

Extract from letter received from Professor J. M. Cassels

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"Dear Gerry,

Thanks for your letter. We are still only hearing rumours here about the neutrino story and what I wrote you was a personal reconstruction of the physics. However Lee will visit us on the 30th November and I will send a more solid story then. Meanwhile:-

- 1) I calculate the 2-body cross-section as:-

$$\sigma \sim \frac{g^2 (p_{\nu}^-)^2}{\pi (E_c)^4}$$

g = weak interaction constant
 $2 \times 10^{-49} \text{ erg-cm}^3$

p_{ν}^- = neutrino energy $\sim 1 \text{ GeV}$

$$\sim 4 \times 10^{-38} \text{ cm}^2$$

which agrees with the number you mention.

- 2) The 3-body cross-sections will rise as p_{ν}^5 , the 4-body as p_{ν}^8 , and so on. This explains how σ_{tot} can reach geometric dimensions by 100 GeV (centre-of-mass, be it noted.) I am not clear how to think of form factors for many-body reactions, so I don't know whether σ_{tot} would in fact go up so far. Some 3-body reactions might get well under way near Nimrod.

- 3) I think the shielding must be 25 feet, not metres. It would have to be some kind of igloo to avoid neutrons coming round corners, obviously. However the sides may not need to be too thick, since the neutrino reactions produce high-energy collimated showers.

- 4) The best detector may be a big ingot of lead glass.

- 5) The pion beam producing the neutrinos need not be too formally organised. Inside the machine there will be a big density of pions running downstream from any target, for example."

Yours,

Jimmy.