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 beamline (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-10086

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).

Evaluation of Hall Probe Scans: Data Listings A

MATLAB function "EvaluatePhaseShifterField" on	01/25/2025 17:46	
A. SCAN PARAMETERS		
Serial Number	HE-SXPS-10086	
z Scanning Date & Time Range	01/09/2025 15:33—01/09/2025 20:50	
Phase Shifter Temperature	20.3185±0.0066	°C
x axis position	0.0478	m
y axis position	0.000162	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	0.251	G
Earth Field Corection B_y	-0.422	G
Nominal Closed Gap Height	10.000	mm

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

MATLAB function "EvaluatePhaseShifterField" on	01/25/2025 17:46	
B. CORE EVALUATIONS FOR CLOSED GAP		
Closed Gap Scanning Date & Time	01/09/2025 17:58	
Closed Gap Temperature	20.33± 0.23	°C
Encoder Gap	9.9955	mm
Encoder Gap Raw	397,282	
[PRD0049.4080] Measured $I1X$ (Integration Length Total)	+2.36 (12 % of Tolerance)	μTm
[PRD0049.4082] Measured $I2X$ (Integration Length Total)	+2.07 (3.5 % of Tolerance)	μTm^2
[PRD0049.4083] Measured $I1Y$ (Integration Length Total)	+5.11 (26 % of Tolerance)	μTm
[PRD0049.4084] Measured $I2Y$ (Integration Length Total)	-4.81 (8.0 % of Tolerance)	μTm^2
[PRD0049.4089] Phase Shifter Phase Accuracy	0.19 (3.3 % of Tolerance)	degXray
Measured PI (Integration Length Total)	10,617.6	T^{2}mm^3
Required min PI (Cell Range Total) at Closed Gap	9,500.0	T^{2}mm^3

MATLAB function "EvaluatePhaseShifterField" on	01/25/2025 17:46	
C. CORE EVALUATIONS FOR OPEN GAP		
Open Gap Scanning Date & Time	01/09/2025 19:29	
Open Gap Temperature	20.32± 0.22	°C
Encoder Gap	99.9992	mm
Encoder Gap Raw	2,197,356	
Measured $I1X$ (Integration Length Total)	+5.07 (25 % of Tolerance)	μTm
Measured $I2X$ (Integration Length Total)	+2.89 (4.8 % of Tolerance)	μTm^2
Measured $I1Y$ (Integration Length Total)	-0.29 (1.5 % of Tolerance)	μTm
Measured $I2Y$ (Integration Length Total)	-2.43 (4.1 % of Tolerance)	μTm^2
Measured PI (Integration Length Total)	39.2	T^{2}mm^3
Required max PI (Integration Length total) at Open Gap	200.0	T^{2}mm^3

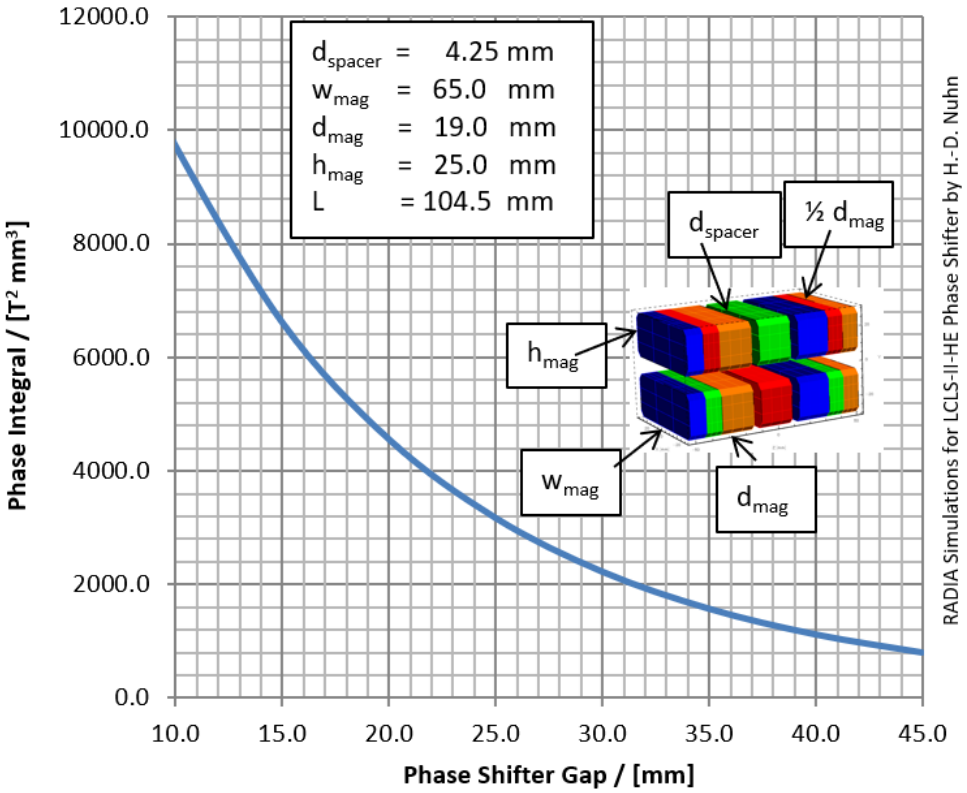
MATLAB function "EvaluatePhaseShifterField" on	01/25/2025 17:46	
D. ENCODER SETTINGS		
Gap Encoder Offset	9.8686	mm

Capacitive Sensor Measurements: Data Listing E

MATLAB function "EvaluatePhaseShifterField" on 01/25/2025 17:46

E. CAPACITIVE SENSOR VALUES

Date	Time	Meas	Enc (mm)	Enc (count)	T_{ref} (°C)	Temp (°C)	Dist Up (mm)	Dist Dn (mm)	Gap (mm)
01-09-2025	14:54:52	REF	14.998	14	20.49	20.75	1.0837	0.5104	86.9999
01-09-2025	14:54:59	REF	14.998	14	20.49	20.76	1.0838	0.5105	87.0000
01-09-2025	14:56:17	PS	14.998	14	20.49	21.07	1.2711	0.4996	87.1765
01-09-2025	14:56:24	PS	14.998	14	20.49	21.06	1.2711	0.4996	87.1765
01-09-2025	14:56:52	PS	14.998	14	20.49	21.18	1.2723	0.4985	87.1766
01-09-2025	14:56:57	PS	14.998	14	20.49	21.19	1.2723	0.4985	87.1766
01-09-2025	14:57:37	REF	14.998	14	20.50	21.19	1.0834	0.5104	86.9996
01-09-2025	14:57:42	REF	14.998	14	20.50	21.17	1.0834	0.5104	86.9996

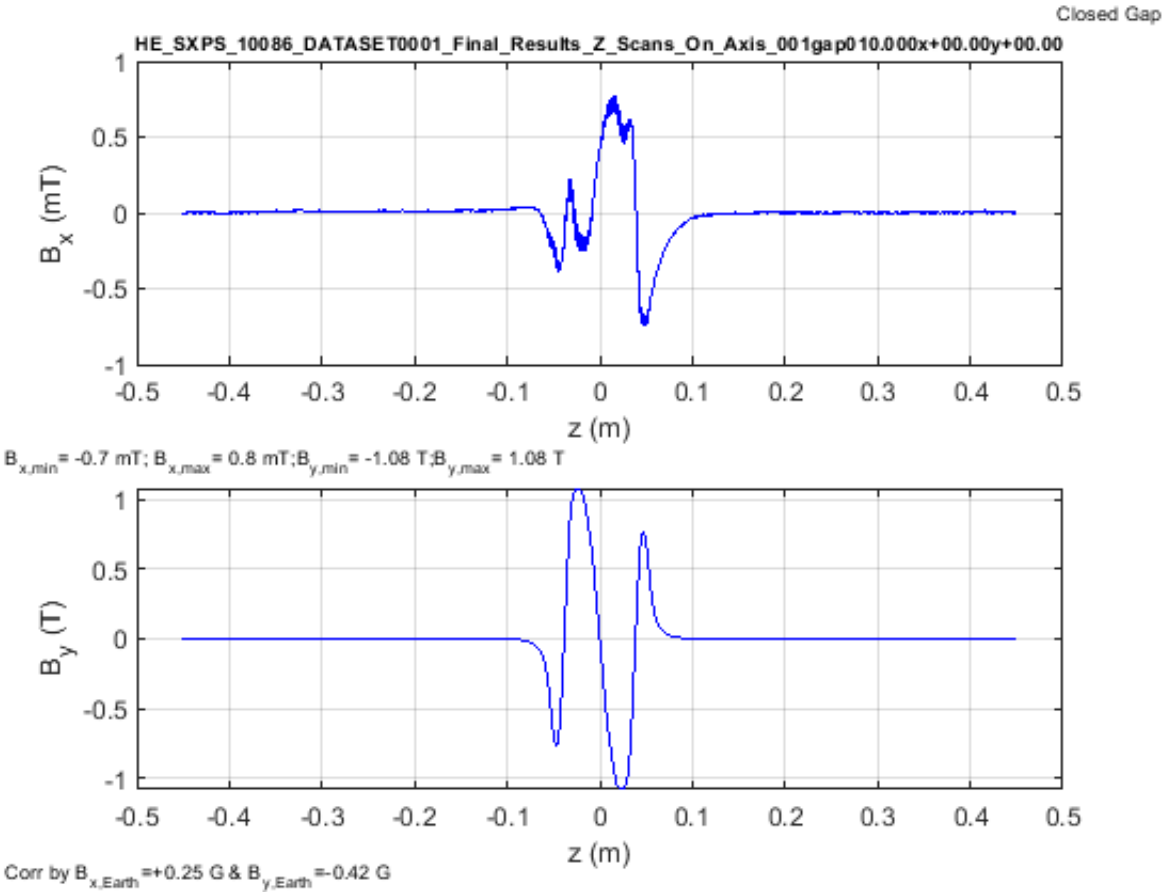


LCLS-II-HE Phase Shifter Magnet Array Design by Z. Wolf

The figure shows design parameters for the phaseshifter magnet array.

