AN INTEGRATED WIRE CHAMBER COMPUTER SYSTEM[*]

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(presented by R.H. **Miller**)

SUMMARY

A wire and core spark chamber designed for on-line operation with a computer has been built and tested. Planes 10 inches in diameter with 256 wires at 1 mm spacing are mounted in such a way that a memory core plane can be attached. Planes may be stacked to form chambers of any depth. During readout, cores are interrogated 32 at a time, and a sub-computer scans the readout, rejecting all empty readouts, but attaching an address to any non-empty readout and transmitting the bit pattern and its address to the computer. This kind of readout, used in conjunction with good scanning strategies, can permit a large (factor 10-100) reduction in the amount of data transmitted to the computer. Tests of the chamber assembly have been run on the computer Maniac III in the Institute for Computer Research. Checks indicate better than 90% spark efficiency at minimum ionization, less than one noise spark per 5 gaps each time the chamber is pulsed, and a mean location error less than 1/2 wire spacing. The computer can reconstruct simulated events for a fictitious experimental arrangement to within the quantization error introduced by the finite structure of the chamber planes within about 1/6 second for an assembly of 32 chamber planes of the kind described.

Wire chambers for use as elements in the controlling logic for pulsing standard (photographic) spark chambers have also been developed.

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DISCUSSION

ROBERTS: The main drawback to the use of a wire array as a logical element is the dead time. This is at least a few hundred microseconds.

R.H. MILLER: You have to choose carefully the place you use it in. I don't know how long it takes Brookhaven to put together a counter hodoscope, but our group put this one together one afternoon and had it running the next morning. This is fairly impressive, showing how quickly and cheaply you can do these things. It's a poor man's system.

PIZER: Would you explain how you made your wire chambers ?

R.H. MILLER: The basic scheme is that we have a good sized washing machine if you like. Mike Neumann's department made up a large hexagonal drum and one mounts the frames of a plane on each face of this thing and on the side is a spool of wire with a little guide on it that guides it on and a braking system that maintains wire tension. We are using stainless steel wire down to 2 mils, aluminium wire down to 4 mils, in this fabrication technique. There are various outfits that will build this into a plastic matrix for you for a price. We have never been quite sure just how well the plastic matrix would stand repeated sparking and this system has turned out to be so simple that we just have not looked into the question of altering our schemes.