## **LCLS-II HXU Measurement Results**

This report is intended to document the results of HXU segment tuning at LBNL and ANL. It should be sent to SLAC for approval before the HXU segment gets shipped.

|  |  |
| --- | --- |
| Serial number from manufacturer’s label: |  |

**Measurement Procedure:**

The measurements have been carried out after the undulator segment had been fully tuned according to “LCLS-II Undulator Test Plan” (LCLS-TN-17-1).

**General Hall Probe Scan Evaluation Parameters**

|  |  |  |
| --- | --- | --- |
| Undulator Temperature | 20.000± 0.0?? | °C |
| First core pole # (count includes zero potential pole) | 8 |  |
| Last core pole # (count includes zero potential pole) | 253 |  |
| Tuning Gap (~~should be 9.000 mm~~) | 9.000 | mm |
|  |  |  |

**Evaluation of Hall Probe Scans at Commissioning Gap**

|  |  |  |
| --- | --- | --- |
| ~~Commissioning Gap~~ Temperature | 20.000± 0.0?? | °C |
| |Bpk|/<|Bpk|> - 1 | ±0.00?? |  |
| Keff ~~at Commissioning Gap~~ (should be 2.3400) | 2.3??? |  |
| ~~Commissioning~~ Gap | 7.94? | mm |
| I1X (over 4.012677 m) | ??? | µTm |
| I2X (over 4.012677 m) | ??? | µTm2 |
| I1Y (over 4.012677 m) | ??? | µTm |
| I2Y (over 4.012677 m) | ??? | µTm2 |
| Phase Shake (rms phase fluctuations over core poles) | ?.?~~?~~ | degXray |
| Cell Phase Advance (over 4.012677 m should be 46,440) | ~~46,440~~ (129×360+?) | degXray |
| Undulator Entrance Phase[[1]](#footnote-1) (3070) | ~~3070~~ (17×180+?) | degXray |
| Undulator Exit Phase[[2]](#footnote-2) (3070) | ~~3070~~ (17×180+?) | degXray |

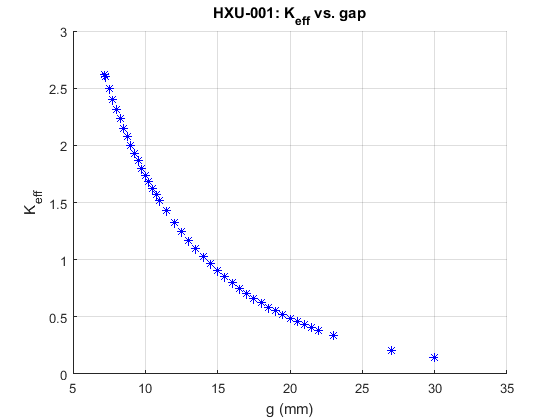
**Undulator Encoder Settings**

|  |  |
| --- | --- |
| USGapEncoderOffset | 66615.80175 |
| DSGapEncoderOffset | -4272.71215 |
| USWLinearEncoder.AOFF | 88.97560 |
| DSWLinearEncoder.AOFF | 87.63570 |
| USALinearEncoder.AOFF | 89.03510 |
| DSALinearEncoder.AOFF | 88.26310 |

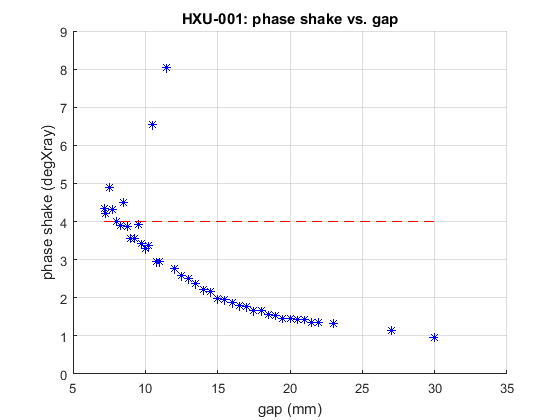
**Undulator Load Cell Readings**

|  |  |
| --- | --- |
| LC\_DAL\_FORCE | -233.73318 |
| LC\_DAU\_FORCE | -376.29268 |
| LC\_DWL\_FORCE | -366.14321 |
| LC\_DWU\_FORCE | -362.12902 |
| LC\_UAL\_FORCE | -173.47990 |
| LC\_UAU\_FORCE | -245.46871 |
| LC\_UWL\_FORCE | -475.50163 |
| LC\_UWU\_FORCE | -291.33711 |

