

LCLS II Undulator Quadrupole Fiducialization Report



Inspector : K. Caban
Engineer : S. Anderson
Drawing No. : SA-381-012-00 R00
Barcode # : 4270
Mfg. S/N : 073
SLAC PC# : 104007

Coordinate System Setup

Spatial Alignment

The Spatial Alignment of the magnet is created through a composite best-fit of the pole tips. Each pole tip scanned .150 inch inboard from the upstream magnet face and the downstream magnet face. A composite best-fit of the upstream poles and the downstream poles is made with the nominal pole tip shape and location. An axis is created through the two best-fit centerpoints. This axis is the spatial alignment of the magnet and defines the Z axis.

Planar Alignment

The Planar Alignment of the magnet is created by averaging the rotations of the composite best-fits of the upstream pole tips and downstream pole tips. This direction defines the Y and X directions of the magnet.

Coordinate Origins

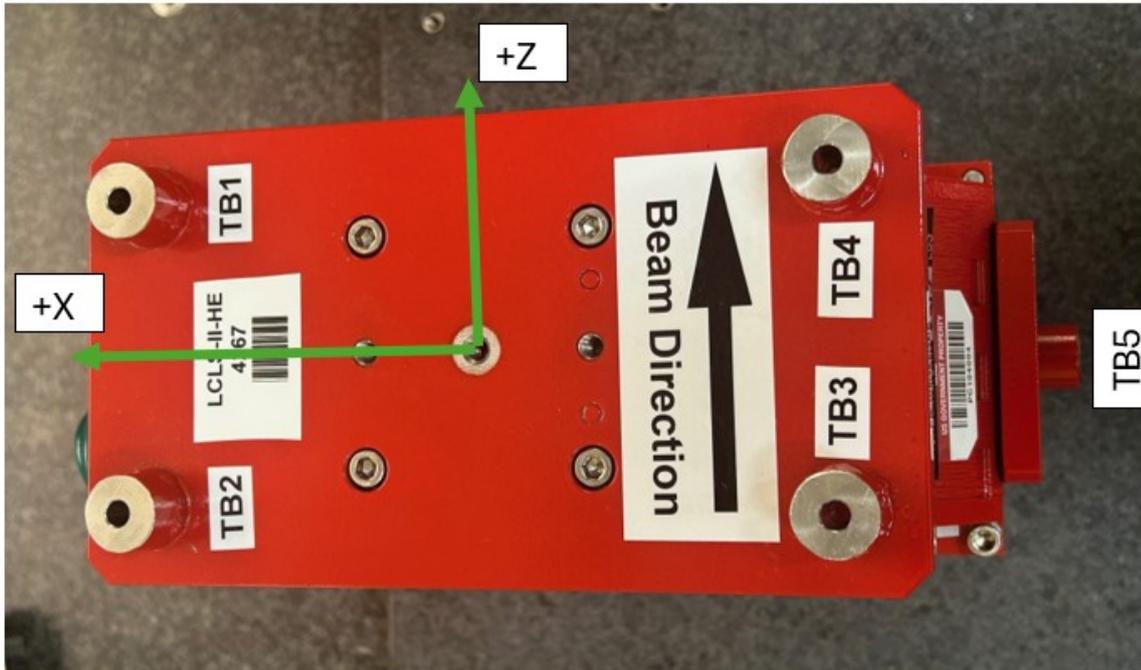
The origins of the magnet coordinate system are as follows. The XY origin lies on the axis of spatial alignment. The Z origin is the intersection of the mid-plane between the upstream and downstream magnet faces and the Z axis.

