August 12, 2003

1 Testbeam Z-Positions

The z-position of beam-counters and material in our testbeam-setup is commonly given as the distance from the front face of the cryostat to the center of the beam-counter or material (unless otherwise specified). I have compiled a list of elements and their positions based on various sources of information.

I have used the following sources of information:

Peter Schacht and Naoko gave me several of the numbers quoted in table 1. Most likely, both of them received them from some reliable expert.

Pavol's G4 code provided another source.

There is also a drawing made in 1994 in one of the folders in the beam-hut. I copied this drawing during a shift (by hand) and included it with some annotations in this note on page 5. In this drawing are a number of things that have likely not moved during the past 10 years, like the thick iron wall, the Halo-wall and the Pb wall. It is also very unlikely that the cryostat has gotten modified, so I assume that the 10cm given as the cryostat window indicates the thickness of the real cryostat wall, and that the dimension given as 16 cm indicates the location of the beam window in that wall. This puts the beam window at a radius of 145-16=129cm from the center of the cryostat. (Incidentally, the G4 code sports a 'warm radius' of 129.55cm.)

A. Maslennikov showed a diagram of the combined testbeam setup during the LArg week in June 2002. I have included his diagram on page 4. He also gives some z-positions in an ATLAS coordinate system where the interaction point is at z=0cm. I have taken these numbers and translated them into a coordinate system where z=0cm is at the cryostat center. A table with these numbers is included on page 3.

According to the MPI drawing of the cryostat for the combined testbeam, the inner diameter (radius) of the cryostat cold vessel is 250 (125) cm (see: http://particle.phys.uvic.ca/ web-atlas/atlas/hec-emec/geometry/). The G4 code specifies the total thickness of the entire cryostat wall, warm and cold, to be 20cm, putting the radius of the outer wall at 145 cm. The HEC NIM paper gives a thickness of the beam window of 0.55 mm.

There is some discrepancy between distances that were quoted by different sources. For the elements that are likely to move around from one beam period to another, I have taken the one that I consider the most reliable recent source (bold face), while for the elements that don't move I try to figure out the source of the discrepancy and make a guess.

Element	1994 drawing	Peter	Naoko	A. Maslennikov
Iron	16-63 or 7-47	7-47		7-47
Halo wall (VM)	64.5	62.5		62.5
Pb wall	106.5	104.5		104.5
F1 (2cm x 2cm x 2cm)	142.4	**160**		140.5
F2 (2cm x 2cm x 2cm)	130	**147.4**		128
MWPC2 (12.8cm x 12.8cm x 3.3 cm)	178		**178.5**	177(y) 180(x)
MWPC3 (12.8cm x 12.8cm x 3.3 cm)	276.5		**277.5**	276(y) 279(x)
MMPC4 (12.8cm x 12.8cm x 3.3 cm)	350.5		**349.5**	348(y) 351(x)
Iron beam dump	396-556(?)	397-718.5		397-718.5
MWPC5 (12.8cm x 12.8cm x 3.3 cm)		3090	**3091.5**	
W2 (15cm x 15cm x 1cm)		3118		
B1 (3cm x 3cm x 1cm)		3132		
W1 (15cm x 15cm x 1cm)		3135		

Table 1: Table of z-positions in cm (as measured starting from the front face of the cryostat) and the sources for that position. For some elements, their size is given in brackets (X x Y x Z). I took the size of F1,F2, MWPCs from the G4 code, but I think the X,Y for F1,F2 might just be their overlap area. The size of W1,W2,B1 is the one that was given on a drawing in a folder in the beam-hut. The numbers that I think are most reliable are in bold face.

	G4	other
R inner cryostat	125.5	125
R outer cryostat		145
beam window		129

Table 2: Dimensions of the cryostat in cm - inner and outer radius and position of the beam window measured from the centre of the cryostat.

z=0cm at: $\rightarrow$	IP of pointing ATLAS	Cryostat center
Cryostat center	451.0	0.0
EMEC active part	369.1-422.7	28.3-81.9
EMEC envelope	364.1-427.3	23.7-86.9
Presampler	362.2-362.6	88.4-88.8
Iron (hole size = 10.2)	251.0-291.0	160.0-200.0
Halo wall (VM) (hole size = 18.4)	232.4-233.7	217.3-218.6
Pb wall (hole size = 4.7)	195.4-196.6	254.4-255.6
F2	169.0-171.0	280.0-282.0
F1	156.5-158.5	292.5-294.5
ATLAS IP	0.0	451.0

Table 3: Table of z-positions in cm as given by A. Maslennikov during the June LArg week. The z-position of the elements is given in the coordinate system of a pointing ATLAS geometry as well as in a coordinate system where the z=0 is located in the centre of the cryostat.