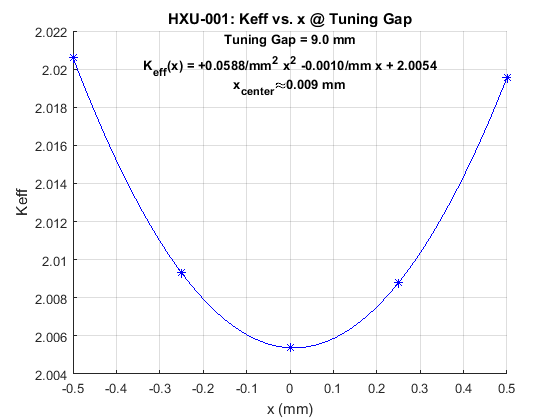
**Evaluation of Hall Probe Scans: *Keff* vs *gap***



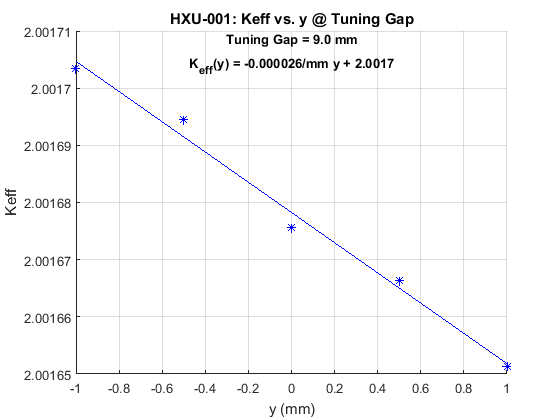
**Evaluation of Hall Probe: Phase Shake vs. gap**



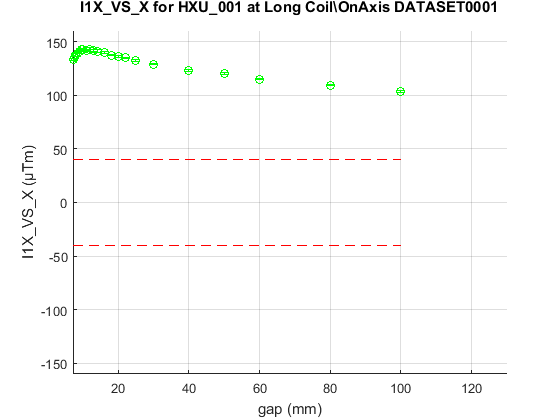
**Evaluation of Hall Probe: *Keff* vs *x* at Tuning Gap**



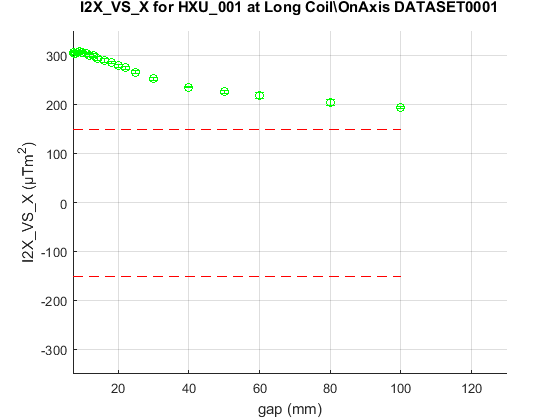
**Evaluation of Hall Probe: *Keff* vs *y* at Tuning Gap**



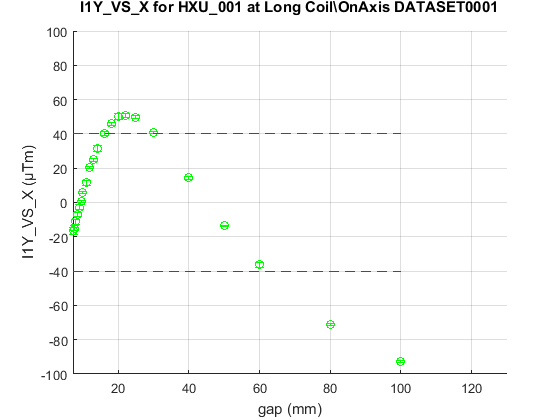
**Long Coil Measurement of the On-Axis First Horizontal Field Integrals**



