032gap030.000x+00.00y+00.00\zscan.dat | exists |
| 037gap035.000x+00.00y+00.00\zscan.dat | exists |
| 040gap040.000x+00.00y+00.00\zscan.dat | exists |
| 041gap045.000x+00.00y+00.00\zscan.dat | exists |
| 042gap050.000x+00.00y+00.00\zscan.dat | exists |
| 043gap055.000x+00.00y+00.00\zscan.dat | exists |
| 044gap060.000x+00.00y+00.00\zscan.dat | exists |
| 045gap070.000x+00.00y+00.00\zscan.dat | exists |
| 046gap080.000x+00.00y+00.00\zscan.dat | exists |
| 047gap090.000x+00.00y+00.00\zscan.dat | exists |
| 048gap100.000x+00.00y+00.00\zscan.dat | exists |

Sub folder: Stretched Wire exists

Sub folder: Stretched Wire\Good Field Region exists

|                                               |        |
|-----------------------------------------------|--------|
| 040gap012.000x-02.00y+00.00.i1X.integrals.txt | exists |
| 044gap012.000x-01.00y+00.00.i1X.integrals.txt | exists |
| 048gap012.000x+00.00y+00.00.i1X.integrals.txt | exists |



LCLS-II Undulator Segment Measurement Results

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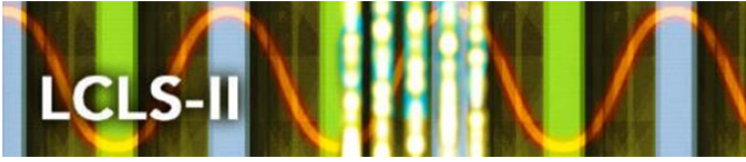
|                                               |        |
|-----------------------------------------------|--------|
| 052gap012.000x+01.00y+00.00.i1X.integrals.txt | exists |
| 056gap012.000x+02.00y+00.00.i1X.integrals.txt | exists |
| 060gap012.000x+00.00y-01.00.i1X.integrals.txt | exists |
| 048gap012.000x+00.00y+00.00.i1X.integrals.txt | exists |
| 076gap012.000x+00.00y+01.00.i1X.integrals.txt | exists |
| 080gap015.000x-02.00y+00.00.i1X.integrals.txt | exists |
| 084gap015.000x-01.00y+00.00.i1X.integrals.txt | exists |
| 088gap015.000x+00.00y+00.00.i1X.integrals.txt | exists |
| 092gap015.000x+01.00y+00.00.i1X.integrals.txt | exists |
| 096gap015.000x+02.00y+00.00.i1X.integrals.txt | exists |
| 100gap015.000x+00.00y-01.00.i1X.integrals.txt | exists |
| 088gap015.000x+00.00y+00.00.i1X.integrals.txt | exists |
| 116gap015.000x+00.00y+01.00.i1X.integrals.txt | exists |
| 120gap020.000x-02.00y+00.00.i1X.integrals.txt | exists |
| 124gap020.000x-01.00y+00.00.i1X.integrals.txt | exists |
| 128gap020.000x+00.00y+00.00.i1X.integrals.txt | exists |
| 132gap020.000x+01.00y+00.00.i1X.integrals.txt | exists |
| 136gap020.000x+02.00y+00.00.i1X.integrals.txt | exists |
| 140gap020.000x+00.00y-01.00.i1X.integrals.txt | exists |
| 128gap020.000x+00.00y+00.00.i1X.integrals.txt | exists |
| 156gap020.000x+00.00y+01.00.i1X.integrals.txt | exists |
| 200gap030.000x-02.00y+00.00.i1X.integrals.txt | exists |
| 204gap030.000x-01.00y+00.00.i1X.integrals.txt | exists |
| 208gap030.000x+00.00y+00.00.i1X.integrals.txt | exists |
| 212gap030.000x+01.00y+00.00.i1X.integrals.txt | exists |
| 216gap030.000x+02.00y+00.00.i1X.integrals.txt | exists |
| 220gap030.000x+00.00y-01.00.i1X.integrals.txt | exists |
| 208gap030.000x+00.00y+00.00.i1X.integrals.txt | exists |
| 236gap030.000x+00.00y+01.00.i1X.integrals.txt | exists |
| 280gap100.000x-02.00y+00.00.i1X.integrals.txt | exists |
| 284gap100.000x-01.00y+00.00.i1X.integrals.txt | exists |
| 288gap100.000x+00.00y+00.00.i1X.integrals.txt | exists |
| 292gap100.000x+01.00y+00.00.i1X.integrals.txt | exists |
| 296gap100.000x+02.00y+00.00.i1X.integrals.txt | exists |
| 300gap100.000x+00.00y-01.00.i1X.integrals.txt | exists |
| 288gap100.000x+00.00y+00.00.i1X.integrals.txt | exists |



