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REPORT ON THE BROOKHAVEN SOLAR NEUTRINO EXPERIMENT*

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Introduction

This report is intended as a brief statement of the recent developments and results of the Brookhaven Solar Neutrino Experiment communicated through Professor G. Kocharov to the Leningrad conference on active processes on the sun and the solar neutrino problem. The report summarizes the results of experiments performed over a period of 6 years, from April 1970 to January 1976.

Neutrino detection depends upon the neutrino capture reaction $^{37}\text{Cl}(\nu, e^-)^{37}\text{Ar}$ producing the isotope ^{37}Ar (half life of 35 days). The detector contains 3.8×10^5 liters of C_2Cl_4 (2.2×10^{30} atoms of ^{37}Cl) and is located at a depth of 4400 meters of water equivalent (m.w.e.) in the Homestake Gold Mine at Lead, South Dakota, U.S.A. The procedures for extracting ^{37}Ar and the counting techniques used were described in previous reports.¹⁻³ The entire recovered argon sample was counted in a small gas proportional counter. Argon-37 decay events were characterized by the energy of the Auger electrons emitted following the electron capture decay and by the rise-time of the pulse. Counting measurements were continued for a period sufficiently long to observe the decay of ^{37}Ar .

Experimental

Although standard procedures were followed in recovering and purifying the samples, there were in the course of these experiments a number of important developments that should be mentioned.

There has been a continual development in counting techniques and counter fabrication directed toward a better characterization of the ^{37}Ar decay event,

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