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Tooling Ball Locations

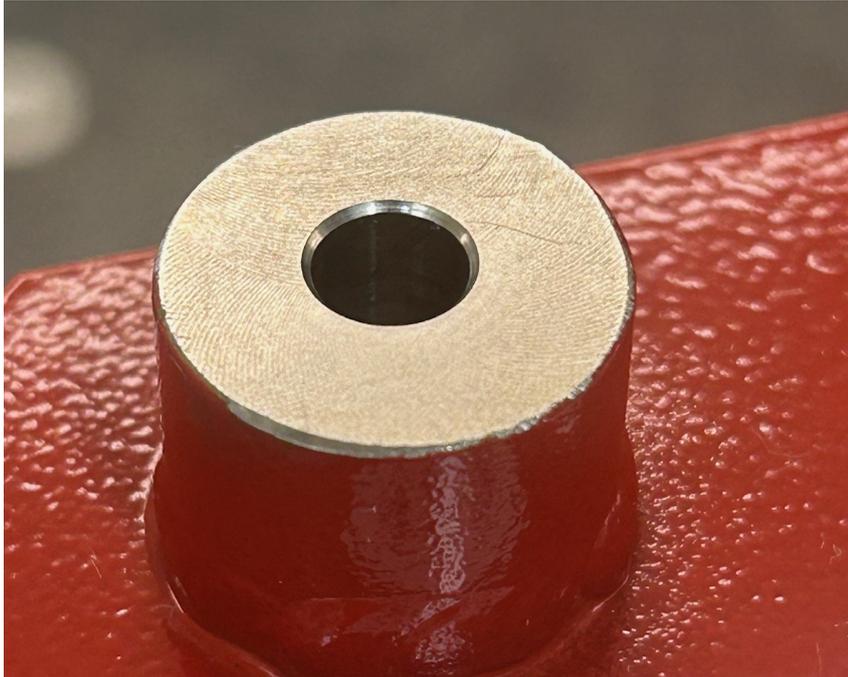


Tooling Ball	X Coord.	Y Coord.	Z Coord.
TB 1	3.36021	6.81523	1.53220
TB 2	3.39892	6.81518	-1.46693
TB 3	-3.34807	6.81731	-1.55286
TB 4	-3.38680	6.81629	1.44653
TB 5	-6.58558	0.10920	-0.01897
TB A	3.36031	6.12773	1.53269
TB B	3.39915	6.12768	-1.46670
TB C	-3.34858	6.12981	-1.55290
TB D	-3.38721	6.12879	1.44672
TB E	-5.89808	0.10905	-0.01870

Tooling Ball Locations (1-5) are 1 inch above Tooling Ball Adapter Plane
 Tooling Ball Locations (A-E) are 5/16 inch above Tooling Ball Adapter Plane
 Dimensions in Inch