# LCLS-II Undulator Segment Measurement Results

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|                                               |        |
|-----------------------------------------------|--------|
| 316gap100.000x+00.00y+01.00.i1X.integrals.txt | exists |
| 042gap012.000x-02.00y+00.00.i2X.integrals.txt | exists |
| 046gap012.000x-01.00y+00.00.i2X.integrals.txt | exists |
| 050gap012.000x+00.00y+00.00.i2X.integrals.txt | exists |
| 054gap012.000x+01.00y+00.00.i2X.integrals.txt | exists |
| 058gap012.000x+02.00y+00.00.i2X.integrals.txt | exists |
| 062gap012.000x+00.00y-01.00.i2X.integrals.txt | exists |
| 050gap012.000x+00.00y+00.00.i2X.integrals.txt | exists |
| 078gap012.000x+00.00y+01.00.i2X.integrals.txt | exists |
| 082gap015.000x-02.00y+00.00.i2X.integrals.txt | exists |
| 086gap015.000x-01.00y+00.00.i2X.integrals.txt | exists |
| 090gap015.000x+00.00y+00.00.i2X.integrals.txt | exists |
| 094gap015.000x+01.00y+00.00.i2X.integrals.txt | exists |
| 098gap015.000x+02.00y+00.00.i2X.integrals.txt | exists |
| 102gap015.000x+00.00y-01.00.i2X.integrals.txt | exists |
| 090gap015.000x+00.00y+00.00.i2X.integrals.txt | exists |
| 118gap015.000x+00.00y+01.00.i2X.integrals.txt | exists |
| 122gap020.000x-02.00y+00.00.i2X.integrals.txt | exists |
| 126gap020.000x-01.00y+00.00.i2X.integrals.txt | exists |
| 130gap020.000x+00.00y+00.00.i2X.integrals.txt | exists |
| 134gap020.000x+01.00y+00.00.i2X.integrals.txt | exists |
| 138gap020.000x+02.00y+00.00.i2X.integrals.txt | exists |
| 142gap020.000x+00.00y-01.00.i2X.integrals.txt | exists |
| 130gap020.000x+00.00y+00.00.i2X.integrals.txt | exists |
| 158gap020.000x+00.00y+01.00.i2X.integrals.txt | exists |
| 202gap030.000x-02.00y+00.00.i2X.integrals.txt | exists |
| 206gap030.000x-01.00y+00.00.i2X.integrals.txt | exists |
| 210gap030.000x+00.00y+00.00.i2X.integrals.txt | exists |
| 214gap030.000x+01.00y+00.00.i2X.integrals.txt | exists |
| 218gap030.000x+02.00y+00.00.i2X.integrals.txt | exists |
| 222gap030.000x+00.00y-01.00.i2X.integrals.txt | exists |
| 210gap030.000x+00.00y+00.00.i2X.integrals.txt | exists |
| 238gap030.000x+00.00y+01.00.i2X.integrals.txt | exists |
| 282gap100.000x-02.00y+00.00.i2X.integrals.txt | exists |
| 286gap100.000x-01.00y+00.00.i2X.integrals.txt | exists |
| 290gap100.000x+00.00y+00.00.i2X.integrals.txt | exists |