Note that there is a small discrepancy in the depth of the active volume of the EMEC, which, according to e.g. LARG-NO-47 is 51cm, whereas the z-position's of A. Maslennikov result in 53.6 cm. As an additional cross-check, I took the z-positions of the Iron wall, Halo wall, Pb wall and F1/F2 counters from table 3 and, based on the dimensions given in Figure 1, calculated the distance of the front face of the cryostat to the centre of the cryostat. The Iron wall, F1 and F2 result in a location of 153 cm, while the Pb wall yields 150.5 cm and the Halo wall 155.5 cm. This is to be compared with the numbers given in table 2.

H6 beam setup layout

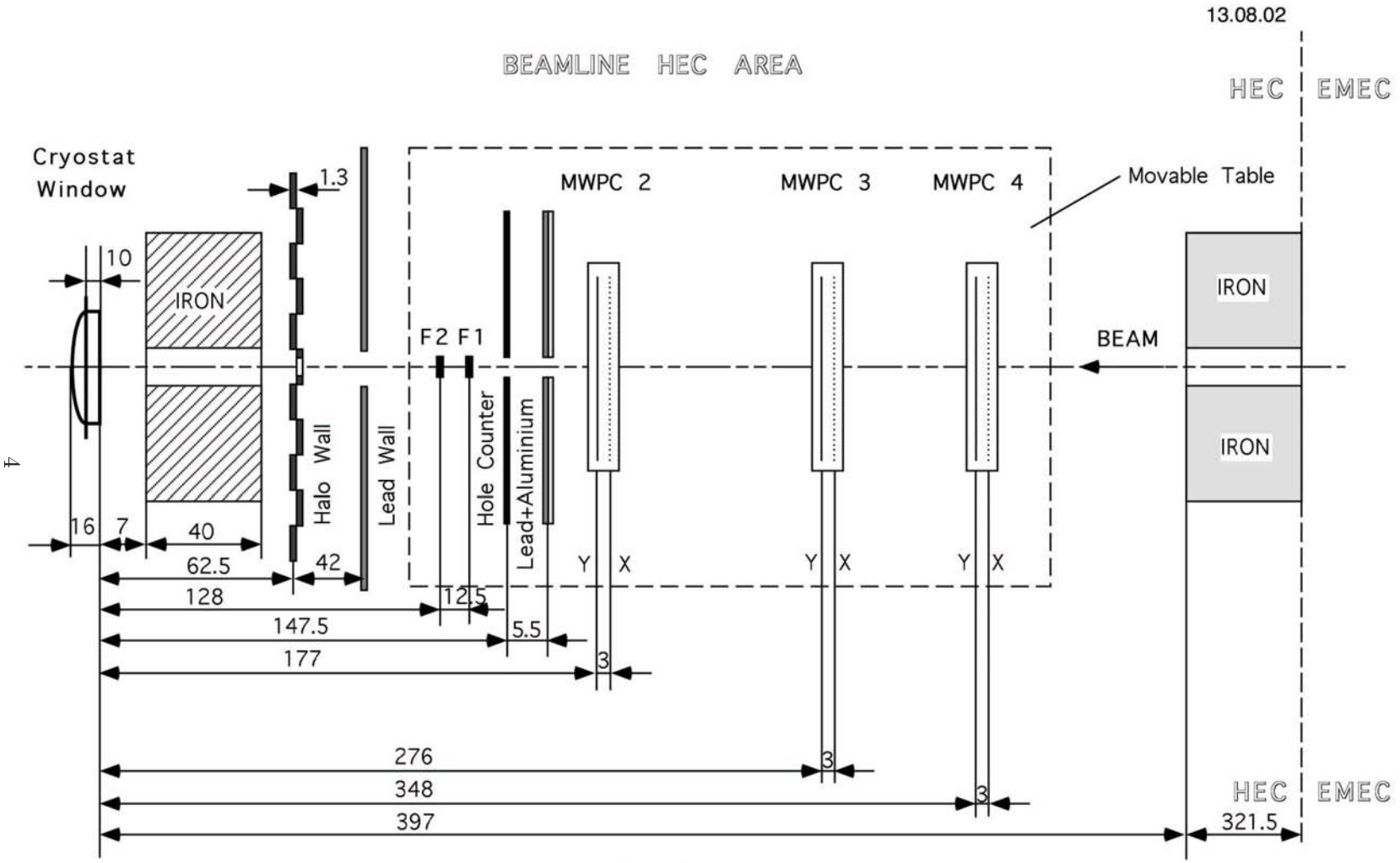

Fig. 1

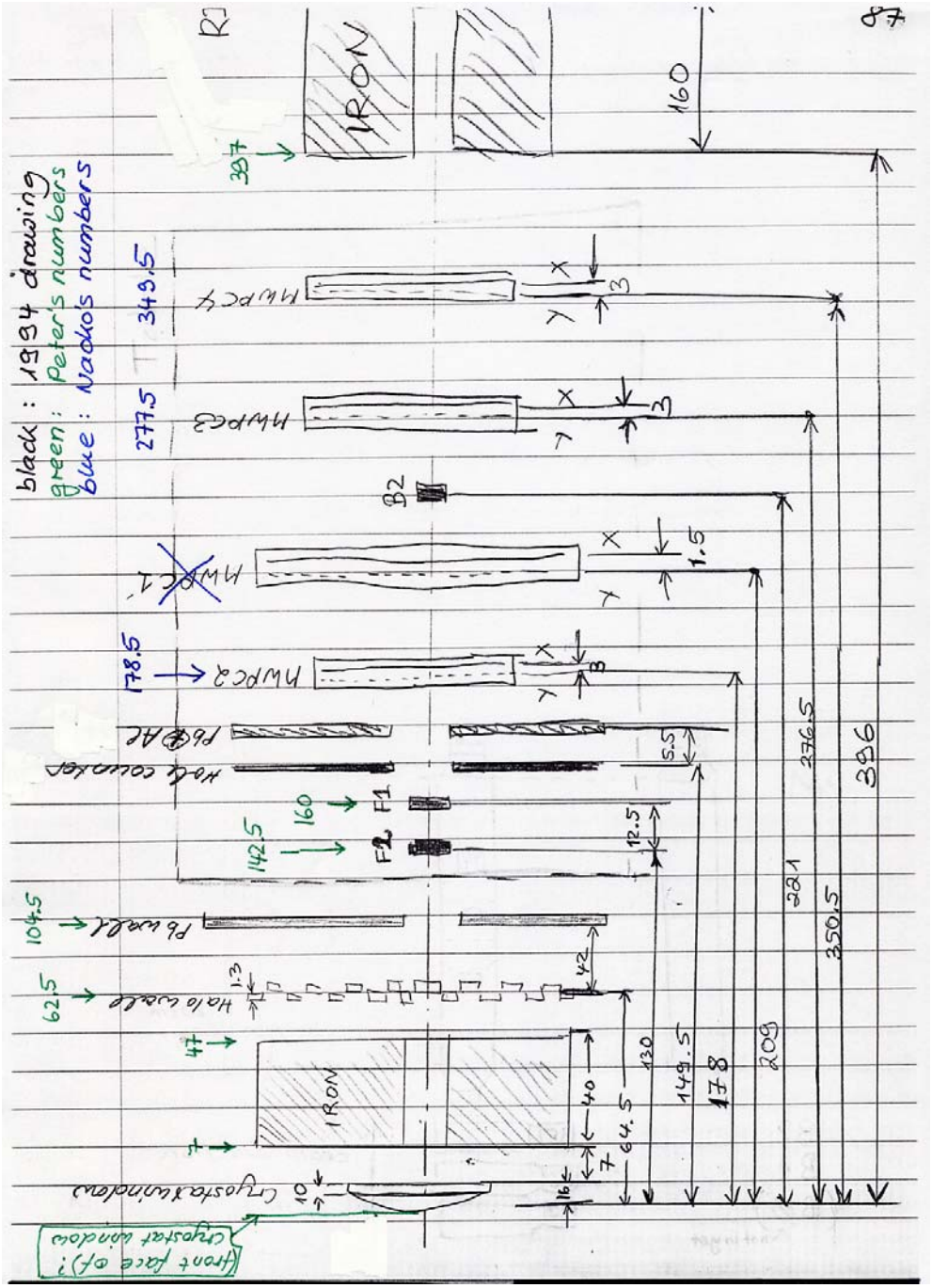

Figure 2: A copy of the drawing found in a folder in the beam-hut. I annotated it with some more up to date numbers. NOTE: Several of the elements in this drawing were NOT present in the 2002 testbeam!