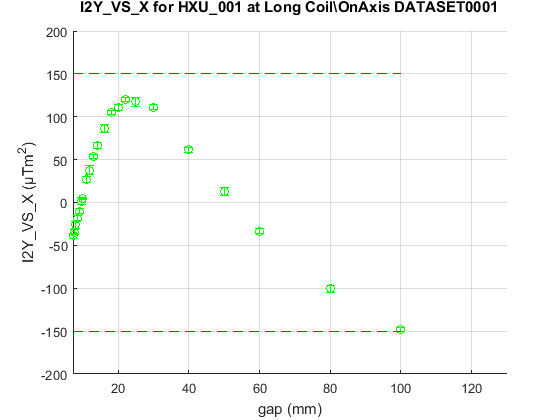
**Long Coil Measurement of the On-Axis Second Horizontal Field Integrals**



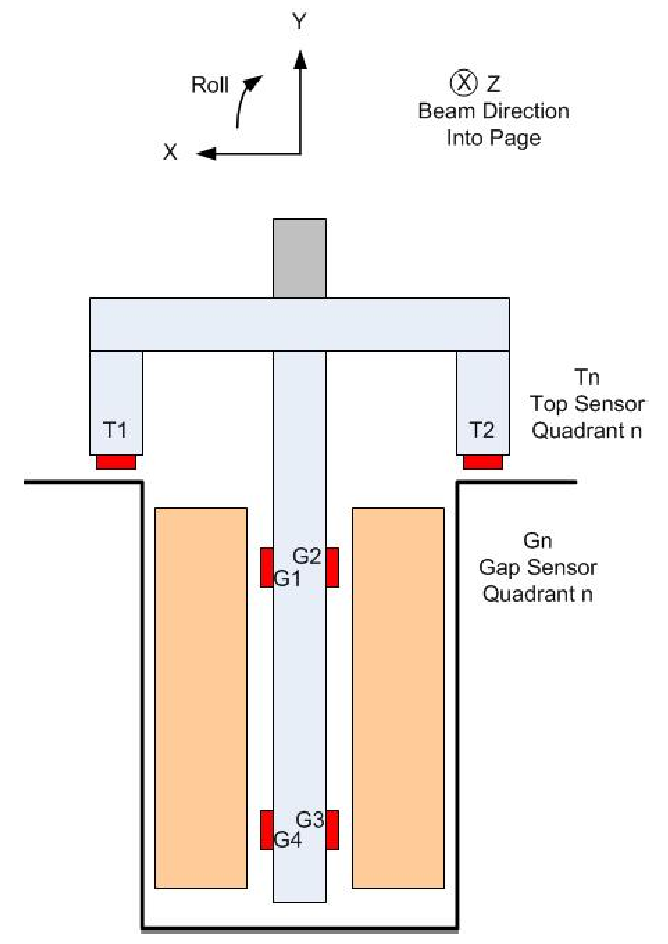
**Long Coil Measurement of the On-Axis First Vertical Field Integrals**



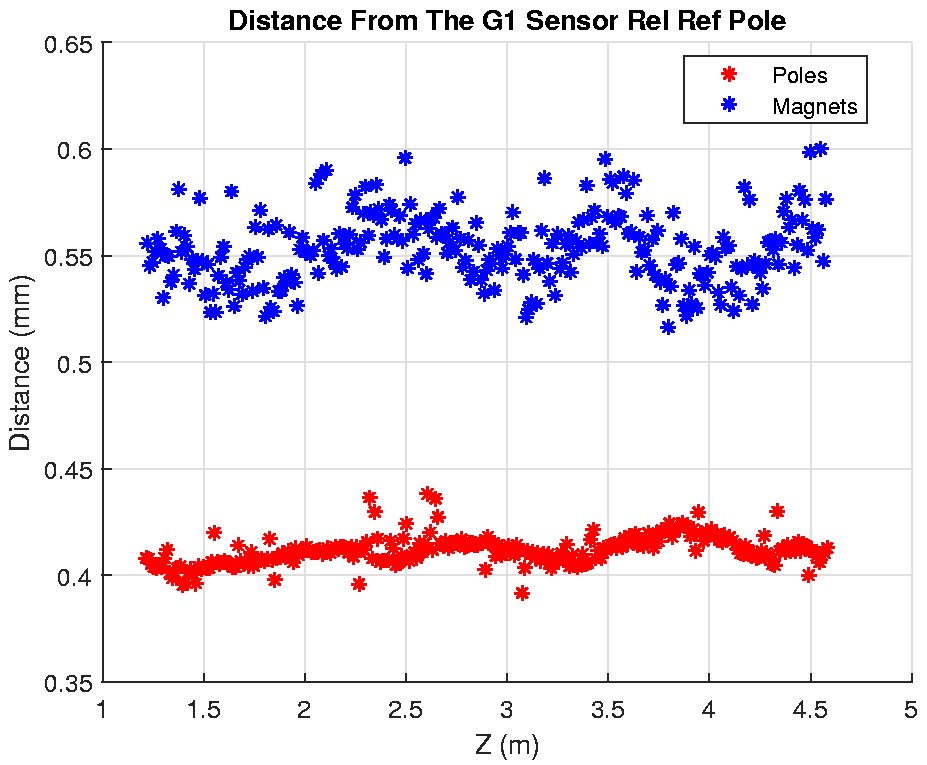
**Long Coil Measurement of the On-Axis Second Vertical Field Integrals**



