

Study of Charm Production in Neutrino Interactions

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Abstract:

The CHORUS experiment was designed to search for $\nu_\mu \rightarrow \nu_\tau$ oscillation by detecting the decay topology of the τ in charged current (CC) ν_τ events.

The CHORUS detector was exposed to the Wide Band Neutrino Beam of the CERN SPS during the years 1994-1997. About 10^6 ν_μ CC events were collected in the nuclear emulsion target. Up to now, about 140,000 ν_μ events have been located and analysed.

The speed of the automated emulsion scanning systems increases each year. With the present performance of these systems, it has become possible to perform large area volume scanning. All tracks belonging to an interaction vertex can be recognised and precisely measured. This technique can not only be applied to the search for neutrino oscillation but can also be used for the recognition of events where charmed particles are produced. Results obtained from the analysis of a sub-sample of the data on the production rate in ν_μ CC interactions of neutral charmed mesons (D^0) and charmed baryons (Λ_c) will be presented. The Λ_c can be unambiguously identified by its decay into a Σ . A study of the production process of the Λ_c was also performed, separating the deep-inelastic and quasi-elastic components. In addition, a new measurement of the branching ratio into muons of the charmed final state particles in neutrino interactions will be shown. The results of searches for rare processes, such as associated charm production will be presented. The prospects for the study of charm physics with the CHORUS data will also be discussed.