## LCLS-II Undulator Segment Measurement Results

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|                                               |        |
|-----------------------------------------------|--------|
| 294gap100.000x+01.00y+00.00.i2X.integrals.txt | exists |
| 298gap100.000x+02.00y+00.00.i2X.integrals.txt | exists |
| 302gap100.000x+00.00y-01.00.i2X.integrals.txt | exists |
| 290gap100.000x+00.00y+00.00.i2X.integrals.txt | exists |
| 318gap100.000x+00.00y+01.00.i2X.integrals.txt | exists |
| 041gap012.000x-02.00y+00.00.i1Y.integrals.txt | exists |
| 045gap012.000x-01.00y+00.00.i1Y.integrals.txt | exists |
| 049gap012.000x+00.00y+00.00.i1Y.integrals.txt | exists |
| 053gap012.000x+01.00y+00.00.i1Y.integrals.txt | exists |
| 057gap012.000x+02.00y+00.00.i1Y.integrals.txt | exists |
| 061gap012.000x+00.00y-01.00.i1Y.integrals.txt | exists |
| 049gap012.000x+00.00y+00.00.i1Y.integrals.txt | exists |
| 077gap012.000x+00.00y+01.00.i1Y.integrals.txt | exists |
| 081gap015.000x-02.00y+00.00.i1Y.integrals.txt | exists |
| 085gap015.000x-01.00y+00.00.i1Y.integrals.txt | exists |
| 089gap015.000x+00.00y+00.00.i1Y.integrals.txt | exists |
| 093gap015.000x+01.00y+00.00.i1Y.integrals.txt | exists |
| 097gap015.000x+02.00y+00.00.i1Y.integrals.txt | exists |
| 101gap015.000x+00.00y-01.00.i1Y.integrals.txt | exists |
| 089gap015.000x+00.00y+00.00.i1Y.integrals.txt | exists |
| 117gap015.000x+00.00y+01.00.i1Y.integrals.txt | exists |
| 121gap020.000x-02.00y+00.00.i1Y.integrals.txt | exists |
| 125gap020.000x-01.00y+00.00.i1Y.integrals.txt | exists |
| 129gap020.000x+00.00y+00.00.i1Y.integrals.txt | exists |
| 133gap020.000x+01.00y+00.00.i1Y.integrals.txt | exists |
| 137gap020.000x+02.00y+00.00.i1Y.integrals.txt | exists |
| 141gap020.000x+00.00y-01.00.i1Y.integrals.txt | exists |
| 129gap020.000x+00.00y+00.00.i1Y.integrals.txt | exists |
| 157gap020.000x+00.00y+01.00.i1Y.integrals.txt | exists |
| 201gap030.000x-02.00y+00.00.i1Y.integrals.txt | exists |
| 205gap030.000x-01.00y+00.00.i1Y.integrals.txt | exists |
| 209gap030.000x+00.00y+00.00.i1Y.integrals.txt | exists |
| 213gap030.000x+01.00y+00.00.i1Y.integrals.txt | exists |
| 217gap030.000x+02.00y+00.00.i1Y.integrals.txt | exists |
| 221gap030.000x+00.00y-01.00.i1Y.integrals.txt | exists |
| 209gap030.000x+00.00y+00.00.i1Y.integrals.txt | exists |



