# RECENT RESULTS FROM NEUTRINO OSCILLATION EXPERIMENTS AT ACCELERATORS

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ABSTRACT

A summary of recent results on neutrino oscillations from accelerator based experiments at Los Alamos, Brookhaven National Laboratories, Fermilab and CERN is given. There has been considerable improvement in the sensitivity of these experiments but so far no indications for neutrino oscillations have been found.

## 1. Introduction

Since the $\nu_e$ mass determination of the Moscow tritium experiment[1] the interest in neutrino oscillations has been growing. It has become even more interesting since a Grenoble-Annecy group at the Bugey reactor[2] claimed to have indications for the oscillation of $\bar{\nu}_e \rightarrow$ anything in the range of $\Delta m^2 \simeq 0.2$ eV$^2$ for mixing angles close to $\sin^2 2\theta \simeq 0.2$, see figure 1. However, this result is contradicted by the result obtained by a Caltech-SIN-TU Munich group at the Gösgen reactor[3], if one believes the limits obtained by comparing their measured and predicted spectra. It is clear that before one can consider $\nu$ oscillations to be established the Bugey result needs confirmation.

In principle it would be nice to obtain this confirmation or non-confirmation from experiments with completely different systematics, as this is the case with oscillation searches done at accelerators. Unfortunately the bulk of accelerator based experiments are sensitive only to neutrino oscillations with muon neutrinos in the initial state and cannot test possible oscillations of the type $\bar{\nu}_e \rightarrow \bar{\nu}_\tau$. In addition they are not yet sensitive enough to reach the region in $\Delta m^2$ and $\sin^2 2\theta$ in question. The best results so far come from a bubble chamber[4] and an emulsion experiment[5] at FNAL looking for $\nu_e$ and $\nu_\tau$ in a wide band $\nu_\mu$ beam, see also figure 1.

Most of the neutrino oscillation searches up to now were by-products of "normal" $\nu$ experiments. Over the last two years a series of new and, in part, dedicated $\nu$ oscillation searches have been performed at acceler-

ators and new results are available from the experiments listed in Table 1, which will be briefly discussed in the following sections.

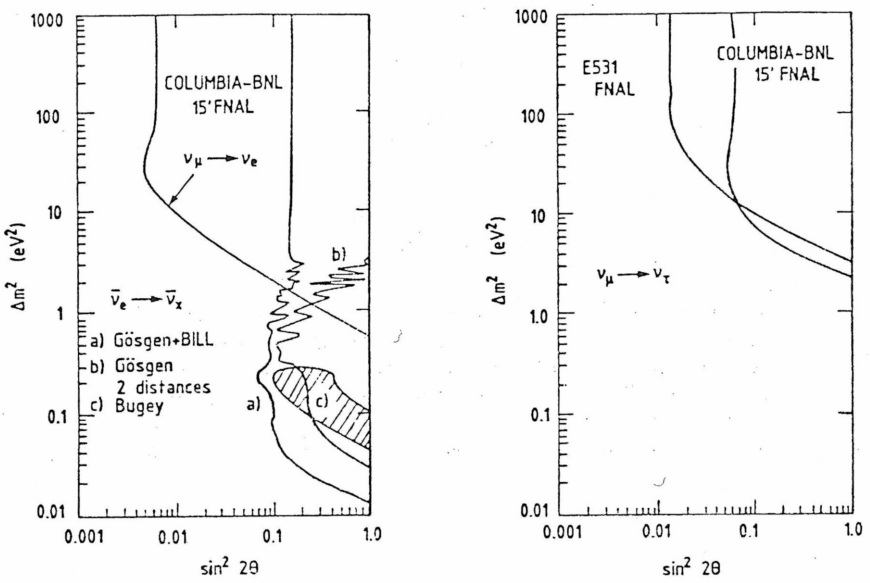


Fig. 1: Old limits in $\sin^2 2\theta$ and $\Delta m^2$ for a) $\nu_\mu \rightarrow \nu_e$ and b) $\nu_\mu \rightarrow \nu_x$.

TABLE 1

| Laboratory | Experiment | Oscillation | Beam | Energy | Distance |
|---|---|---|---|---|---|
| BNL | E775 | $\nu_\mu \rightarrow \nu_e$ | WBB | $\sim$ 1.5 GeV | 100 m |
| | | $\nu_\mu \rightarrow \nu_e$ | NBB | > 2 GeV | 100 m |
| LAMPF | E225 | $\bar{\nu}_\mu \rightarrow \bar{\nu}_e$ | Beam Stop | 40 MeV | 10 m |
| FNAL | *CCFR | $\nu_\mu \rightarrow \nu_x$ | NBB | 40-230 GeV | 700/1100 m |
| CERN | BEBC | $\nu_\mu \rightarrow \nu_e$ | WBB | 2.5 GeV | 850 m |
| | *CDHS | $\nu_\mu \rightarrow \nu_x$ | Bare Target | 3 GeV | 130/890 m |
| | *CHARM | $\nu_\mu \rightarrow \nu_x$ | " | 1.5 GeV | 120/910 m |
| | | $\nu_\mu \rightarrow \nu_e$ | " | " | " |

* These experiment have finished their analysis and published while the others have either preliminary results or are very close to having them.