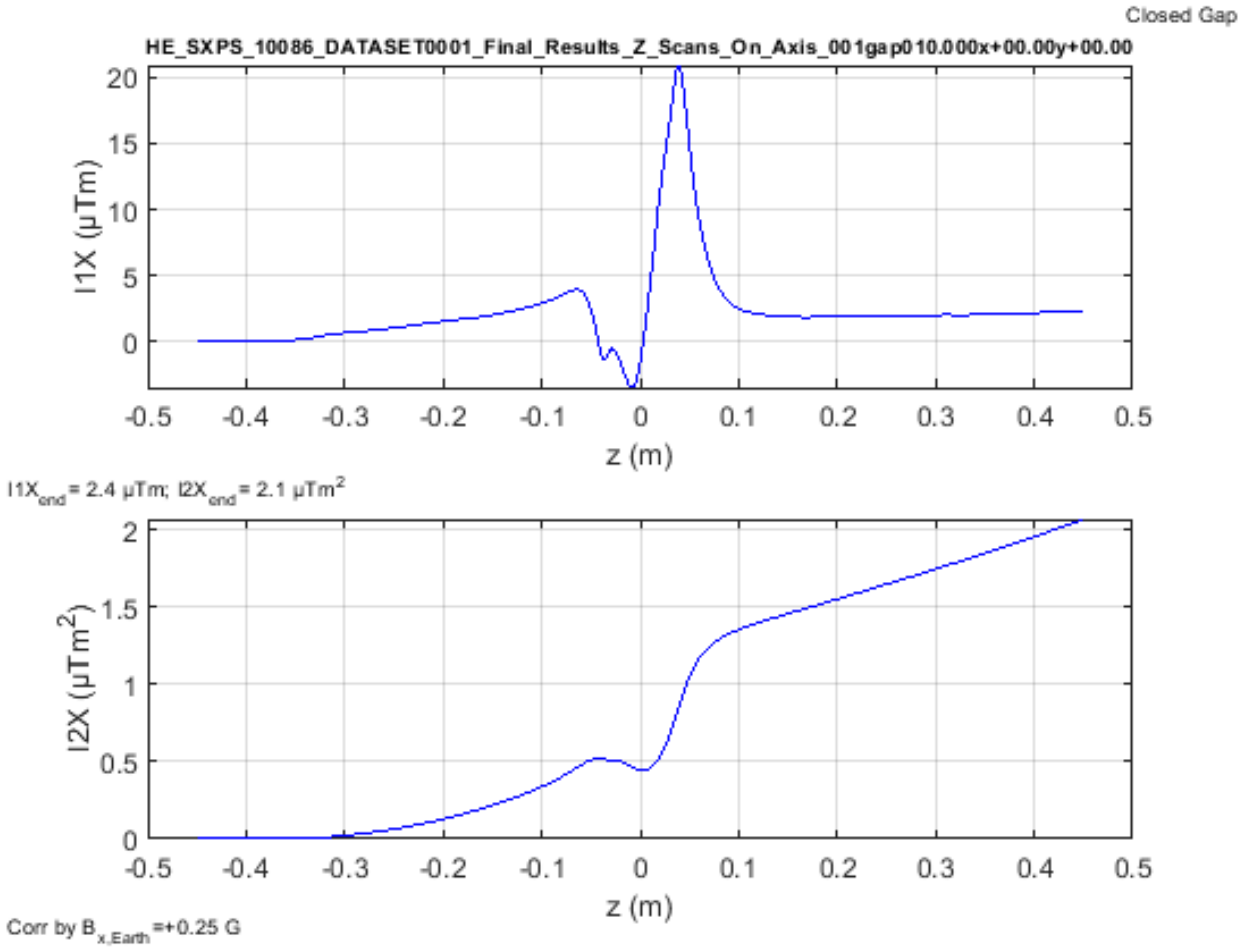
The following figures show results of the field analysis at closed gap.

Hall Probe Scans at Closed Gap: Horizontal and Vertical Field



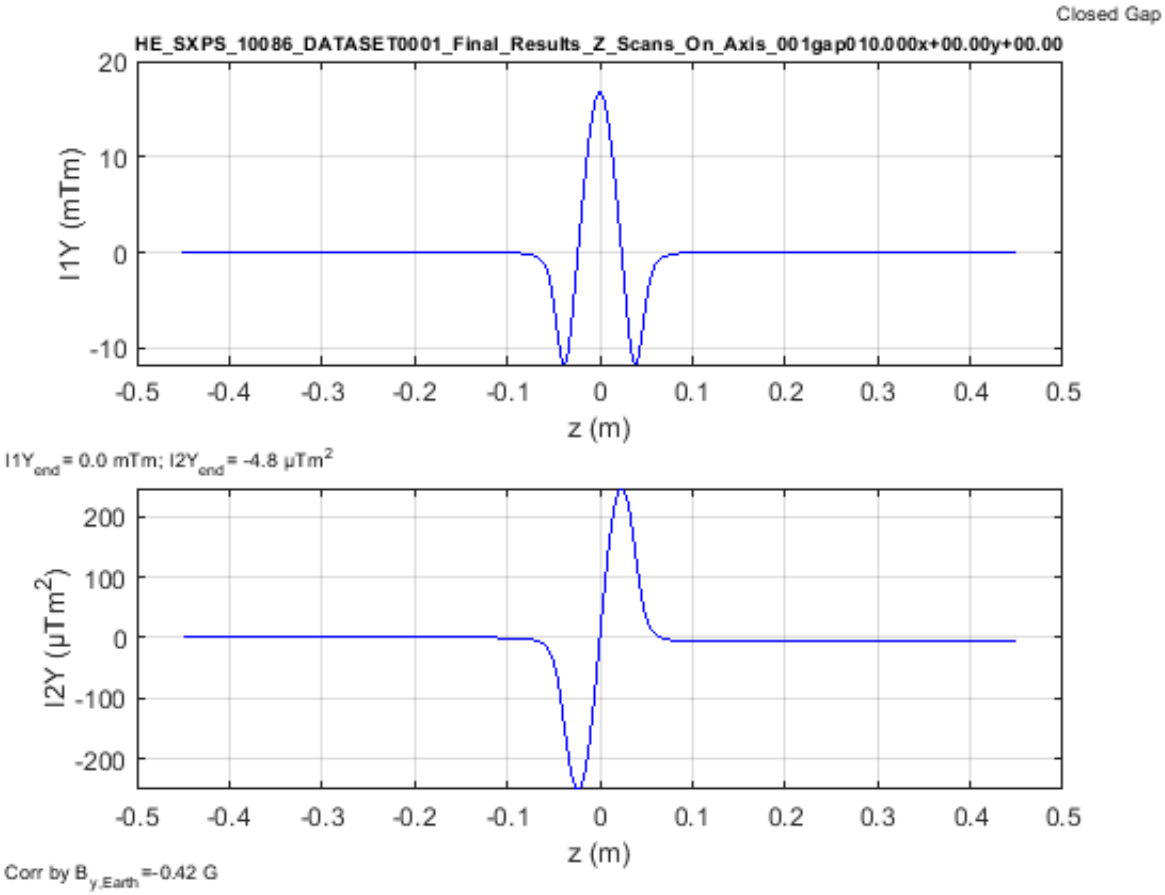
The figures show the x (upper) and y (lower) field components along the phase shifter beam axis over the Integration Length for the closed gap. The field extremes are listed on the left hand side between the upper and lower figure. The z-axis is centered on the phase shifter. The amount of earth field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

