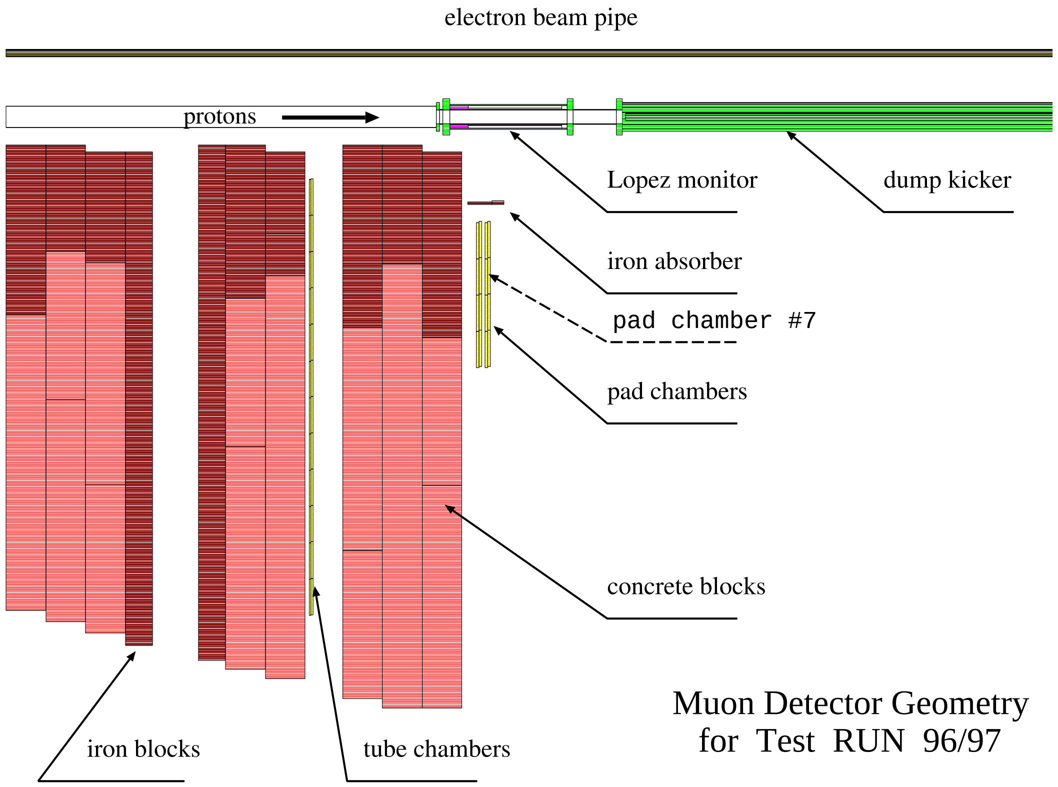

Figure 2: Top view (horizontal cut at y=0) of the RUN-96 Muon Detector.

the RUN-98 detector (see fig.1) the Lopez-monitor hopefully will be moved to another position outside the muon detector.

2 Proton Beam Pipe in the Region of the Muon Detector.

As seen in Fig.1 the proton beam pipe has a rather complicated structure in the region of the muon detector. From previous MC studies it was found that a lot of particles fly through the beam pipe and interact in it's walls near the muon chambers. To reduce backgrounds from secondaries, the proton beam pipe has a cone shape in the RUN-98 geometry as seen in fig.1. The sizes and Z-position of this cone tube are listed in table 2, where (Z min) is the starting Z position of a tube, ΔZ is a length along Z, R1 is the inner tube radius at Z=Zmin, R2 is the inner tube radius at Z=Zmin + ΔZ and ΔR is the tube thickness.

	Z min (cm)	ΔZ (cm)	R1 (cm)	R2 (cm)	ΔR (cm)
Cone tube	1485.	512.5	3.	6.	0.2

Table 2: Z position and sizes of the cone tube in the RUN-98 geometry. (Z min) is the starting Z position of a tube, ΔZ is the tube length, R1 is the inner tube radius at Z=Zmin, R2 is the inner tube radius at Z=Zmin + ΔZ and ΔR is the tube thickness.

