

# Neutrino Induced Dimuons and Coherent-Rho in NOMAD

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Neutrino induced charm production, detected via charm's semi-muonic decay, offers the most precise quantification of the strange-sea and the mass-parameter of the charm quark,  $m_c$ . We have extracted 15k charm dimuon events in neutrino-Fe interactions in the NOMAD front calorimeter corresponding to a sample of 9M single muon events. The analysis leads to a measurement of the dimuon to single muon rate with a precision of ~2%. The key to this systematic precision is the high-resolution light target (drift chambers) data which yield the energy scale and the pion-induced backgrounds affecting this analysis. Within the NLO QCD formalism, we obtain the strange sea suppression factor of  $\kappa_s = 0.63 \pm 0.04(\text{Stat}+\text{Syst})$ , and the  $m_c = 1.058 \pm 0.059 \text{ GeV}/c^2$  (MS-bar scheme).

Measurement of neutrino production of coherent mesons uniquely elucidates the space-time structure of the weak current, provides a clear probe to test the conserved vector current (CVC), and conveys the 'hadronic-content' of the weak current. Once in every few hundred interactions, a high energy neutrino scatters coherently off the target nucleus producing a Rho meson, emitted collinearly with the incident neutrino, while the nucleus remains intact. Kinematically, the interaction is a very low four-momentum and high hadronic energy transfer process. In Neutral Current (NC) this results in a  $\rho^0$  and in Charged Current (CC) in a  $\rho^+$ , where the two are related via the weak mixing angle. Using the NOMAD light target data, corresponding to a sample of \$1.44M  $\nu_\mu$ -CC events in the energy range 2.5 - 300 GeV, we have conducted analyses of coherent  $\rho$  production in NC and CC. Clear signals are observed in both NC and CC. We report the rate of coherent  $\rho^0$  and  $\rho^+$  with respect to  $\nu_\mu$ -CC. The precision on coherent  $\rho^+$  is the best among all reported neutrino-induced coherent mesons to date.

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