RESULTS ON WEAK NEUTRAL CURRENTS FROM THE CDHS COLLABORATION

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INTRODUCTION

The results of an experiment to measure the neutral (NC) to charged current (CC) cross section ratios for inclusive neutrino nucleon scattering

$$R_\nu = \frac{\sigma(\nu+Fe \to \nu+X)}{\sigma(\nu+Fe \to \mu^- X)} \quad \text{and} \quad R_{\bar\nu} = \frac{\sigma(\bar\nu+Fe \to \bar\nu+X)}{\sigma(\bar\nu+Fe \to \mu^+ X)}$$

are presented. The experiment has been carried out by the CERN-Dortmund-Heidelberg-Saclay collaboration[1]. Preliminary results from the part of the data have been reported previously[2]. One of the aims of this experiment is to obtain a precise determination of the electroweak mixing parameter $\sin^2\theta_W$. Model calculations to derive $\sin^2\theta_W$ from R_ν will be discussed. Such calculations also relate R_ν to $R_{\bar\nu}$, so that a measurement of the two quantities can be used to test the model.

In the original version of this talk a limit on right handed weak currents, obtained by the CDHS collaboration, was discussed. Since the presented material is already published[3], it will be omitted here.

EXPERIMENTAL DETAILS

The experiment is very similar to the first neutral current experiment of this collaboration[4]. The data were taken in the years 1978/79 with the CDHS detector[5] exposed to the CERN 200 GeV narrow band neutrino beam. The effective neutrino and antineutrino spectra

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relevant to the conditions of this experiment are shown in Fig. 1. The detector is a magnetized iron cylinder, 3.85 m in diameter, with the axis parallel to the beam axis. Longitudinally it is subdivided into 19 modules consisting of iron slabs with a total thickness of 0.75 m. The slabs are interleaved with planes of scintillators for hadron calorimetry, and drift chambers are inserted between the modules for muon tracking. The scintillator structure allows one to measure the position of the shower.

The main idea of the experiment is to measure only the hadronic showers produced in neutrino interactions, in order to treat NC and CC interactions alike, as much as possible. In particular, no pattern recognition or track reconstruction for muons of CC events is performed. In this way, when forming the ratio of NC events to CC events, many sources of systematical errors are eliminated.

The detector records neutrino-iron interactions producing hadronic showers of energies above the trigger threshold of about 3 GeV. For each event the hadronic energy E_H, the interaction vertex, and the event length L are measured. L is defined as the thick-

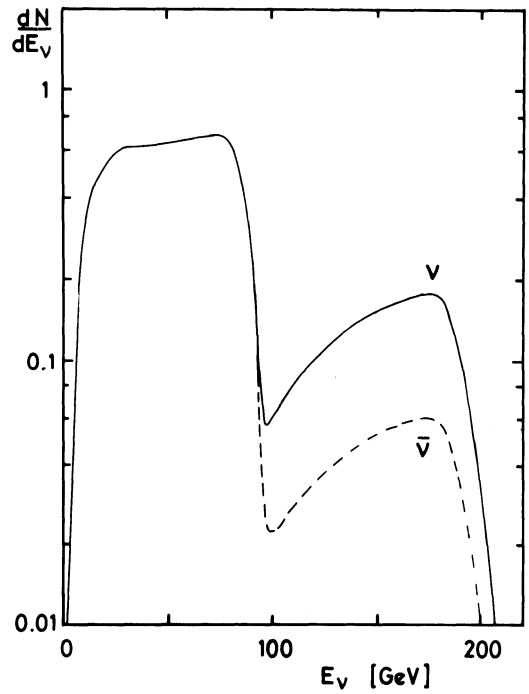

Fig. 1. Neutrino and antineutrino spectra of the CERN 200 GeV narrow band beam valid for the cuts of the neutral current experiment. The abscissa is given in arbitrary units.