Hall Probe Scans at Closed Gap: Horizontal 1st and 2nd Field Integrals



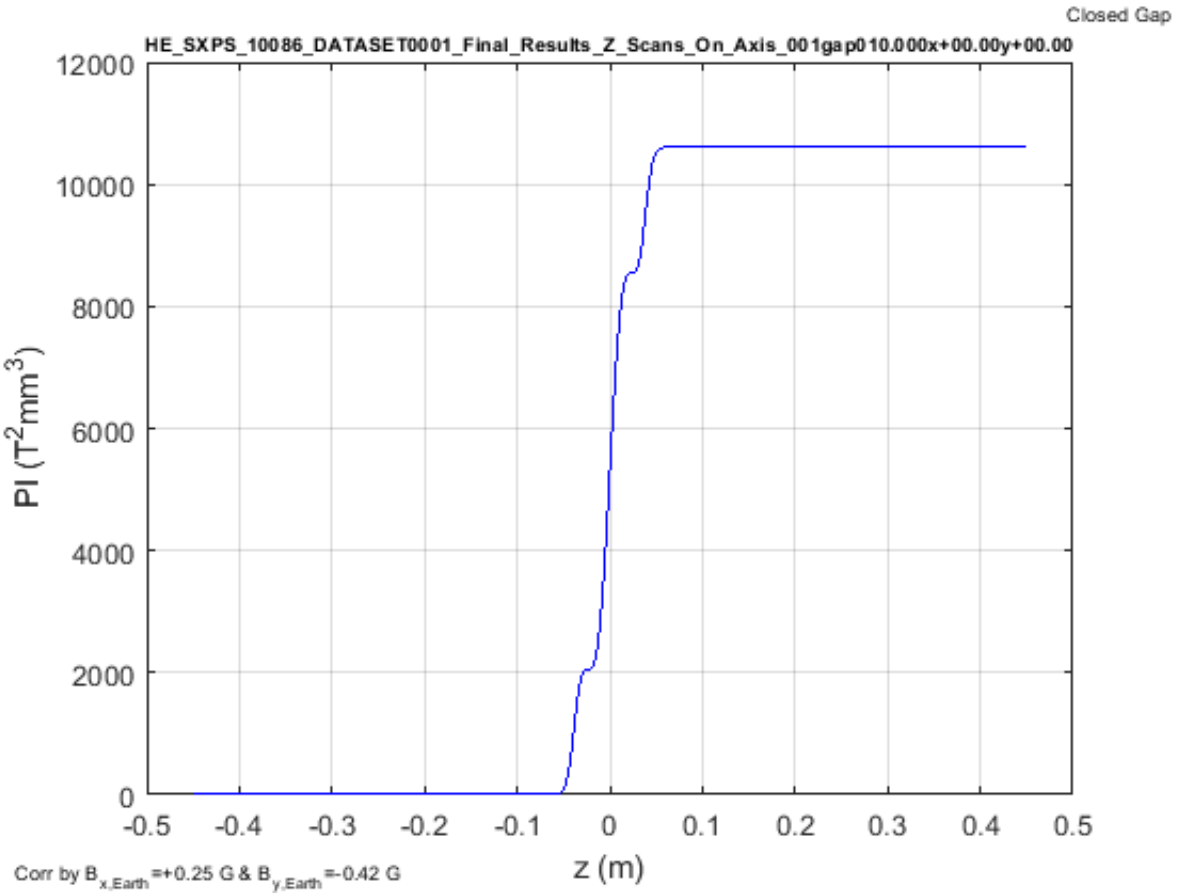
The figures show the horizontal first (I1X, upper) and second (I2X, lower) field integrals along the phase shifter beam axis over the Integration Length for the closed gap. The end values are listed on the left hand side between the upper and lower figure. The z-axis is centered on the phase shifter.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

Hall Probe Scans at Closed Gap: Vertical 1st and 2nd 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]

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:

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

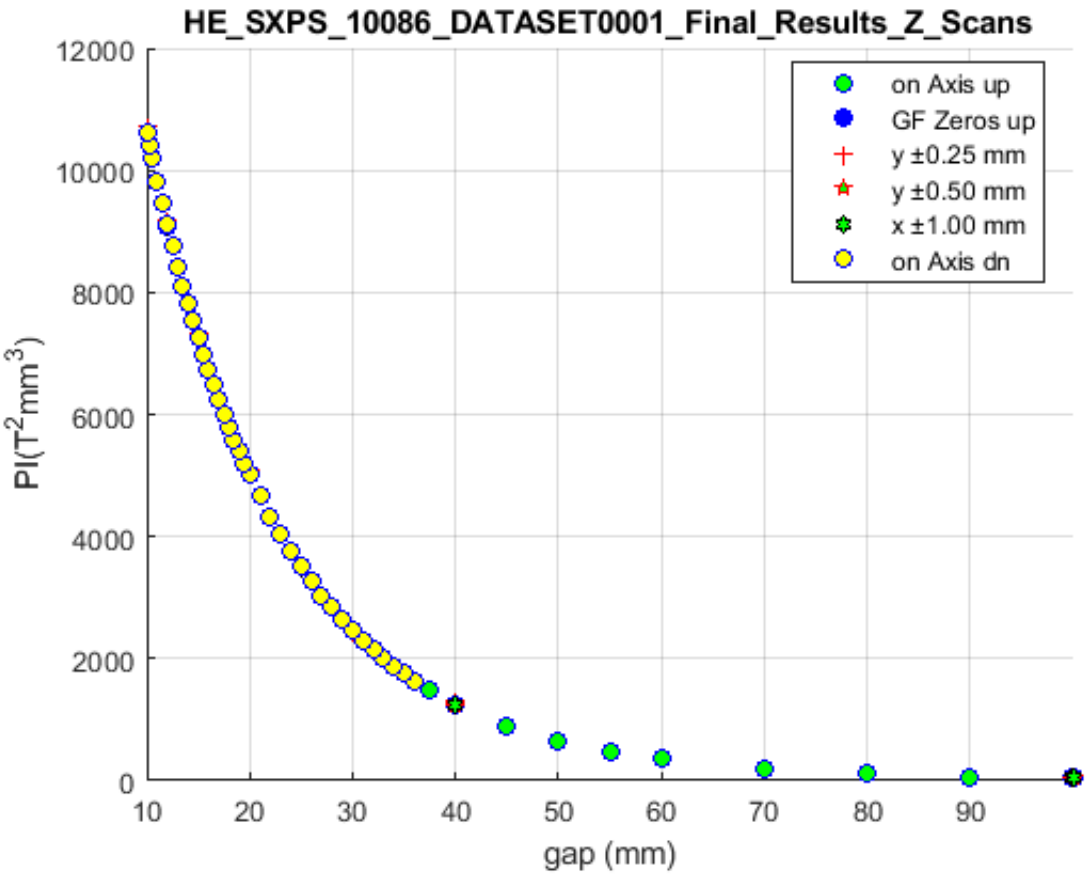
with

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

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.

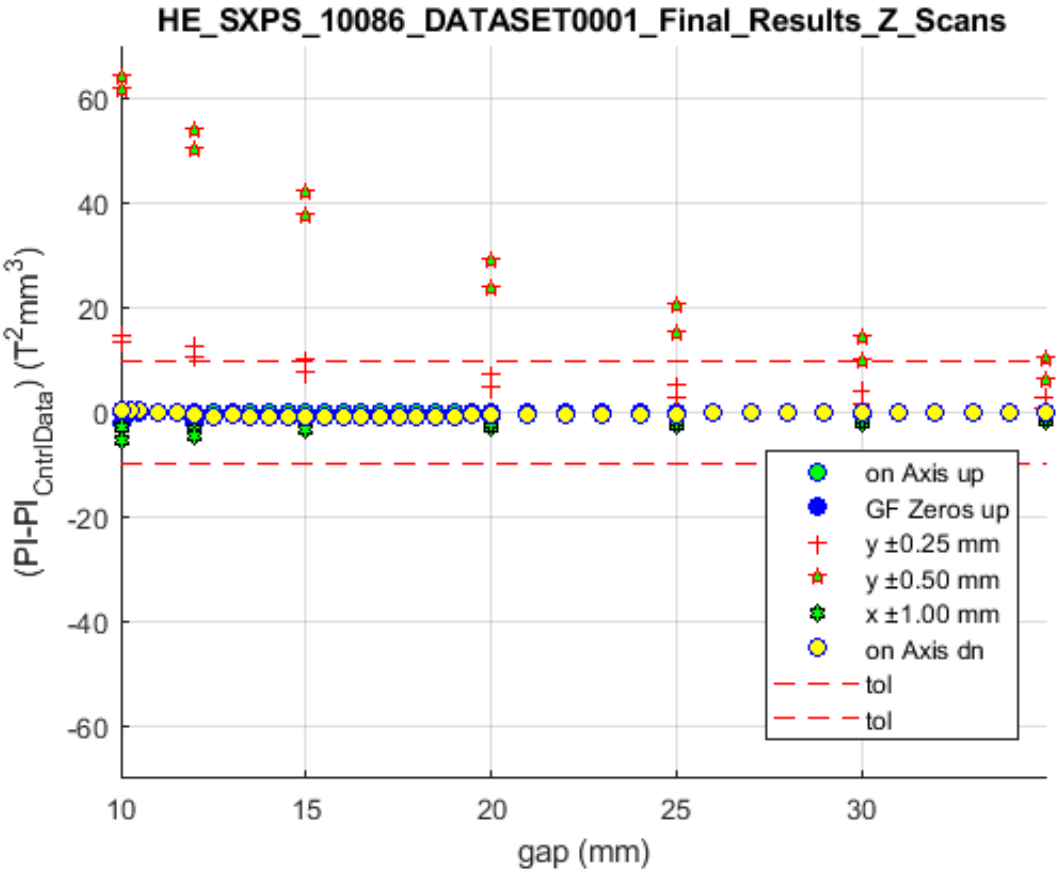
The following figures show the results of the gap dependent analysis.

