

ZERO ORDER PROPOSAL FOR THE SEARCH FOR W MESON

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The primary method for searching for the ν -produced W in spark chambers is based on observing the lepton pair originating from the same vertex. We are proposing here the same method, subject to all previous criticisms, except with a new twist.

Our proposal consists of making 20 slits in the last section of the main ν shield, approximately 1 BeV/c (of range) apart. One would place proportional wire-chamber detectors in such slits (maximum 1 foot wide, depending on the roughness of the Fe shield). Each detector would be 8 feet by 8 feet with wire spacing \approx 1 cm.

In case the end of the shield is earth, we would propose digging 20 fox-hole trenches 3 m apart to accommodate the wire planes.

The main sources of background for such a detector are the inelastic neutrino events, where the produced π decays in less than the interaction length into μ . The table below gives such odds for various materials. The odds (quoted as one against the table entry) are calculated using $1/2 (L_{inter}/L_{decay})$ since either of the tracks could have been the pion.

Table I.

Observed Track Length (BeV/c)	Material		
	U	Fe	Dirt ($\rho = 2$)
2	630	430	90
4	1260	860	180
6	1890	1290	270
8	2520	1720	360
10	3150	2150	450

The sensitivity of the method is roughly 10^3 below the inelastic cross section for a reasonably heavy W. The iron or U of course preferred since the gain in the coherent cross-section rate is obvious.

In the last 20 GeV/c range of shield, the main source of background is neutrino generated μ 's estimated at $20 - 30/2 \times 10^{13}$ pulse (focused π 's and ν 's). The muons from the decay tunnel are 40 - 50/pulse.

Given 100 particles/20 μ sec pulse and the resolving time of proportional chambers $\sim 1\mu$ sec or less, it appears that an on-line computer would not have a difficult job in linking these 5 sparks/chamber into tracks.

The reconstruction of the vertex locality is rather poor and dominated by multiple scattering. One estimates, however, that it will provide rejection of the order of 10^{-3} against accidental linking of two independent tracks into a vertex.

Cost Estimates

We break the cost into two parts: 1) NAL cost and, 2) user cost.

A. NAL cost:

i) iron underground:

a) Excavation: 150 m ³	\$30 K
b) Finishing wall, concrete	\$30 K
c) Sump pumps	\$10 K
d) Power	<u>\$20 K</u>

TOTAL \$90 K

ii) "Fox-hole" arrangement implies 3 \times larger tunnel thus increases cost ~ 3 , i. e., \$270 K.

B. User cost:

20 wire sp. ch. @ \$5,000	\$100 K
20 \times 500 wires @ \$3/wire readout	\$ 30 K
Computer buffer	\$150 K
HV system	\$ 50 K
Ne gas system	<u>\$ 20 K</u>

TOTAL \$350 K