The Test of Split High Voltage on MDC Prototype

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1 The Prototype

(1) Structure

The structure of the prototype is similar to the MDC. It contains four layers, each layer has three to five cells. There are four sense wires in each cell, the sense wire offset 0.35 mm from the cell certre. Figure 7 shows the structure of the prototype and cell.

(2) High Voltage System

The prototype need four different high voltage values, they are high voltage for field wires, sense wires, guard wires and potential wires. Figure 8 shows the high voltage system.

(3) Gas

The working gas used for the prototype is the same as MDC (HRS gas, ratio is Ar:CO2:CH4 = 89:10:1).

(4) Electronics

The electronics system include pre-amplifier, main amplifier and readout system. Figure 9 shows the readout system.

2 Sinals

In order to see the influence of different high voltage, a couple of high voltage group were set up. We keep the relative high volatge between the sense and field wire to be the same, varies the high voltage of sense and field wires. The following pictures show the signals at different high voltage group.

(1) Full negative high voltage

HVs = 0
HVf = -4.4 kv
HVp = -1.6 kv

HVg = -.25 kv

Shown as figure 1 (A, B, C)

(2) Split high voltage

a. HVs = 1.6 kv
HVf = -2.8 kv
HVp = 0
HVg = 1.35kv

Shown as figure 2 (A, B)

b. HVs = 2.0 kv
HVf = -2.4 kv
HVp = 0.4 kv
HVg = 1.75kv

Shown as figure 3 (A, B)

c. HVs = 2.4 kv
HVf = -2.0 kv
HVp = 0.8 kv
HVg = 2.15kv

Shown as figure 4 (A, B)

3 Energy lose distribution

Figure 5 shows a typical dE/dx distribution

(1) The test shows that the peak value of dE/dx becames higher as high voltage of sense wire increase when we keep the absolute high voltage as a constant. Shown as table 1

HVs(kv)	0	1.6	2.0	2.4
PEAK	59	65	67	69

Table 1

(2) The test shows that the peak value of dE/dx varies a little when we change the coupling capacitors. Showns as table 2 and figure 6 (A, B, C, D)

Cap.(n)	no	10	1.5	0.5
PEAK	71	69	68	67

Table 2

4 Conclusion

We obtain the following preliminary results through the prototype test :

(1) If the leakage current keeps in low level and do not get worse when we decrease the high voltage of field wires under 2 kv, the split high voltage is possible.

(2) We should pay much attention on the selection of the copling capacitor, noise reduction and readout circuit.

(3) We will set up online system and do the same test on MDC-II during summer shutdown.