LCLS-II Undulator Segment Measurement Results

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|                                               |        |
|-----------------------------------------------|--------|
| 237gap030.000x+00.00y+01.00.i1Y_integrals.txt | exists |
| 281gap100.000x-02.00y+00.00.i1Y_integrals.txt | exists |
| 285gap100.000x-01.00y+00.00.i1Y_integrals.txt | exists |
| 289gap100.000x+00.00y+00.00.i1Y_integrals.txt | exists |
| 293gap100.000x+01.00y+00.00.i1Y_integrals.txt | exists |
| 297gap100.000x+02.00y+00.00.i1Y_integrals.txt | exists |
| 301gap100.000x+00.00y-01.00.i1Y_integrals.txt | exists |
| 289gap100.000x+00.00y+00.00.i1Y_integrals.txt | exists |
| 317gap100.000x+00.00y+01.00.i1Y_integrals.txt | exists |
| 043gap012.000x-02.00y+00.00.i2Y_integrals.txt | exists |
| 047gap012.000x-01.00y+00.00.i2Y_integrals.txt | exists |
| 051gap012.000x+00.00y+00.00.i2Y_integrals.txt | exists |
| 055gap012.000x+01.00y+00.00.i2Y_integrals.txt | exists |
| 059gap012.000x+02.00y+00.00.i2Y_integrals.txt | exists |
| 063gap012.000x+00.00y-01.00.i2Y_integrals.txt | exists |
| 051gap012.000x+00.00y+00.00.i2Y_integrals.txt | exists |
| 079gap012.000x+00.00y+01.00.i2Y_integrals.txt | exists |
| 083gap015.000x-02.00y+00.00.i2Y_integrals.txt | exists |
| 087gap015.000x-01.00y+00.00.i2Y_integrals.txt | exists |
| 091gap015.000x+00.00y+00.00.i2Y_integrals.txt | exists |
| 095gap015.000x+01.00y+00.00.i2Y_integrals.txt | exists |
| 099gap015.000x+02.00y+00.00.i2Y_integrals.txt | exists |
| 103gap015.000x+00.00y-01.00.i2Y_integrals.txt | exists |
| 091gap015.000x+00.00y+00.00.i2Y_integrals.txt | exists |
| 119gap015.000x+00.00y+01.00.i2Y_integrals.txt | exists |
| 123gap020.000x-02.00y+00.00.i2Y_integrals.txt | exists |
| 127gap020.000x-01.00y+00.00.i2Y_integrals.txt | exists |
| 131gap020.000x+00.00y+00.00.i2Y_integrals.txt | exists |
| 135gap020.000x+01.00y+00.00.i2Y_integrals.txt | exists |
| 139gap020.000x+02.00y+00.00.i2Y_integrals.txt | exists |
| 143gap020.000x+00.00y-01.00.i2Y_integrals.txt | exists |
| 131gap020.000x+00.00y+00.00.i2Y_integrals.txt | exists |
| 159gap020.000x+00.00y+01.00.i2Y_integrals.txt | exists |
| 203gap030.000x-02.00y+00.00.i2Y_integrals.txt | exists |
| 207gap030.000x-01.00y+00.00.i2Y_integrals.txt | exists |
| 211gap030.000x+00.00y+00.00.i2Y_integrals.txt | exists |



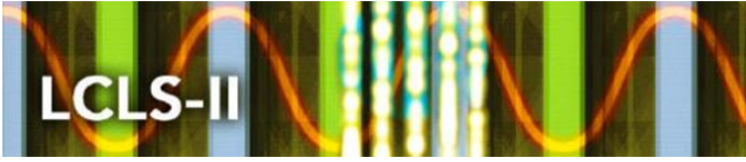
LCLS-II Undulator Segment Measurement Results

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|                                               |        |
|-----------------------------------------------|--------|
| 215gap030.000x+01.00y+00.00.i2Y.integrals.txt | exists |
| 219gap030.000x+02.00y+00.00.i2Y.integrals.txt | exists |
| 223gap030.000x+00.00y-01.00.i2Y.integrals.txt | exists |
| 211gap030.000x+00.00y+00.00.i2Y.integrals.txt | exists |
| 239gap030.000x+00.00y+01.00.i2Y.integrals.txt | exists |
| 283gap100.000x-02.00y+00.00.i2Y.integrals.txt | exists |
| 287gap100.000x-01.00y+00.00.i2Y.integrals.txt | exists |
| 291gap100.000x+00.00y+00.00.i2Y.integrals.txt | exists |
| 295gap100.000x+01.00y+00.00.i2Y.integrals.txt | exists |
| 299gap100.000x+02.00y+00.00.i2Y.integrals.txt | exists |
| 303gap100.000x+00.00y-01.00.i2Y.integrals.txt | exists |
| 291gap100.000x+00.00y+00.00.i2Y.integrals.txt | exists |
| 319gap100.000x+00.00y+01.00.i2Y.integrals.txt | exists |

