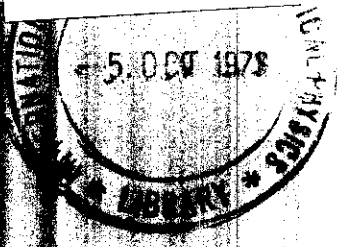


806/71

0 000 000 023182 G

IC/73/133



# INTERNATIONAL CENTRE FOR THEORETICAL PHYSICS

TOPICAL SEMINAR  
ON  
WEAK INTERACTIONS

26 - 29 June 1973

(SUMMARIES)



INTERNATIONAL  
EDUCATIONAL  
SCIENTIFIC  
AND CULTURAL  
ORGANIZATION

1973 MIRAMARE-TRIESTE

International Atomic Energy Agency  
and  
United Nations Educational Scientific and Cultural Organization

INTERNATIONAL CENTRE FOR THEORETICAL PHYSICS

T O P I C A L   S E M I N A R  
O N  
W E A K   I N T E R A C T I O N S

26 - 29 June 1973

(SUMMARIES)

MIRAMARE - TRIESTE

July 1973

Please note that copies of papers referred to may be obtained direct from the authors and not from the ICTP.

STATUS OF  $\bar{\nu}_e + e^- \rightarrow \bar{\nu}_e + e^-$  EXPERIMENT <sup>†</sup>

H.S. Gurr, F. Reines and H.W. Sobel

Department of Physics, University of California, Irvine, Cal., USA.

The reaction  $\bar{\nu}_e + e^- \rightarrow \bar{\nu}_e + e^-$  was sought in a 15.7 Kgm segmented plastic scintillation detector exposed to a  $\bar{\nu}_e$  flux of  $2.2 \times 10^{13} \bar{\nu}_e/\text{cm}^2 \text{ sec}$  from a large fission reactor. Background reduction was effected by the use of a 330 Kgm, 4M anticoincidence NaI detector, liquid scintillators, and water, lead, cadmium and concrete shielding<sup>\*)</sup>. In a total run time of 143 days (111 days reactor on, 32 days reactor off - line time) a reactor associated signal in the energy range 3.6  $\rightarrow$  4.5 MeV was measured to be  $0.29 \pm 0.17/\text{d}$ . Corrections for reactor associated backgrounds from  $\bar{\nu}_e + p \rightarrow n + e^+$  and neutrons,  $\lesssim 0.03/\text{d}$ , reduced the signal to 0.26/d and the limited gain stability of the system increased the uncertainty from  $\pm 0.17$  to  $\pm 0.2/\text{d}$ . The V-A prediction is 0.24/d, giving a ratio  $\sigma_{\text{exp}}/\sigma_{\text{V-A}} = 1.1 \pm 0.8$ , where  $\sigma_{\text{V-A}} \sim 5 \times 10^{-47} \text{ cm}^2/\text{fission } \bar{\nu}_e$ . Continued operation of the system is expected to reduce the uncertainty to  $\pm 0.7 \times (\text{V-A})$ . Since the sensitivity of the present system is limited by the reactor independent background which is  $\sim 3$  times the predicted V-A signal, an effort is under way to reduce the natural radioactivity believed to be responsible for most of the background.

---

<sup>†</sup> Sponsored by U.S. Atomic Energy Commission.

<sup>\*)</sup> Details of earlier versions of this experiment as well as references which may be drawn from such experiments may be found in status reports by the authors: Phys. Rev. Letters 24, 1448 (1970); 28, 1406 (1972).