Evaluation of Hall Probe Scans: PI vs. gap



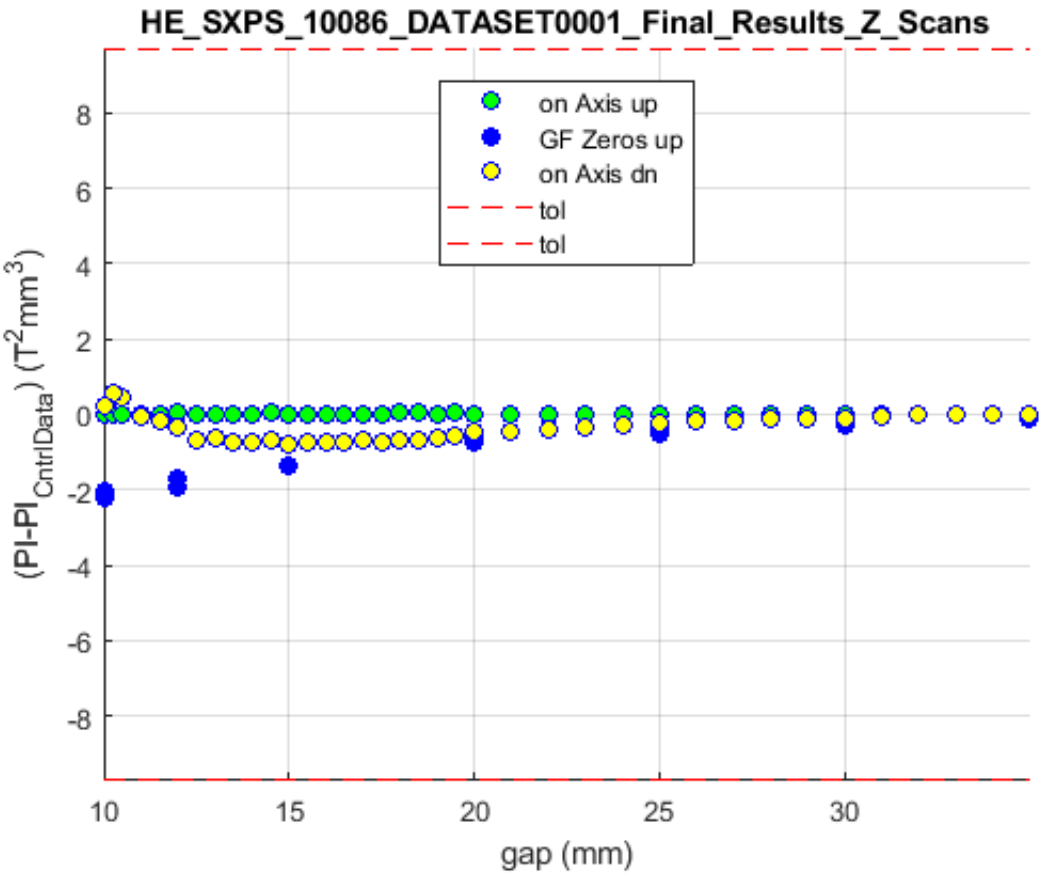
The figure shows phase shifter Phase Integral, PI, as a function of gap over the 10 mm - 90 mm gap range. The legend shows a number of different cases that will become clearer on page 9 because their effect cannot be observed in this full scale plot. Note: The gap values are derived from the readings 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_10086_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



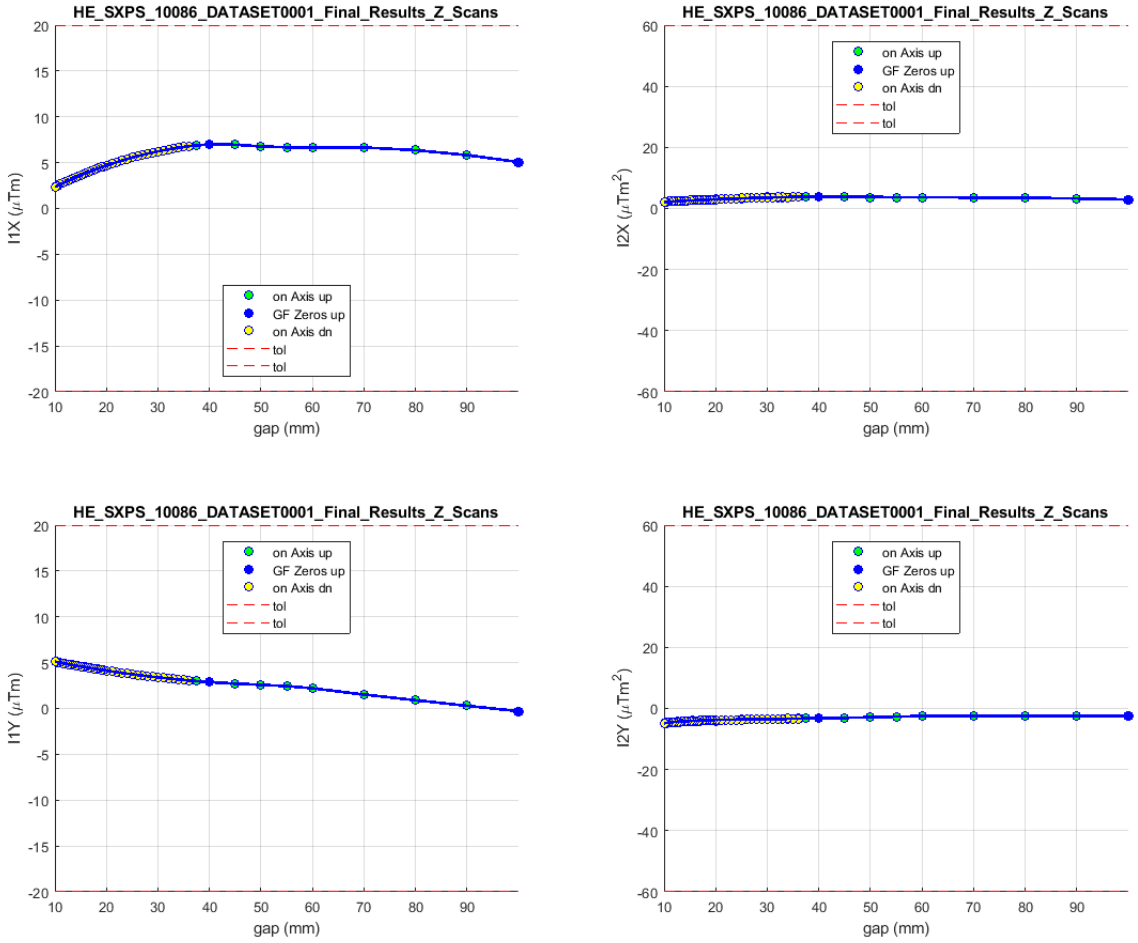
The figure shows the relative difference between the measured phase shifter Phase Integral, PI, and a cubic spline fit to the list of reference data points as a function of gap over the 10 mm-30 mm operational range. The cubic spline fit data is stored on the V: drive in the Controls Data folder in file `he_sxps_10086_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.

