

LCSim geometry

Sho Uemura

SLAC

Coordinate systems: beamline vs. LCSim

- $y = 0$ is beam plane
- $z = 0$ is front lip of magnet
- Only disagreement is in $x = 0$ reference
 - ▶ Beamline people use either beam-without-chicane or magnet center line as $x = 0$ reference
 - ▶ I use beam spot on target as $(0, 0, 0)$; magnet center line is $x = 21.17$ mm

Electron beam positions at various locations in the system calculated using the mapped magnetic field are:

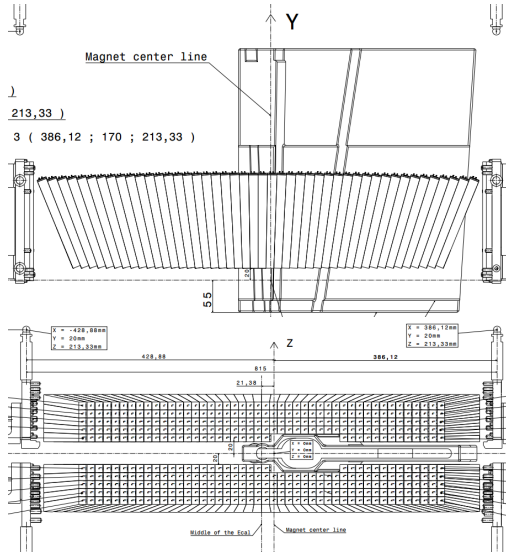
Name	Z Pos	X Pos	Local Z pos	Local X pos
A1 - 110	-314.2 mm	55.71 mm		-32.78 mm
A2 - 111	-100 mm	64.14 mm		-24.34 mm
B1 - 10 Target (+2 mm)	2 mm	67.37 mm		-21.12 mm
A3 - 112 Silicon 1	+100 mm	69.64 mm	-400 mm	-18.84 mm
A4 - 113 Silicon 2	+200 mm	71.48 mm	-300 mm	-17.1 mm
A5 - 114 Silicon 3	+300 mm	72.63 mm	-200 mm	-15.86 mm
A6 - 115 Silicon 4	+500 mm	73.22 mm	0 mm	-15.26 mm
A7 - 116 Silicon 5	+700 mm	71.10 mm	+200 mm	-17.38 mm
A8 - 117 Magnet Exit	+900.1 mm	66.29 mm	+400 mm	-22.20 mm
B3 - 12 Ecal Entry	1319 mm	50.64 mm		-37.84 mm
B4 - 13 Ecal Middle	1549 mm	41.54 mm	-135 mm	-45.27 mm

For the photons this is:

Name	Z Pos	X Pos	Local Z pos	Local X pos
A1 - 110	-314.2 mm	-		
A2 - 111	-100 mm	-		
B1 - 10 Target	0 mm	-		
A3 - 112 Silicon 1	+100 mm	70.36 mm	-400 mm	-18.12 mm
A4 - 113 Silicon 2	+200 mm	73.42 mm	-300 mm	-15.07 mm
A5 - 114 Silicon 3	+300 mm	76.47 mm	-200 mm	-12.02 mm
A6 - 115 Silicon 4	+500 mm	82.58 mm	0 mm	-5.91 mm
A7 - 116 Silicon 5	+700 mm	88.68 mm	+200 mm	0.194 mm
A8 - 117 Magnet exit	+900.1 mm	94.79 mm	+400 mm	6.303 mm
B3 - 12 Ecal Entry	1319 mm	107.6 mm		19.10 mm
B4 - 13 Ecal Middle	1549 mm	114.6 mm	-135 mm	26.11 mm

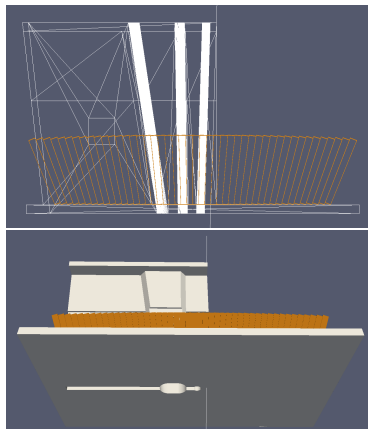
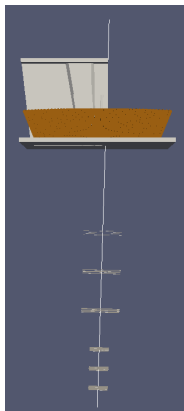
Sources

- From drawings and surveys
 - ▶ Front face of ECal is 55 mm from rear face of flange
 - ▶ ECal center line is 21.38 mm from magnet center line ($x = 42.55$)
 - ▶ Flange x offset not quite clear, but photon beam should go through hole
 - ▶ z relative to magnet: 4 mm difference between plan and survey
- From beamline sim (see previous slide): photon beam angle 30.52 mrad



Previous geometry

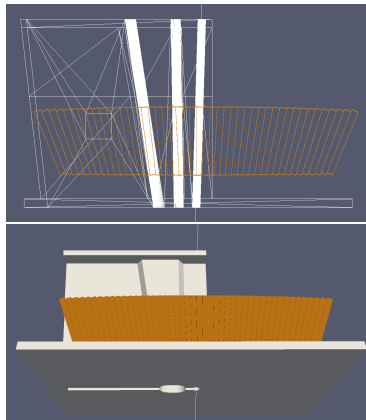
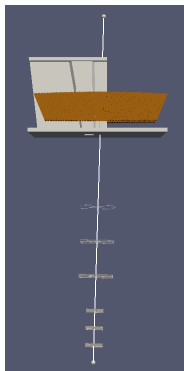
- All electron-run geometries until last week:
 - ▶ Front face of ECal flange at $z = 1350$ mm
 - ▶ Flange not aligned with photon beam
 - ▶ Front face of ECal crystals at $z = 1370$ mm (flush against flange)
 - ▶ ECal symmetric around z-axis



New geometry (HPS-Proposal2014-v3)

- New electron-run geometry:

- ▶ Front face of ECal flange at $z = 1318$ mm
- ▶ Flange photon hole aligned with photon beam
- ▶ Front face of ECal crystals at $z = 1393$ mm (55 mm gap from flange)
- ▶ ECal aligned so the photon beam intersects centerline of ECal at its front face ($x = 42.53$ mm)



New flange model

- Current electron flange model is a tessellated solid exported from CAD model—inefficient in Geant4 (but not a huge deal)
- UNH produced a model for electron flange using Geant4 primitives a while back
- Unless someone wants to do it, no plans to incorporate this in LCSim geometry

