PART II

EXPECTED CROSS SECTION FROM MEASUREMENTS OF FISSION FRAGMENT ELECTRON SPECTRUM

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I. INTRODUCTION

In Part I of this paper a measurement of the cross section for the reaction $\nu_-(p^+,n^o)\beta^+$ for antineutrinos from fission fragments is described. In order to predict the average cross section for this reaction, one needs to know the energy spectrum.

A measurement of the electron (beta) energy spectrum from fission, enables a determination of the end point distribution for the beta emitters involved. Since this is also the end point distribution for the antineutrino spectra, one can calculate the required antineutrino spectrum. Muehlhause and Oleksa[1] made such a measurement but their results did not permit an unambiguous interpretation of the cross section in terms of the two-component or four-component theory of the antineutrino.

In the present experiment (Fig. 1) a single plastic scintillator was used as the electron spectrometer. This type of detector has a low gamma sensitivity with nearly 100 percent efficiency for electron detection. A gas flow proportional counter placed between the fission source and the scintillator was used as a transmission counter to signal the passage of an electron through it into the scintillator. Using this system for gating a pulse height analyzer, the number of events subjected to pulse height analysis was about 1/4 the total scintillator counts. A fission counter was used as the source of fission electrons in order to determine the number of fissions involved in the measurement. This scintillation spectrometer with its known geometry and a suitable energy calibration was used to measure the number of electrons per fission as a function of energy from 1.5 to 8 Mev.

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