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

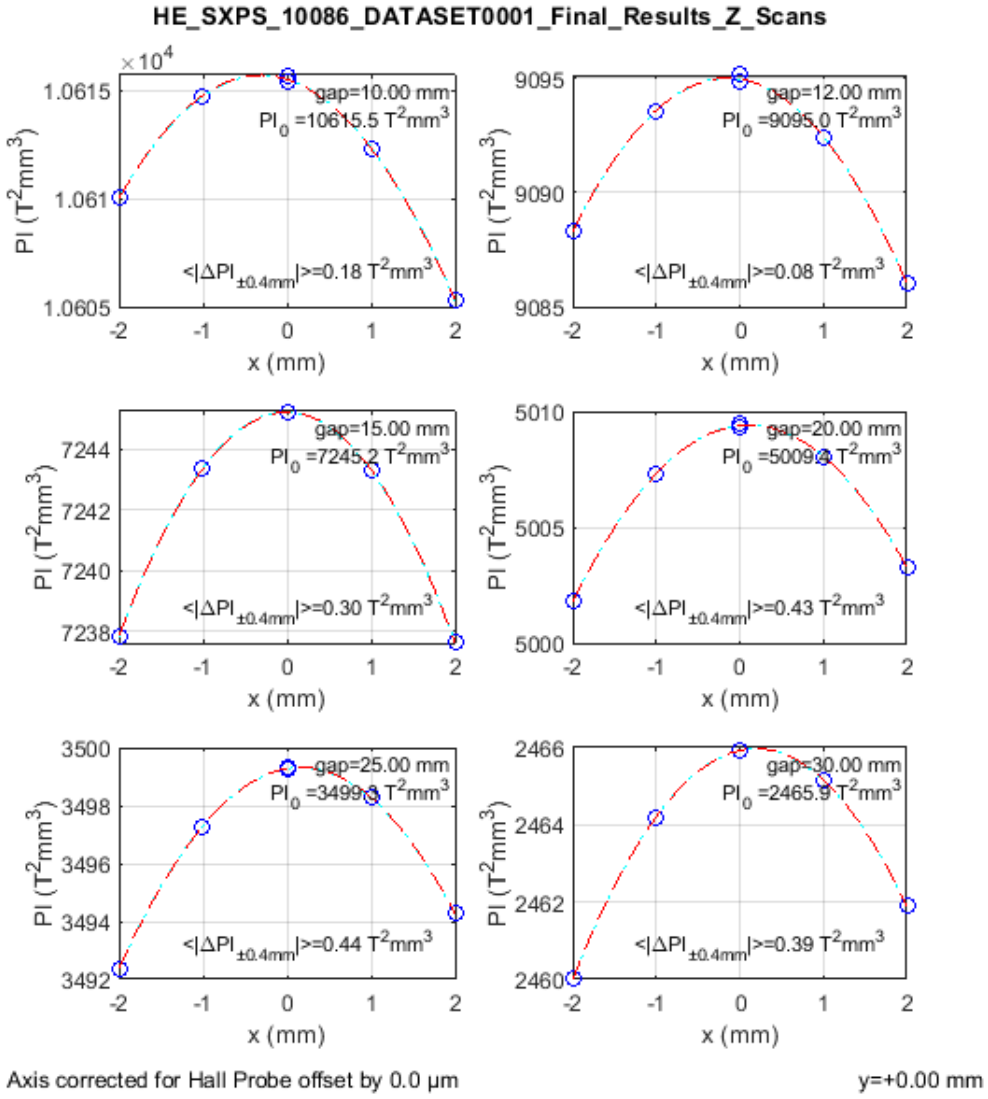


The figures show the field integrals (I1X, I2X, I1Y, I2Y) at the end of the integration range as function of the closed gap. The intergrals were taken along a z-distance of 0.900 m (integration range) centered on the phaseshifter. The proximity of the green and yellow circles shows that the field integrals 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",

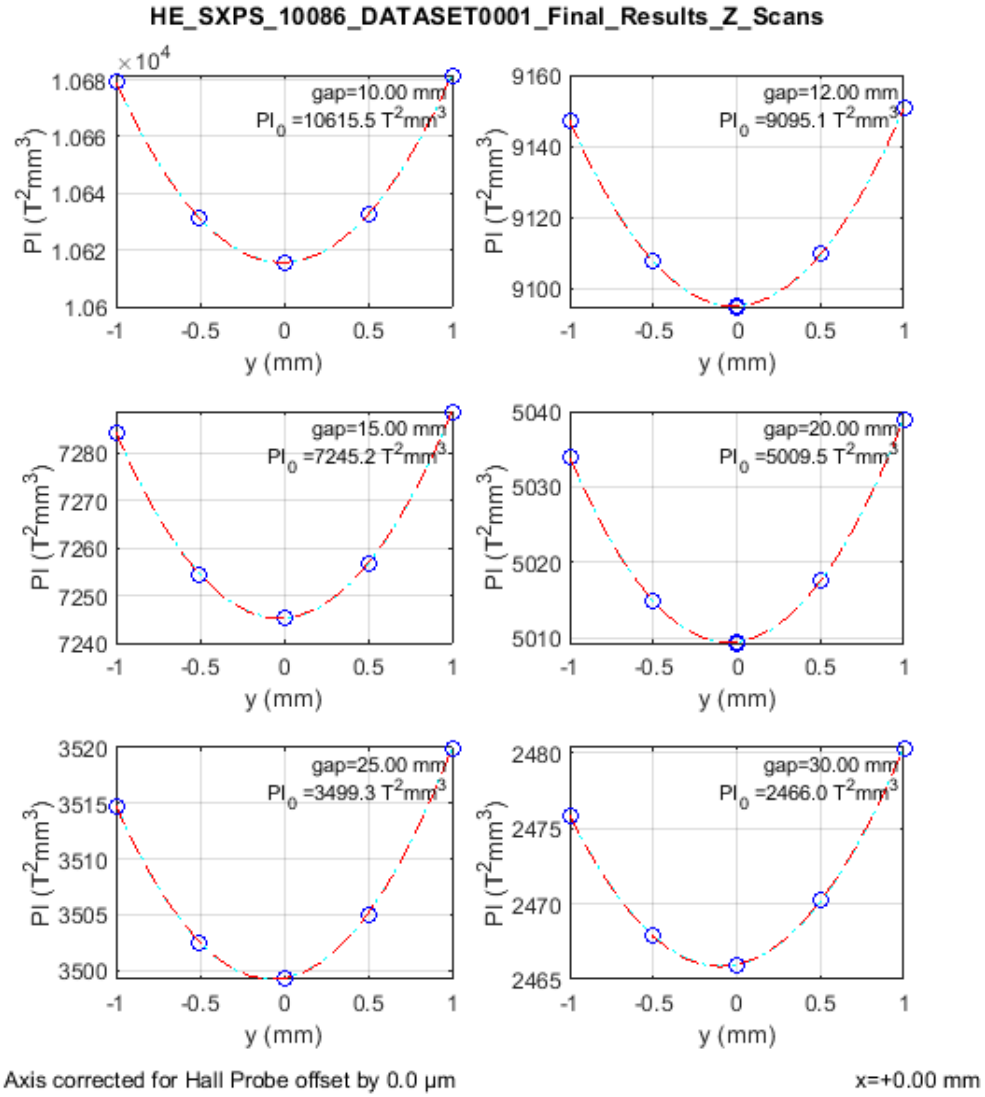
and demonstrate how the controls representations of the field integrals relate to the actual measurements (see final section of this document for file information).

Evaluation of Hall Scans: PI vs. x dependence



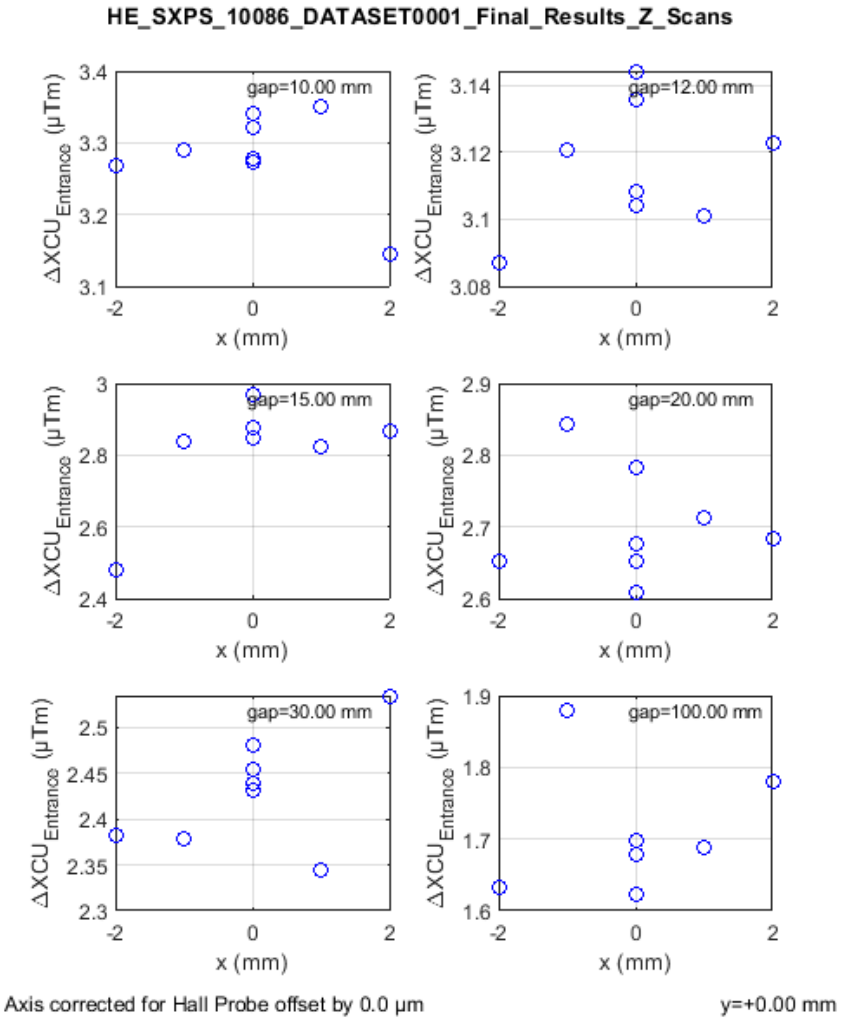
The figure shows the deviation of the phase integral, PI, from the off-axis value, PI_0, as function of x at a number of operational gaps. The average deviation at $z = \pm 0.4$ mm is printed at the lower part of each plot. [Documentary Information]