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Tooling Ball Adapter Info

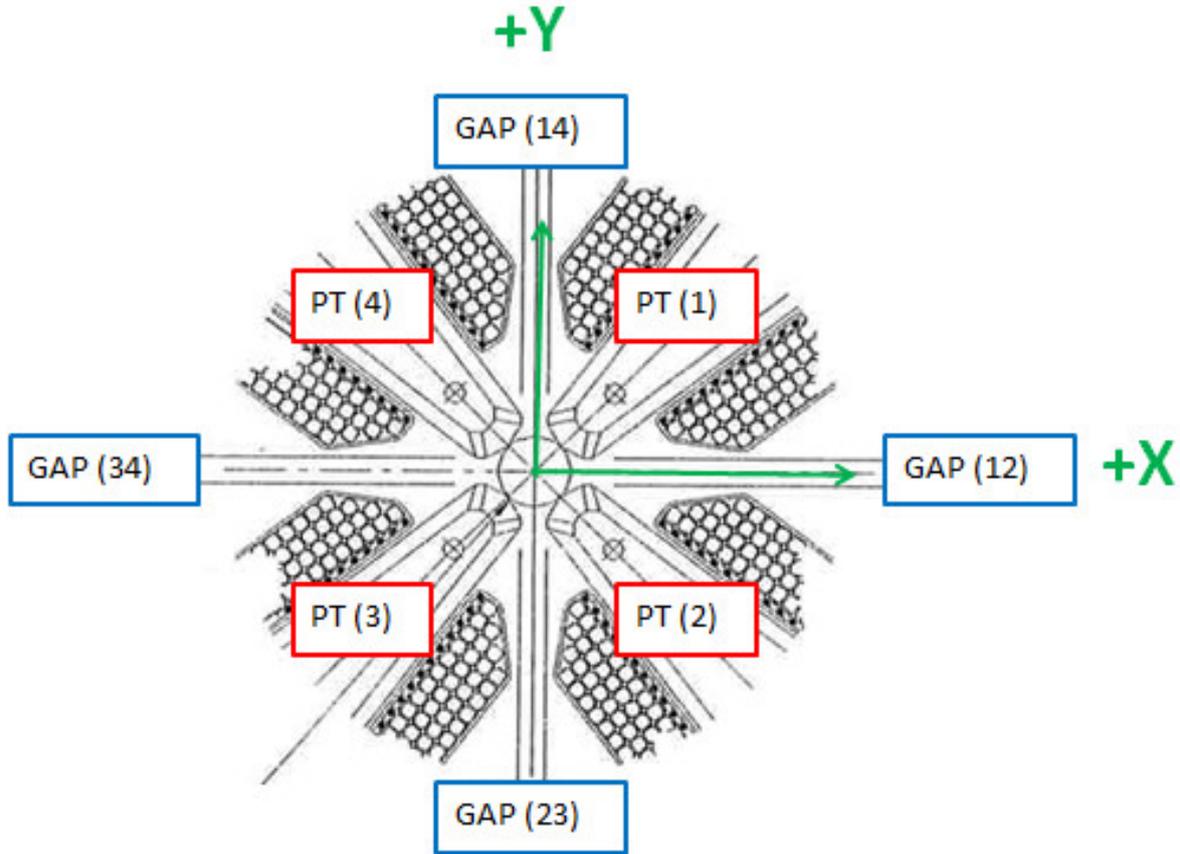


Tooling Ball	Form	Dia. 0.2501 - 0.2504	Perpendicularity
TB 1	0.00017	0.25005	0.00041
TB 2	0.00011	0.25011	0.00043
TB 3	0.00009	0.25032	0.00037
TB 4	0.0001	0.25032	0.00033
TB 5	0.00015	0.25037	0.00026

