

# Doubt on distinctions between muon and electron events with the Super-Kamiokande detector

Mitsui.K<sup>(a)</sup>, Kitamura.T<sup>(b)</sup>, and Wada.T<sup>(c)</sup>

<sup>(a)</sup> Yamanashi Gakuin University, Kofu 400-8575, Japan,

<sup>(b)</sup> c/o RIST, Kinki University, Higashi-Osaka 577-8502, Japan,

<sup>(c)</sup> Dept. of Physics, Okayama University, Okayama 700-8530, Japan

March 10, 2001

## Abstract

In the study of Kasuga et al (the Super Kamiokande group) for atmospheric neutrino flux in sub-GeV and multi-GeV energy ranges, the distinction between muon and electron events in the water Čerenkov detector has been showed with a mis-identification probability less than 1 %. However, the relation between the expected total number of photoelectrons by muon and its momentum is obtained only from ionizations and knock-on electron processis. Moreover, we found it difficult to get correctly the expected total number of photoelectrons by muon and electron by the Kasuga expressions. Accordingly, we used the full MC simulated calculations for distinctions between muon and electron events.

Our full MC simulated calculations for sub-GeV region give that the total mis-identifications of distinctions between both the events should be an order of  $\geq 10$  %. Also the most of deficits give rise to muon events. Even the multi-GeV/c region brings about deficits of muons with a order of a few % except the case of starting points along the center of detector with an incident dirction angle of  $\theta \simeq 0$ . The deficits of muon-like events observed by Kamiokande and Super Kamiokande groups may be overcome by applying our calculation results.