Evaluation of Hall Scans: PI vs. y dependence



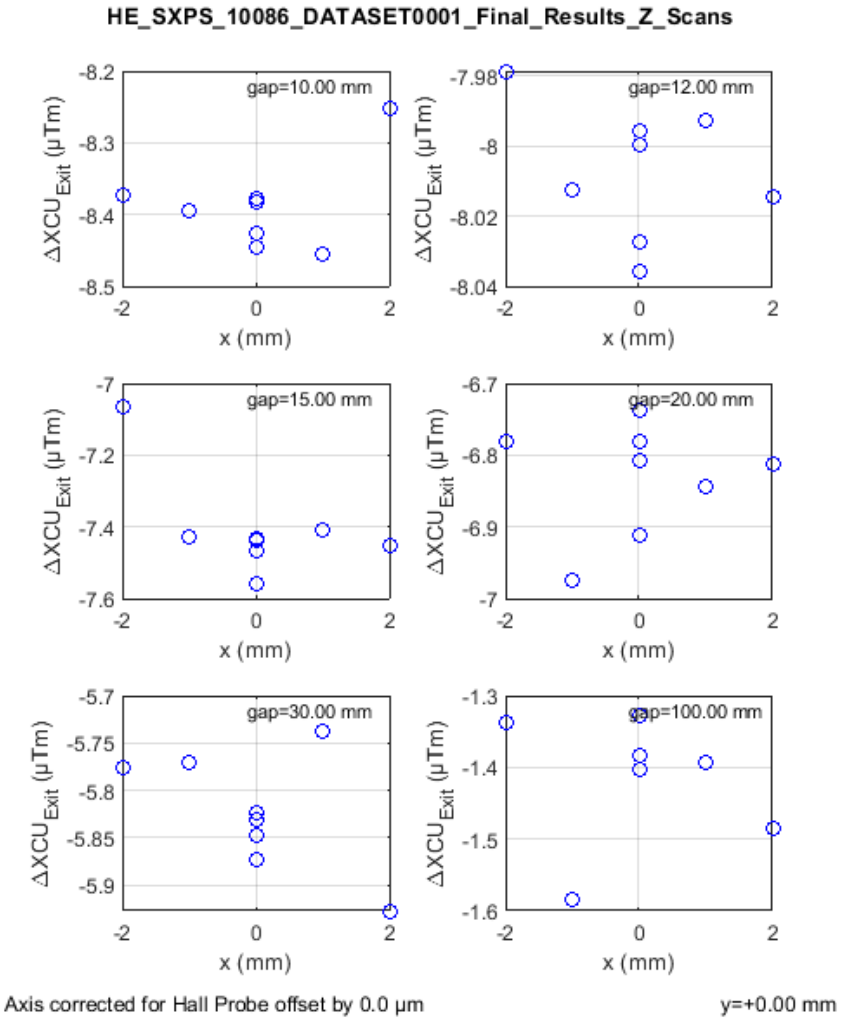
The figure shows the deviation of the phase integral, PI, value from the on-axis value, PI_0, as function of y at a number of operational gaps. [Documentary Information]

Estimated Upstream Horizontal Corrector Strength Requirement vs. x



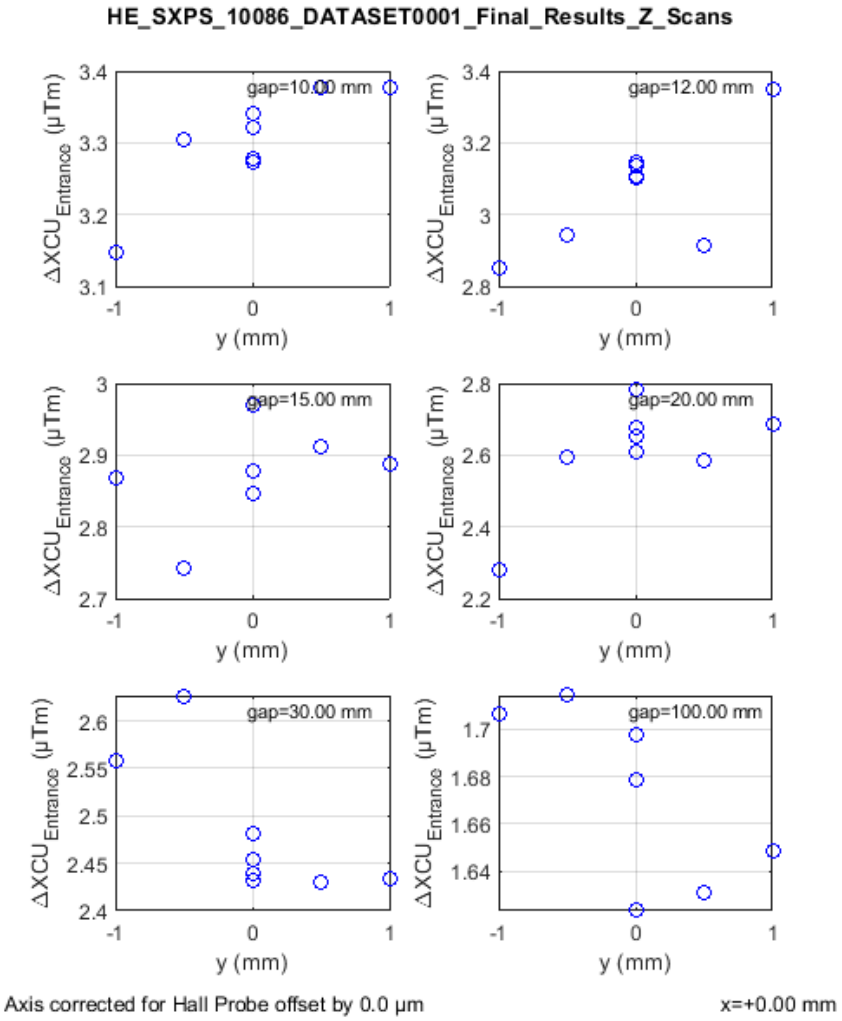
The figure shows the required strength of the upstream horizontal corrector to remove the second vertical phase shifter field integral at the downstream BPM for a number of phase shifter gaps. The analysis was done at a number of off-axis locations in the x-z plane. All values are very small.

Estimated Downstream Horizontal Corrector Strength Requirement vs. x



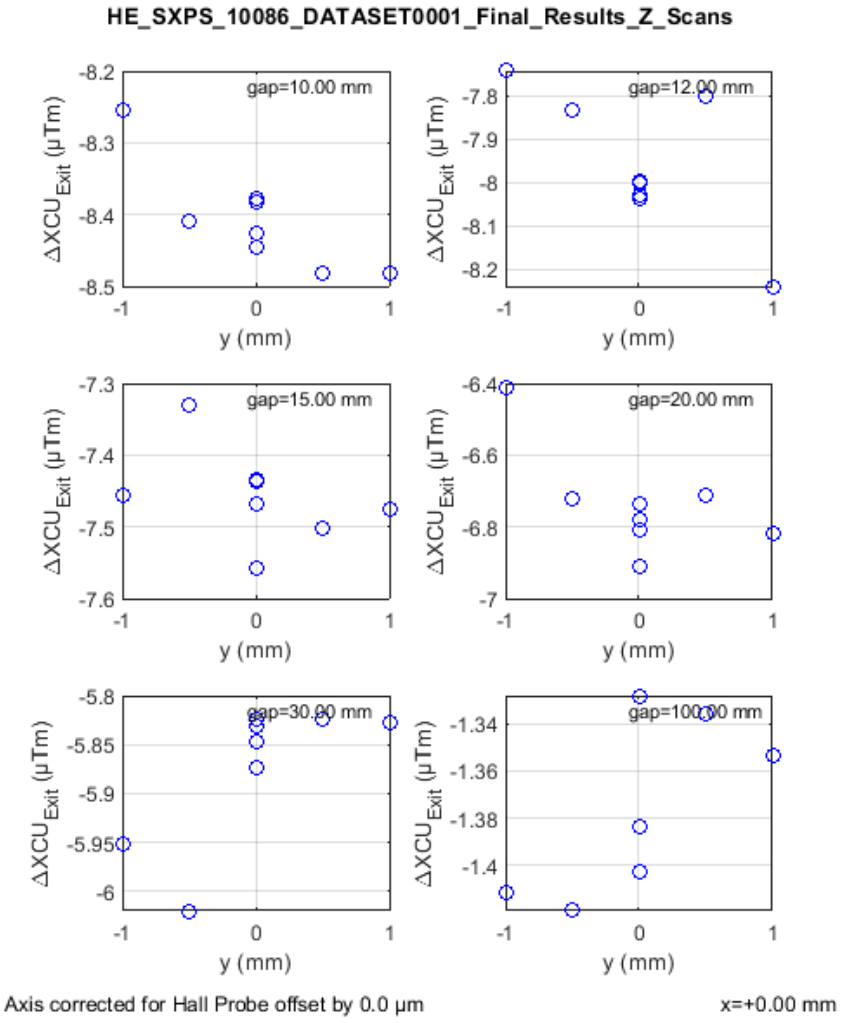
The figure shows the required strength of the downstream horizontal corrector to remove the first vertical phase shifter field integral and upstream corrector field integral at the downstream BPM for a number of operational phase shifter gaps. The analysis was done at a number of off-axis locations in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