Sub folder: Stretched Wire\On Axis exists

|                                               |        |
|-----------------------------------------------|--------|
| 004gap012.000x+00.00y+00.00.i1X.integrals.txt | exists |
| 008gap014.000x+00.00y+00.00.i1X.integrals.txt | exists |
| 012gap016.000x+00.00y+00.00.i1X.integrals.txt | exists |
| 016gap018.000x+00.00y+00.00.i1X.integrals.txt | exists |
| 020gap020.000x+00.00y+00.00.i1X.integrals.txt | exists |
| 024gap022.000x+00.00y+00.00.i1X.integrals.txt | exists |
| 028gap024.000x+00.00y+00.00.i1X.integrals.txt | exists |
| 032gap026.000x+00.00y+00.00.i1X.integrals.txt | exists |
| 036gap028.000x+00.00y+00.00.i1X.integrals.txt | exists |
| 040gap030.000x+00.00y+00.00.i1X.integrals.txt | exists |
| 048gap040.000x+00.00y+00.00.i1X.integrals.txt | exists |
| 052gap050.000x+00.00y+00.00.i1X.integrals.txt | exists |
| 056gap060.000x+00.00y+00.00.i1X.integrals.txt | exists |
| 060gap070.000x+00.00y+00.00.i1X.integrals.txt | exists |
| 064gap080.000x+00.00y+00.00.i1X.integrals.txt | exists |
| 068gap090.000x+00.00y+00.00.i1X.integrals.txt | exists |
| 072gap100.000x+00.00y+00.00.i1X.integrals.txt | exists |
| 006gap012.000x+00.00y+00.00.i2X.integrals.txt | exists |
| 010gap014.000x+00.00y+00.00.i2X.integrals.txt | exists |



LCLS-II Undulator Segment Measurement Results

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|                                               |        |
|-----------------------------------------------|--------|
| 014gap016.000x+00.00y+00.00.i2X_integrals.txt | exists |
| 018gap018.000x+00.00y+00.00.i2X_integrals.txt | exists |
| 022gap020.000x+00.00y+00.00.i2X_integrals.txt | exists |
| 026gap022.000x+00.00y+00.00.i2X_integrals.txt | exists |
| 030gap024.000x+00.00y+00.00.i2X_integrals.txt | exists |
| 034gap026.000x+00.00y+00.00.i2X_integrals.txt | exists |
| 038gap028.000x+00.00y+00.00.i2X_integrals.txt | exists |
| 042gap030.000x+00.00y+00.00.i2X_integrals.txt | exists |
| 050gap040.000x+00.00y+00.00.i2X_integrals.txt | exists |
| 054gap050.000x+00.00y+00.00.i2X_integrals.txt | exists |
| 058gap060.000x+00.00y+00.00.i2X_integrals.txt | exists |
| 062gap070.000x+00.00y+00.00.i2X_integrals.txt | exists |
| 066gap080.000x+00.00y+00.00.i2X_integrals.txt | exists |
| 070gap090.000x+00.00y+00.00.i2X_integrals.txt | exists |
| 074gap100.000x+00.00y+00.00.i2X_integrals.txt | exists |
| 005gap012.000x+00.00y+00.00.i1Y_integrals.txt | exists |
| 009gap014.000x+00.00y+00.00.i1Y_integrals.txt | exists |
| 013gap016.000x+00.00y+00.00.i1Y_integrals.txt | exists |
| 017gap018.000x+00.00y+00.00.i1Y_integrals.txt | exists |
| 021gap020.000x+00.00y+00.00.i1Y_integrals.txt | exists |
| 025gap022.000x+00.00y+00.00.i1Y_integrals.txt | exists |
| 029gap024.000x+00.00y+00.00.i1Y_integrals.txt | exists |
| 033gap026.000x+00.00y+00.00.i1Y_integrals.txt | exists |
| 037gap028.000x+00.00y+00.00.i1Y_integrals.txt | exists |
| 041gap030.000x+00.00y+00.00.i1Y_integrals.txt | exists |
| 049gap040.000x+00.00y+00.00.i1Y_integrals.txt | exists |
| 053gap050.000x+00.00y+00.00.i1Y_integrals.txt | exists |
| 057gap060.000x+00.00y+00.00.i1Y_integrals.txt | exists |
| 061gap070.000x+00.00y+00.00.i1Y_integrals.txt | exists |
| 065gap080.000x+00.00y+00.00.i1Y_integrals.txt | exists |
| 069gap090.000x+00.00y+00.00.i1Y_integrals.txt | exists |
| 073gap100.000x+00.00y+00.00.i1Y_integrals.txt | exists |
| 007gap012.000x+00.00y+00.00.i2Y_integrals.txt | exists |
| 011gap014.000x+00.00y+00.00.i2Y_integrals.txt | exists |
| 015gap016.000x+00.00y+00.00.i2Y_integrals.txt | exists |
| 019gap018.000x+00.00y+00.00.i2Y_integrals.txt | exists |