Additional background can arise from interactions in the Lopez monitor and in the Dump kicker, which are positioned inside the proton beam line (see figures 1,2,3). Simplified versions of the Lopez-monitor and Dump-Kicker were implemented in HBGEAN. Fig.4 shows the top

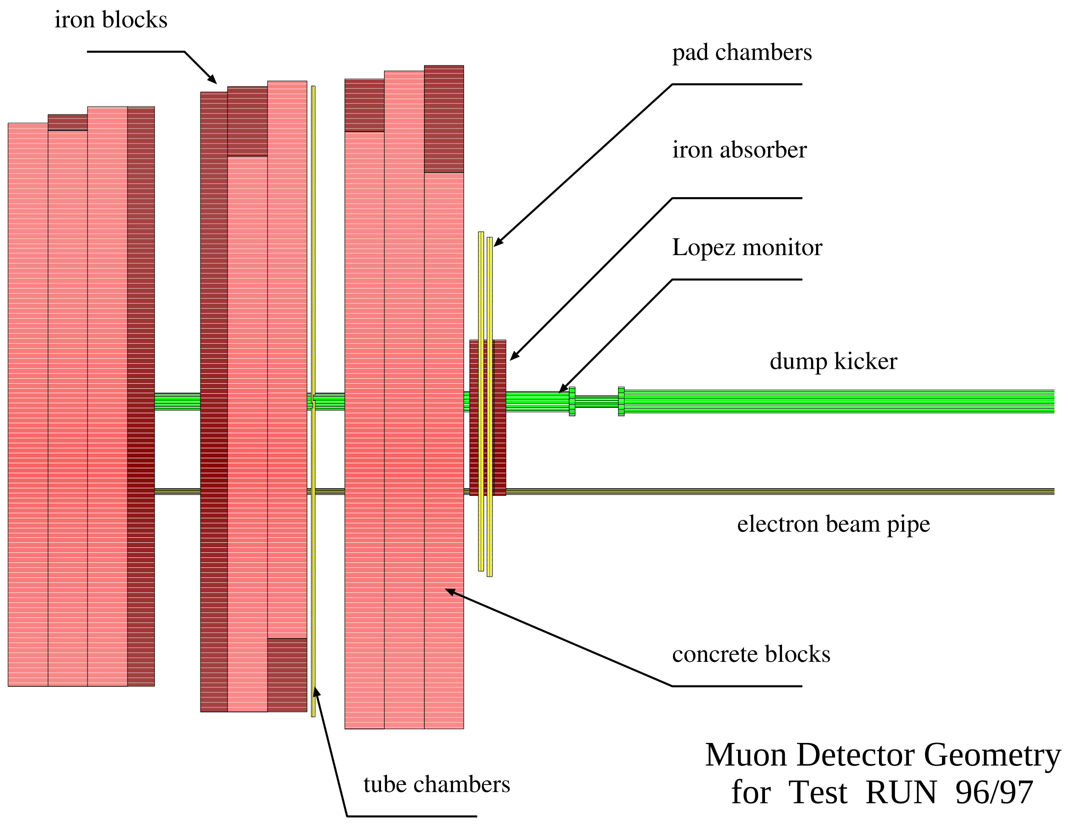

Figure 3: Side view of the RUN-96 Muon Detector.

view (horizontal cut at y=0) of the RUN-96 muon detector in the region of Lopez-monitor. As seen in fig.4 the Lopez-monitor is described as a set of iron and ferrite cylinders.

The cross section of the proton beam pipe with the Dump-Kicker inside is shown on the left side of Fig.5. The right side of fig.5 contains both a vertical and a horizontal cut of the proton beam pipe and Dump-Kicker. The Dump-Kicker is implemented in HBGEAN as the high voltage electrodes (two iron sectors) and two ferrite bars.

Table 3 lists the starting Z position and the length in Z of the Dump-Kicker in the RUN-98 geometry.

	Z min (cm)	ΔZ (cm)
Dump Kicker	1997.5	152.5

Table 3: The Dump-Kicker starting Z position and length in Z in the RUN-98 geometry.

3 Hadron Absorbers of HERA-B Muon Detector.

There are three types of hadron absorbers implemented in HBGEAN.

- Three hadron absorbers assembled of iron and concrete blocks (see figures 1,2,3). The iron blocks occupy mainly the region around the proton beam pipe. The concrete blocks are taken from the former JADE muon detector and are used for the outer part of these absorbers. The armored concrete has a density of 5.2 g/cm^3. The positions and sizes