sidmay05

NOTICE
This detector has been superseded by the sidaug05 detector, which contains improved modeling of the tracker support and readout materials as well as a definition of the far forward machine-detector interface for the 2 milliradian crossing angle.

This is the version of the Silicon Detector modelled as of May 31, 2005.
The compact description of this detector in xml format can be found at http://www.lcsim.org/detectors/sidmay05.zip . What follows is a plain text description of the file compact.xml found in this zip file.

The tracking region is defined to be a cylinder with radius 125.5cm and z extent +/- 167.9cm.

Beampipe:

The beampipe is composed of three sections: a cylindrical central tube and forward and backward conical sections.
The central tube has an inner radius of 1.2cm and a z extent of +/- 6.251cm and is made of .025cm thick Beryllium.
The conical sections are 1mm thick Beryllium and flare from 1.2cm inner radius at 6.25cm to 8.13cm at the edge of the tracking region.
The central tube has a titanium inner liner .005cm thick.

Vertex Detector:

The vertex detector is composed of a central barrel system with five layers and forward systems composed of four disks.

The barrels are all 12.5cm long and are composed of .01cm Silicon, of which the outer .002 is sensitive.
The inner radii of the layers are:

1.4, 2.6, 3.7, 4.8, 6.0

There are four forward disks on either end, composed of a total of .03cm of silicon, of which the inner .002 is sensitive. All of the disks extend to a maximum radius of 7.0cm. The z positions and inner radii for the four disks are:

z	inner radius
7.0cm	1.4cm
9.5cm	1.6cm
12.0 cm	1.8cm
17.0 cm	2.0cm

The vertex detector is supported by a Beryllium cage and surrounded by a foam cryostat.

The barrel support is a cylinder 0f 0.1cm Beryllium with inner radius 7.0cm and z extent +/- 6.5cm.
The endplate supports are disks of 0.5cm Beryllium with inner radius 1.5cm, outer radius 7.0cm and inner z of 6.5cm.

The barrel cryostat is a cylinder 0f 1.5cm PolystyreneFoam with inner radius 11.2cm and z extent +/- 23.0cm.
The endplate cryostats are disks of 3.0cm PolystyreneFoam with inner radius 2.3cm, outer radius 11.2cm and inner z of 20.0cm.

Tracker:

The tracker is composed of five barrels with five endplates. The z extent of the barrels increases with radius.
The sensitive medium is silicon, supported with CarbonFiber/Rohacell/Carbonfiber barrels or disks.

Barrels:

For the barrels, the support tubes are composed of .025cm CarbonFiber, 1.3cm of Rohacell31 and 0.25cm CarbonFiber.
The sensitive medium is .03cm of silicon mounted on the outer radius of the support cylinders.
The inner radii and z extent of the cylindrical layers are:

z	inner radius
26.67	18.635
61.67	44.885
96.67	71.135

131.67	97.385
164.90	123.635

Endcap:

The forward disk supports are composed of .039cm CarbonFiber, 2.5cm Rohacell31 and 0.039cm of CarbonFiber.
The sensitive medium is 0.3cm of silicon and is consists of a back-to-back double layer for stereo readout.
These are mounted on the inner side of the support disks.

z	inner radius	outer radius
27.1	4.0	20.5
62.1	7.9	46.75
97.1	11.7	73.0
132.1	15.6	99.25
164.94	19.5	125.5

Calorimeters:

Electromagnetic Calorimeter:

This element sets the basic size and aspect ratio for the rest of the detector. The inner radius for the barrel is 127cm. The aspect ratio is set to cos(theta) =0.8, meaning the inner z of the endcap EM calorimeter is at z of 168cm.

The EM calorimeter is a sampling calorimeter composed of 30 layers of

material	thickness
Tungsten	.250cm
G10	.068cm
Silicon	.032cm
Air	.025cm

The endcap plug sits inside the barrel cylinder, so the barrel z extent is +/- 179.5cm.
The endcap starts at an inner radius of 20cm and extends out to 125cm.

Hadron calorimeter:

The hadron calorimeter is a sampling calorimeter composed of 34 layers of

material	thickness
Steel	2.0cm
G10	0.3cm
PyrexGlass	0.11cm
RPCGas	0.12cm
PyrexGlass	0.11cm
Air	0.16cm

It begins immediately outside of the EM calorimeters, with the endcap plug sitting inside the barrel.

The barrel inner radius is 138.5 with a z extent of +/- 277cm.
The endcap extends from an inner radius of 20.0 cm to an outer radius of 138.25, inner z of 179.5

Solenoid:

The solenoid is modelled as a cylinder with an inner radius of 250cm. This is larger than the outer radius of the hadron calorimeter since we will not be building a cylindrical detector, but a polygonal one (current thinking is octagonal). The barrel composition is as follows:

material	thickness	z

Steel	6.0cm	271.0cm
Air	8.5cm	271.0cm
Aluminum	39.3cm	262.5cm
Steel	6.0cm	262.5cm
Air	20.0cm	271.0cm
Steel	3.0cm	271.0cm

This is capped with disk endplates of 6cm steel from r=250cm to 332.8cm

Muon System:

The muon system is implemented as a sampling calorimeter composed of 48 layers of:

material	thickness
Iron	5.0cm
G10	0.3cm
PyrexGlass	0.11cm
RPCGas	0.12cm
PyrexGlass	0.11cm
Air	0.86cm

The barrel inner radius is 333.0cm with z extent of +/- 277cm.
The endcap sits outside the barrel at an inner z of 277.5cm and radius from 20.0cm to 645.0cm

The field is solenoidal, constant 5 Tesla along z up to half the coil thickness and -0.6 outside.

Masks and far forward detectors remain to be implemented.