Dimensions in Inch

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Pole Tip Gap Measurements

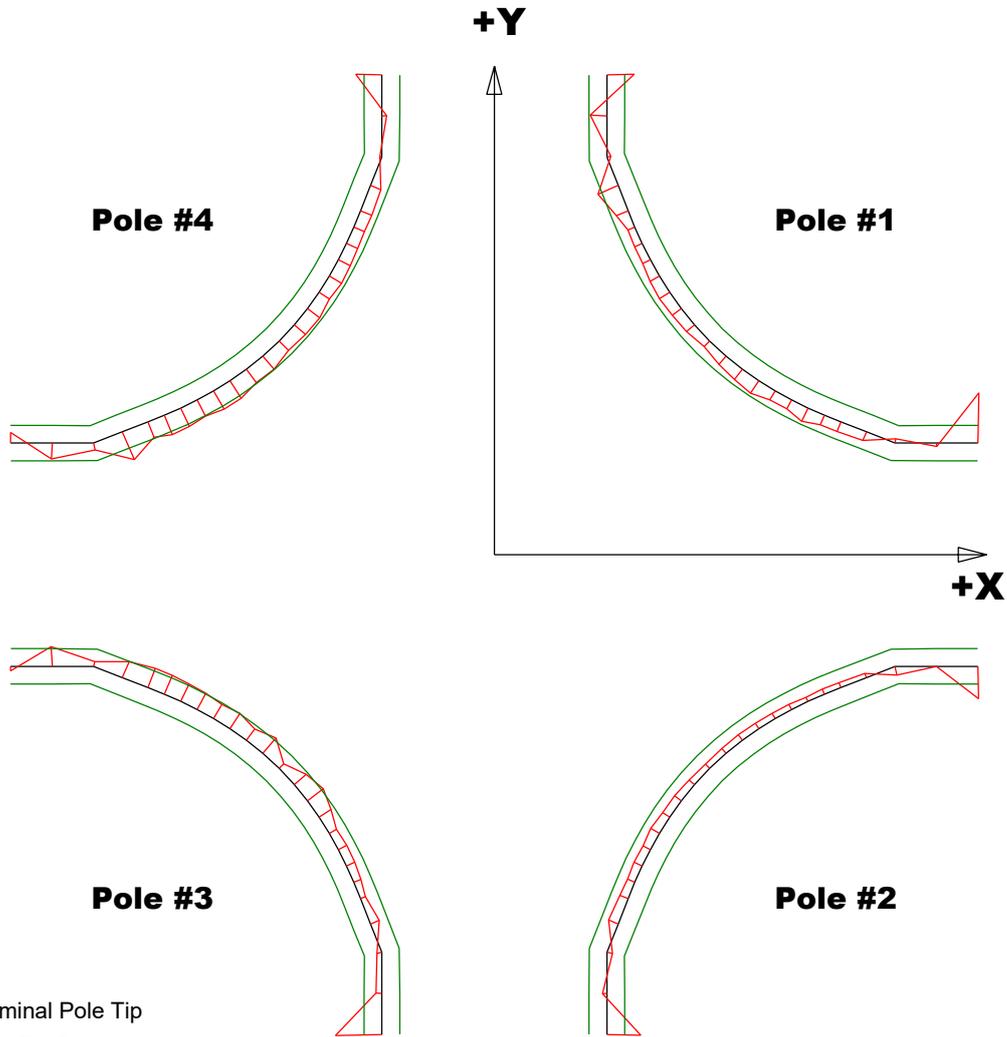


	Nominal Distance	Downstream Pole End	Upstream Pole End
Pole Tip Distance 1-3	0.433 ± .002	0.4319	0.43209
Pole Tip Distance 2-4	0.433 ± .002	0.43192	0.4313
Gap 1-2	0.159 ± .002	0.15969	0.15947
Gap 2-3	0.159 ± .002	0.15937	0.15851
Gap 3-4	0.159 ± .002	0.15786	0.15961
Gap 4-1	0.159 ± .002	0.15861	0.15789