Estimated Upstream Horizontal Corrector Strength Requirement vs. y



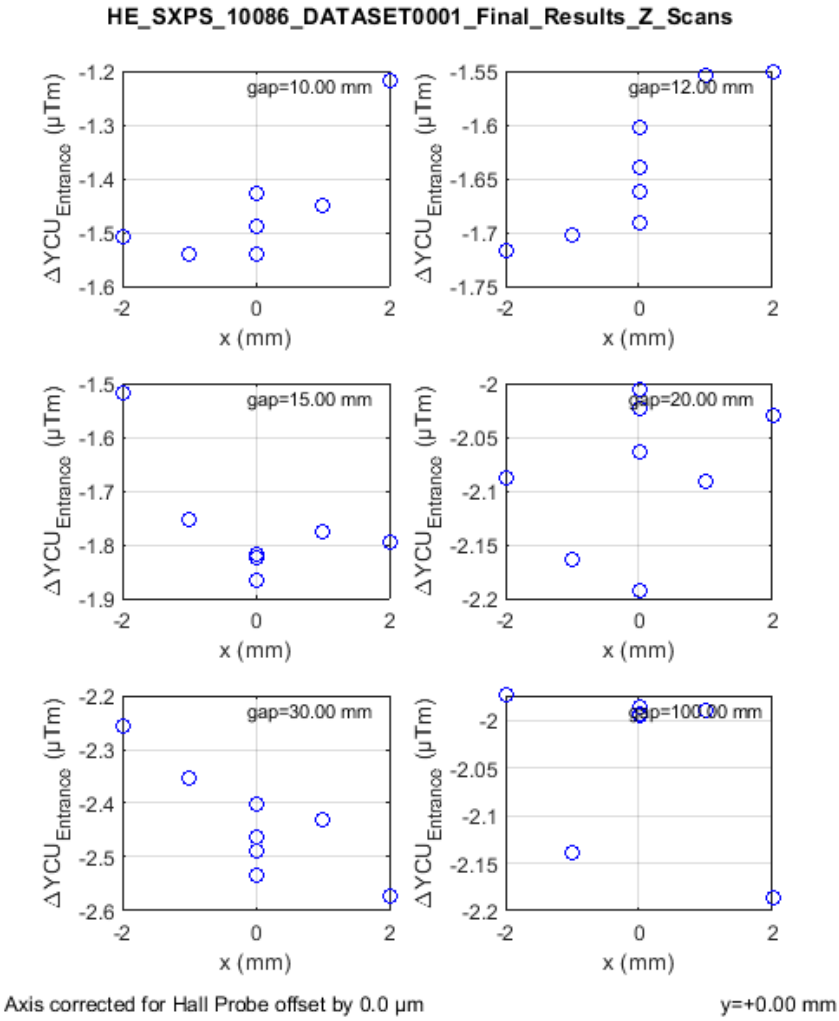
The figure shows the required strength of the upstream horizontal corrector to remove the second vertical phase shifter field integral at the downstream BPM for a number of operational phase shifter gaps. The analysis was done at a number of off-axis locations in the y-z plane. All values are very small.

Estimated Downstream Horizontal Corrector Strength Requirement vs. y



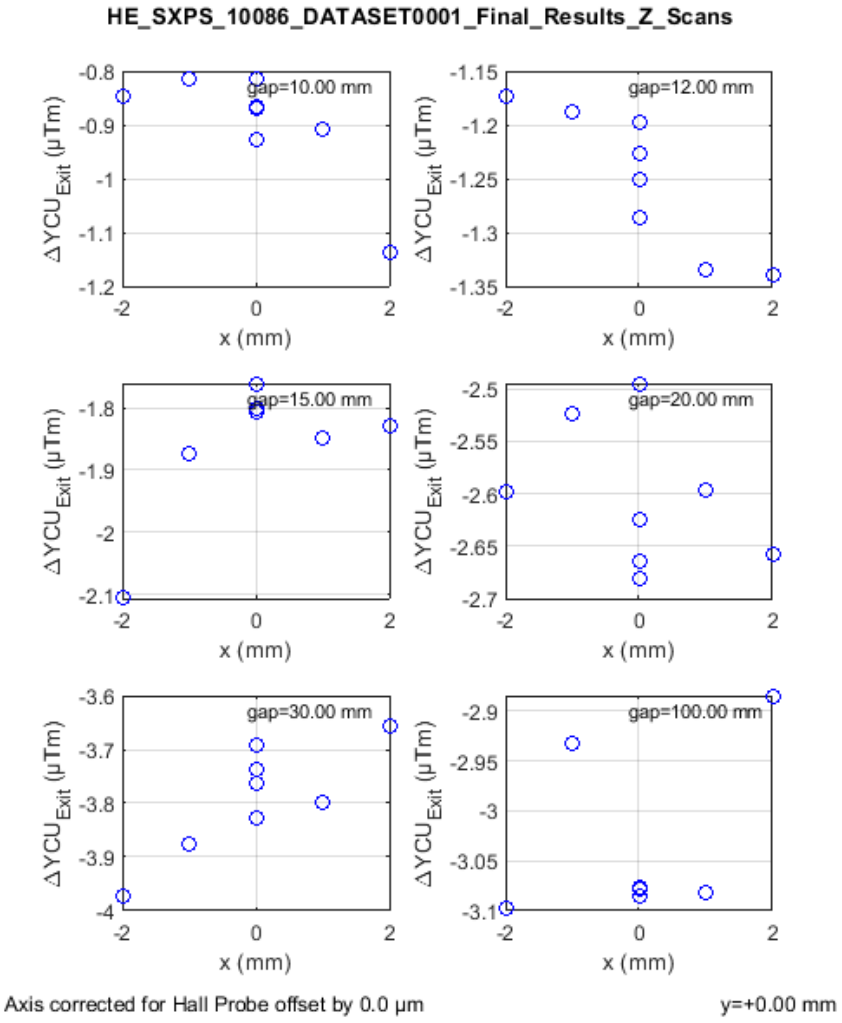
The figure shows the required strength of the upstream horizontal corrector to remove the first vertical phase shifter and upstream corrector field integral at the downstream BPM for a number of operational undulator gaps. The analysis was done at a number of off-axis locations in the y-z plane. All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

Estimated Upstream Vertical Corrector Strength Requirement vs. x



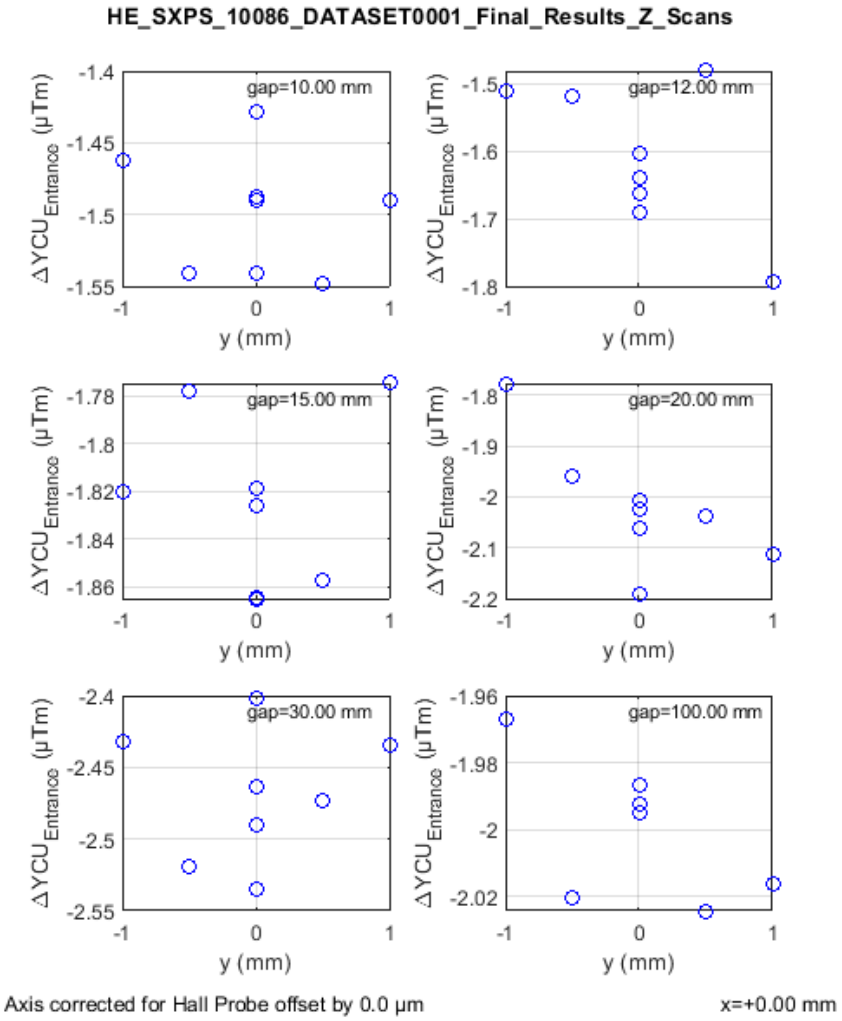
The figure shows the required strength of the upstream horizontal corrector to remove the second horizontal phase shifter field integral at the downstream BPM for a number of operational phase shifter gaps. The analysis was done at a number of off-axis locations in the x-z plane. All values are very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

