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PC Module Bench Tests

The first pc module has gone through its initial bench tests. This report presents a summary of some of the observed waveforms.

The pc wire plane differs from a drift chamber wire plane in that the wire spacing is only 2 mm instead of 4 mm , and in order to reduce the channel count, some of the wires are bussed. The 32 central sense wires are read out individually. The 64 sense wires on each side of the central region are bussed in groups of 4. So there is a total of 160 wires but only 64 output channels on a pc wire plane. A pc module has two u planes and two v planes for a total of 4 sense wire planes.

The pulse height uniformity was tested with a 10 mCi Fe^{55} source. The gas used was 25% Argon, 75% Isobutane and the operating voltage was 2100 V. Because of the closer wire spacing the pc modules require a higher operating voltage than the drift chamber modules. An operating voltage of 2100 V on the pc module gave a similar pulse height to that seen on a drift chamber module operating at 1800 V. Figure 1 shows pulse height scans across two of the planes in the module. The effect of bussing the wires can be clearly seen in the reduced pulse heights on the 16 channels on either side of the central region. Figure 2 shows a typical pulse from channel 32 which is a single wire. Figure 3 shows a typical pulse from channel 16 which is four wires bussed together. Bussing the wires seems to have no effect on the pulse shape or risetime, but it does reduce the amplitude of the pulse. The above waveforms represent the average of 100 pulses in both cases as it allowed a stable measurement of amplitude and risetime which is not possible on an individual pulse basis. The following waveforms, unless otherwise stated, also represent averages of 100 pulses.

Crosstalk between channels was also observed and is about a factor of two worse than for the drift chamber planes. Figure 4 shows crosstalk on channel 31 due to signals on channel 32. The crosstalk pulse is about 5% of the amplitude of the pulse that caused it, but of opposite polarity. Crosstalk tends to get smaller as you get further away from the initiating pulse but that is not always the case. For example the crosstalk on channel 30 (figure 5) due to a pulse on channel 32 is smaller than the crosstalk on channel 31. But the crosstalk on channel 28 (figure 6) is bigger than the crosstalk on channel 30 and has a positive lobe which could be a potential source of false discriminator triggers. Figure 7 shows crosstalk between channels 16 and channels 15 which are bussed in groups of 4. Again the crosstalk pulse shows a positive lobe which could result in false triggers. Figure 8 shows some typical accumulated pulses (top trace) and crosstalk pulses (bottom trace) without using averaging, to give some idea of the pulse amplitude and shape variation that actually occurs.

The following tables summarize our measurements.

Amplitude Variation

plane	min mV	max mV	variation from average ±%
U2	220	280	12
U1	230	380	25
V2	220	280	12
V1	270	350	13

Table 1

Crosstalk

Single Channel Crosstalk	chnl 32 pulse mV	crosstalk pulse mV	percent
Adjacent to chnl 32	260	12	5% negative
4 chnls from chnl 32	280	6	2% positive

Bussed Channel Crosstalk	chnl 16 pulse mV	crosstalk pulse mV	percent
Adjacent to chnl 16	210	4	2% positive
4 chnls from chnl 16	210	6	3% positive

Table 2

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