LCLS-II Undulator Segment Measurement Results

HE-SXPS-15081

|                                               |        |
|-----------------------------------------------|--------|
| 023gap020.000x+00.00y+00.00.i2Y_integrals.txt | exists |
| 027gap022.000x+00.00y+00.00.i2Y_integrals.txt | exists |
| 031gap024.000x+00.00y+00.00.i2Y_integrals.txt | exists |
| 035gap026.000x+00.00y+00.00.i2Y_integrals.txt | exists |
| 039gap028.000x+00.00y+00.00.i2Y_integrals.txt | exists |
| 043gap030.000x+00.00y+00.00.i2Y_integrals.txt | exists |
| 051gap040.000x+00.00y+00.00.i2Y_integrals.txt | exists |
| 055gap050.000x+00.00y+00.00.i2Y_integrals.txt | exists |
| 059gap060.000x+00.00y+00.00.i2Y_integrals.txt | exists |
| 063gap070.000x+00.00y+00.00.i2Y_integrals.txt | exists |
| 067gap080.000x+00.00y+00.00.i2Y_integrals.txt | exists |
| 071gap090.000x+00.00y+00.00.i2Y_integrals.txt | exists |
| 075gap100.000x+00.00y+00.00.i2Y_integrals.txt | exists |

Sub folder: **Fiducialization** exists

|                              |        |
|------------------------------|--------|
| HE.SXPS_15081_fiducials.xlsx | exists |
|------------------------------|--------|

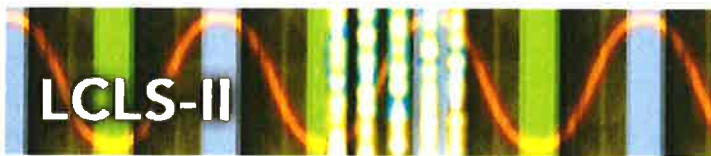
Sub folder: **Controls Data** exists

|                                     |        |
|-------------------------------------|--------|
| he_sxps.15081.i1x_vs_gap_spline.dat | exists |
| he_sxps.15081.i1y_vs_gap_spline.dat | exists |
| he_sxps.15081.i2x_vs_gap_spline.dat | exists |
| he_sxps.15081.i2y_vs_gap_spline.dat | exists |



LCLS-II Undulator Segment Measurement Results

HE-SXPS-15081



LCLS-II Undulator Segment Measurement Results  
Summary of findings

HE-SXPS-15081

| Finding | Solution |
|---------|----------|
|         |          |
|         |          |

Approval and Assignment by Heinz-Dieter Nuhn

|                       |               |  |
|-----------------------|---------------|--|
| Data Storage Checked: | Y             |  |
| Magnet Accepted:      | Y             |  |
| Assigned Location:    | HE-SXPS-15081 |  |

|                                                                                     |                   |                 |
|-------------------------------------------------------------------------------------|-------------------|-----------------|
|  | Heinz-Dieter Nuhn | August 27, 2026 |
| (Signature)                                                                         | (Name)            | (Date)          |