Estimated Downstream Vertical Corrector Strength Requirement vs. x



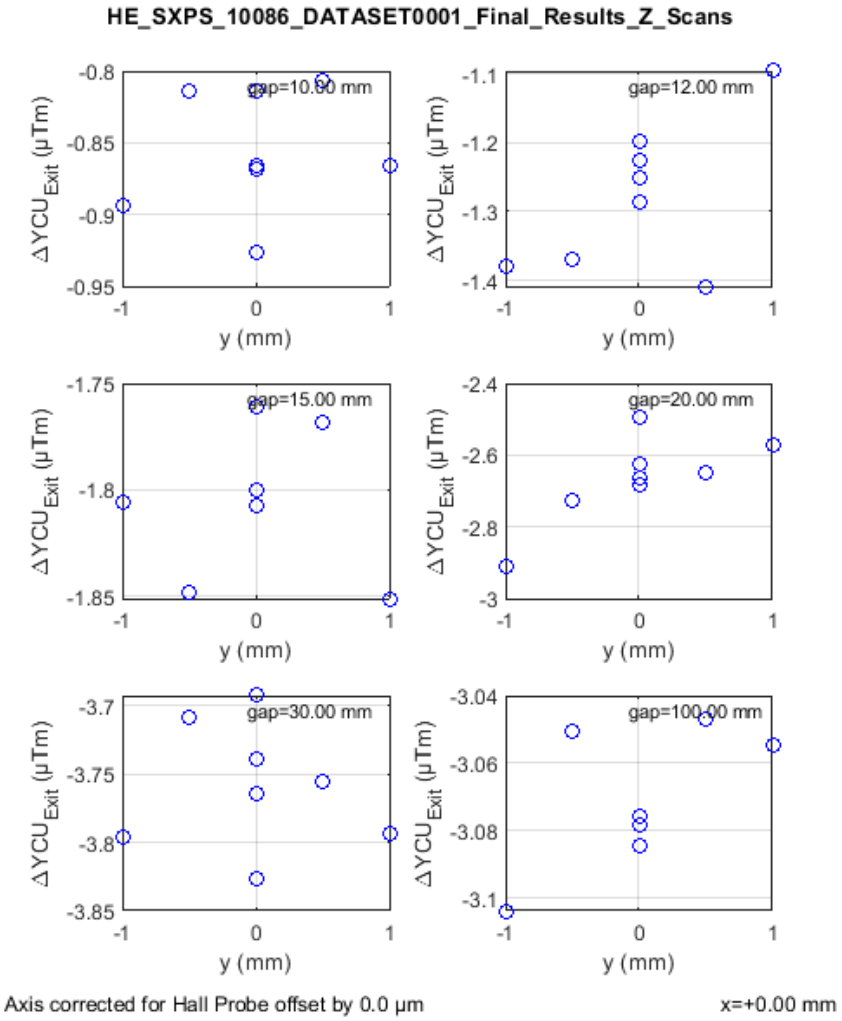
The figure shows the required strength of the downstream vertical corrector to remove the first horizontal phase shifter field integral and upstream corrector fields integral at the downstream BPM for a number of operational phase shifter gaps. The analysis was done at a number of off-axis locations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

Estimated Upstream Vertical Corrector Strength Requirement vs. y



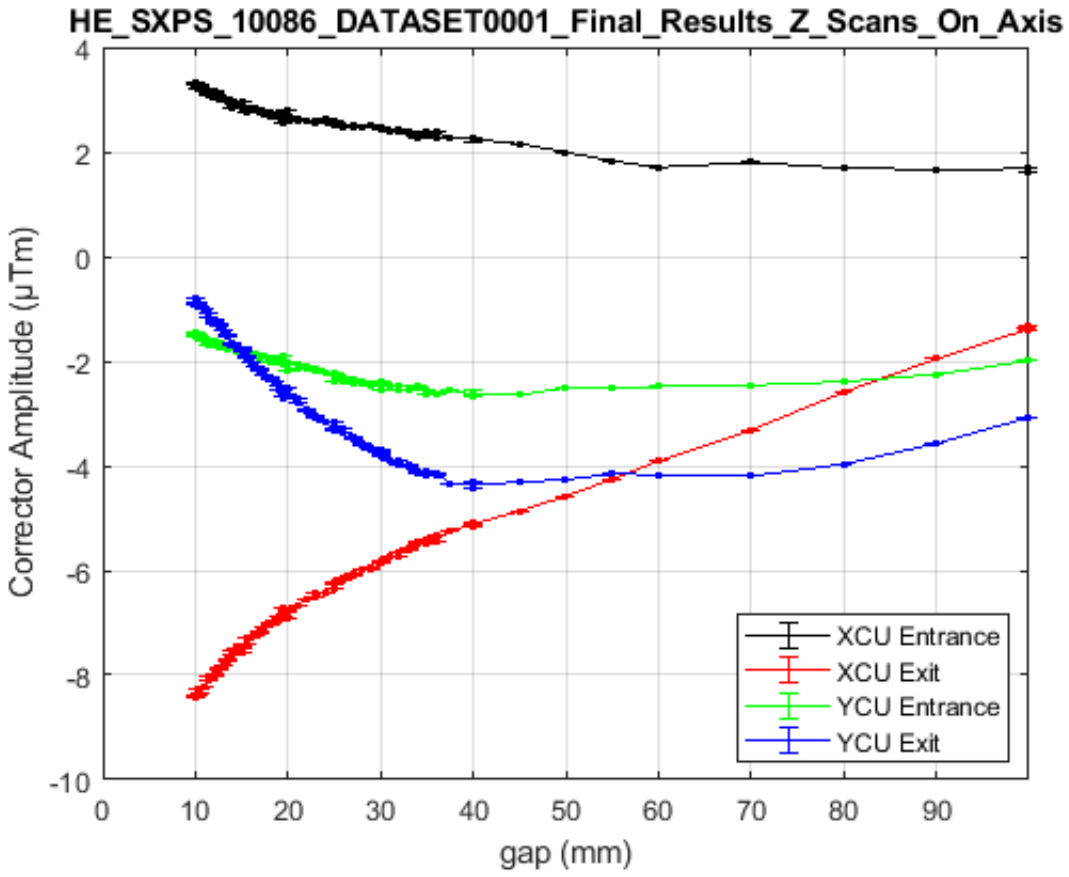
The figure shows the required strength of the upstream vertical corrector to remove the second horizontal phase shifter field integral at the downstream BPM for a number of operational phase shifter gaps. The analysis was done at a number of off-axis locations in the y-z plane. All values are very small.

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.

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.

Measurement Results are stored:

At V-Drive:

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

☐ _____

In Folder

☒ HE_SXPS_10086\DATASET0001\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

zscan.dat	exists
zscan.dat	exists
zscan.dat	exists
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zscan.dat	exists
zscan.dat	exists
zscan.dat	exists
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Sub folder: Z Scans\On Axis `exists`

zscan.dat	exists
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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

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

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

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

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

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

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

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_10086_fiducials.xlsx	exists

Sub folder: Controls Data `exists`

he_sxps_10086_i1x_vs_gap_spline.dat	exists
he_sxps_10086_i1y_vs_gap_spline.dat	exists
he_sxps_10086_i2x_vs_gap_spline.dat	exists
he_sxps_10086_i2y_vs_gap_spline.dat	exists

Finding	Solution

Approval and Assignment by Heinz-Dieter Nuhn

Data Storage Checked:	Y	
Magnet Accepted:	Y	
Assigned Location:	HE-SXPS-10086	

Heinz-Dieter Nuhn	Heinz-Dieter Nuhn	January 25, 2025
(Signature)	(Name)	(Date)