

Spokesperson: K. Niu
Nagoya Univ.
telephone: 052-781-5111
Ext. 2444
telex: 04477323
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STUDY OF NEUTRINO INTERACITONS BY NUCLEAR EMULSIONS

H. Fuchi, K. Hoshimo, S. Kusamata, K. Niu, K. Niwa, S. Tasaka
and Y. Yanagisawa

Department of Physics, Nagoya University
Chikusa-ku, Nagoya, Japan

N. Ushida

Faculty of Education, Aichi University of Education
Kariya, Aichi, Japan

Y. Maeda and H. Kimura
Faculty of Education, Yokohoma National University
Hodogayaku, Yokohama, Japan

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Study of Neutrino Interactions by Nuclear Emulsions

Objectives

1. Search for neutrino interactions in which short-lived charmed mesons and baryons sign themselves by decaying in the emulsion.
2. Search for "Super Fragments" in which one of nucleons is replaced by a charmed baryon and decay after several microns with higher Q value than that of normal hyper fragment.
3. Momentum and energy analysis on secondary charged particles and γ rays of neutrino interactions which show above signs.

Instruments

Emulsion chambers consisting of nuclear emulsion films and thin low and high Z materials. Unit chamber has measures of 12 cm x 9.5 cm x ~5 cm.

Total amount of nuclear emulsions is about 5 liters.

Conditions desired

1. Most of the exposure will be desired during running of E-53A. Accumulated intensity of higher than 10^{18} protons with wide band neutrino beam are expected to produce more than 100 events in 5 liters. Maximum duration of exposure will be decided by sampling a small part of emulsions at each suitable opportunity.
2. Provisions will be made to store the emulsions in a well shielded place during times in which hadrons are being used in the bubble chamber.

Conditions desired (cont'd)

3. To reduce the rate of nuclear interaction due to nucleonic component of cosmic rays, shielding thickness of about 100 grams/cm² is desired.

4. To reduce the background due to radioactivity from concrete or the earth, enclosure of emulsion chambers by metal plate with thickness of a few radiation length is very effective.

Proposed Location for Exposure

The exposure can be made in the N5 beam line tagging portakamp.