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Dimensions in Inch

Composite Best-fit of Pole Tips, Downstream



Black = Nominal Pole Tip
 Red = Pole Tip Deviations
 Green = +/- .001 Tolerance

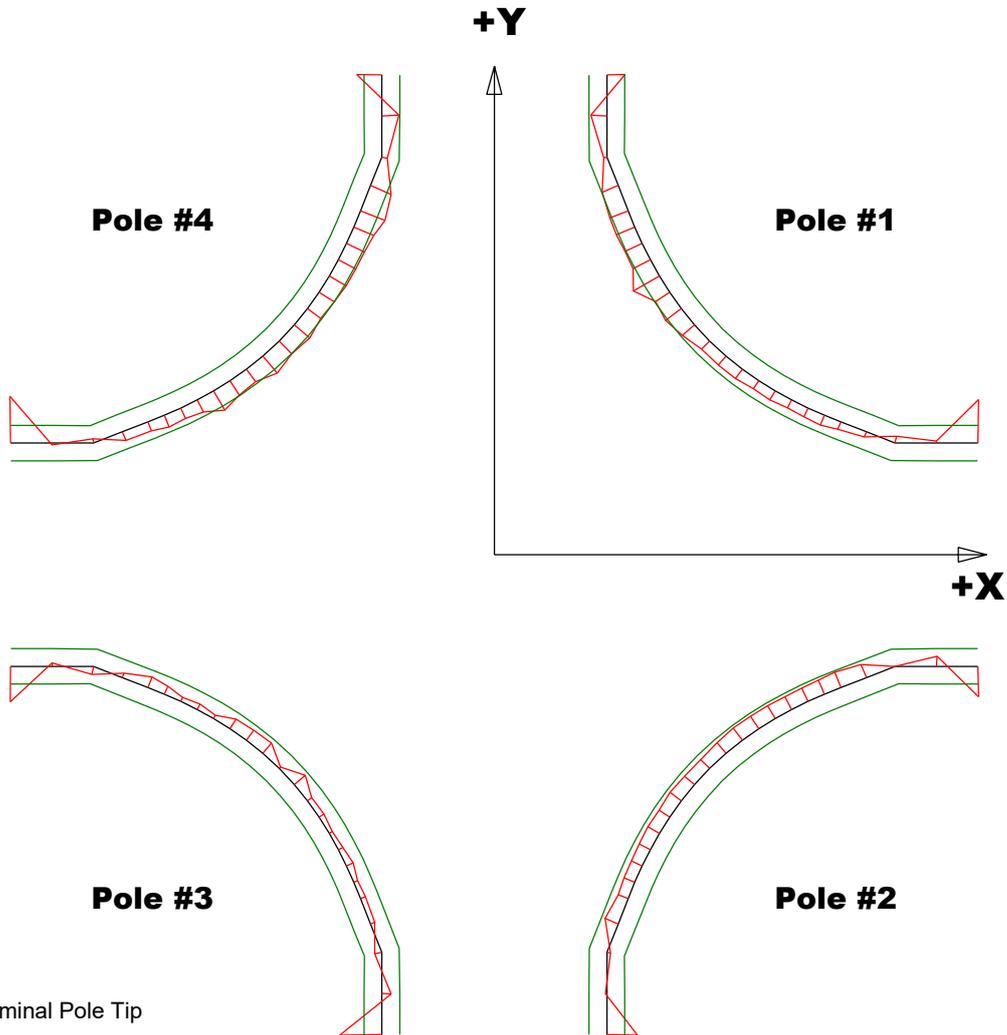
Dimensions in Inch

Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00283	-0.0019	-0.00259	-0.00146
Max. Dev.	0.00123	0.00058	0.00116	0.00169

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Composite Best-fit of Pole Tips, Upstream



Black = Nominal Pole Tip
 Red = Pole Tip Deviations
 Green = +/- .001 Tolerance

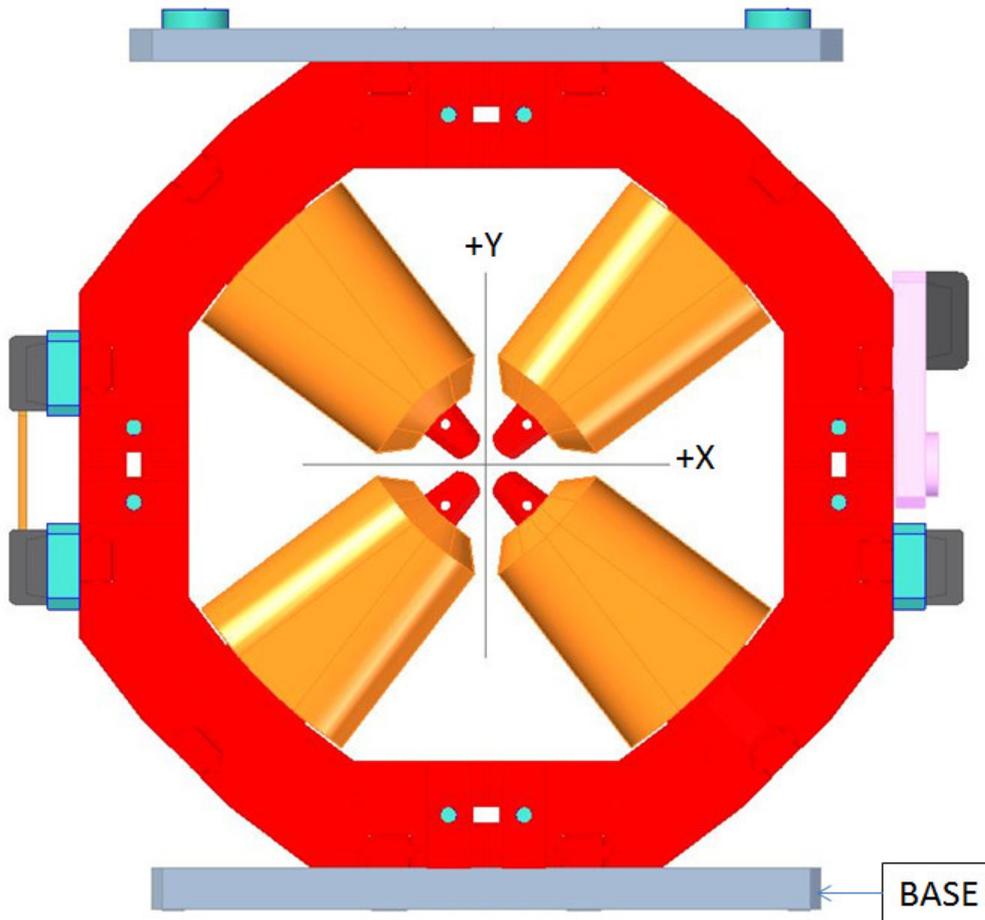
Dimensions in Inch

Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00245	-0.00173	-0.00236	-0.00264
Max. Dev.	0.00169	0.00094	0.00082	0.00147

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Angle of the Composite Pole Tip Best-Fit In Relation to Base



Angle in Decimal Degrees ° :0.02080

Angle in Milliradians :0.36311

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