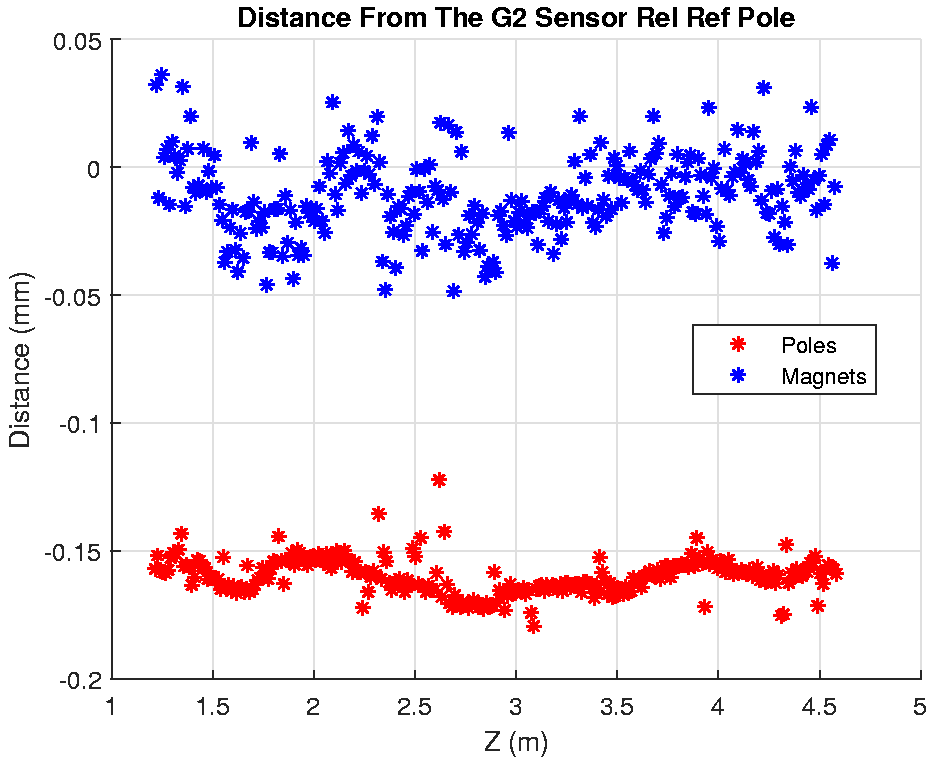
**Capacitive Sensor Arrangement**



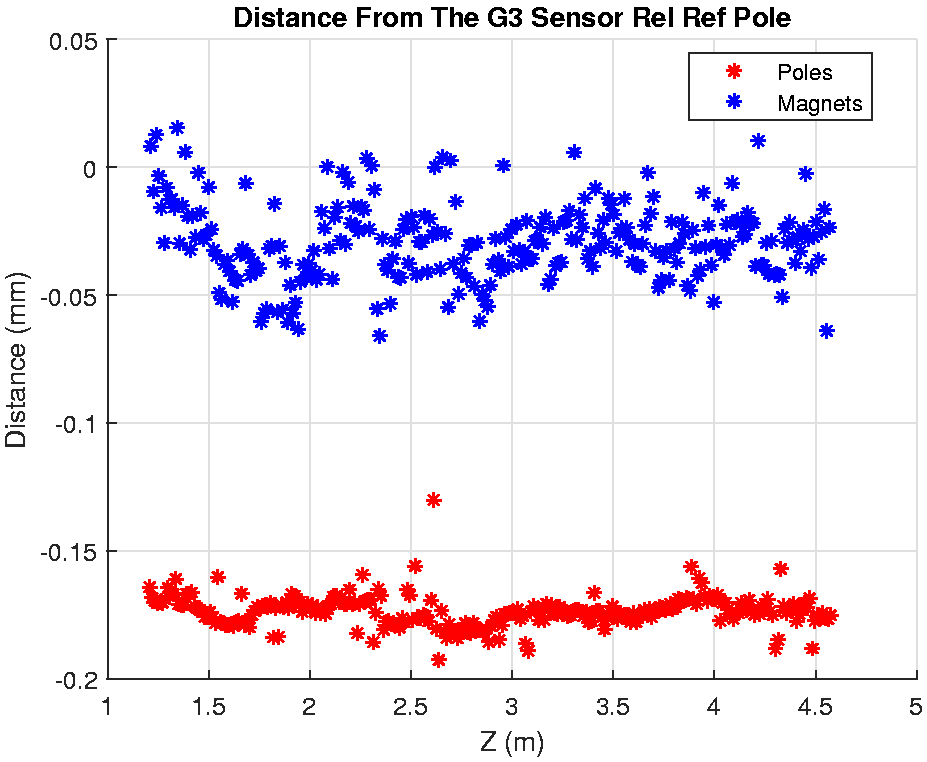
**G1 Capacitive Sensor Readings**



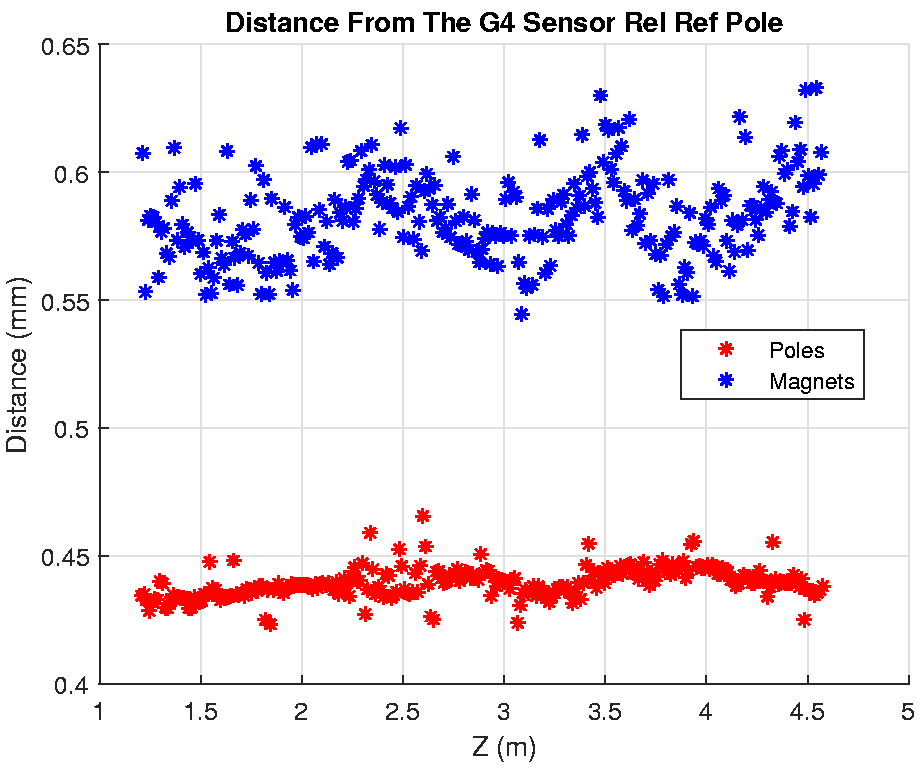
**G2 Capacitive Sensor Readings**



**G3 Capacitive Sensor Readings**



**G4 Capacitive Sensor Readings**



1. Phase advance from cell start (undulator center – ~~2.0296339~~ 4.0127677/2 = 2.006384 m ) to center of physical pole 8. [↑](#footnote-ref-1)
2. Phase advance from physical pole 253 to cell end (undulator center + ~~2.0296339~~ 2.006384 m ). [↑](#footnote-ref-2)