Measurement of basic parameters of scintillator used in K2K SciBar detector
T551 report

M. Yokoyama, M. Hasegawa, S. Yamamoto, T. Sasaki, T. Morita, K. Hiraide, J. Kubota, T. Nakaya (Kyoto U.) Y. Takubo (Osaka U.) T. Ishii, K. Nitta (KEK)

The purpose of this test experiment is to measure basic parameters of scintillator used for K2K SciBar detector. The SciBar detector was constructed in summer 2003 to upgrade K2K near detector system. It is a tracking detector consisting of approximately 15,000 scintillator bars, which serve as active target, with dimension $2.5 \times 1.3 \times 300$ cm^3. With this full-active, fine-segment detector, we can detect all particles from neutrino interaction. In SciBar detector, dE/dx information in each scintillator bars is recorded and used for identification and momentum reconstruction of protons. To provide basic input, response of scintillators with protons and pions are measured with the same scintillator and same readout as the real ones.

Figure 1 shows measured range (left) and dE/dx (right) of protons as a function of momentum. The momentum was measured with TOF. Black (red) points represent measured data (GEANT MC). The measured range shows excellent agreement with MC expectation. For dE/dx, a discrepancy is seen in low momentum region. This is presumably due to saturation and non-linearity of readout electronics for large amount of charge, which is not included in the MC at this moment. We will measure and implement it in the MC to compare with data. Then, this data will give us important information about the response of scintillators in SciBar detector.

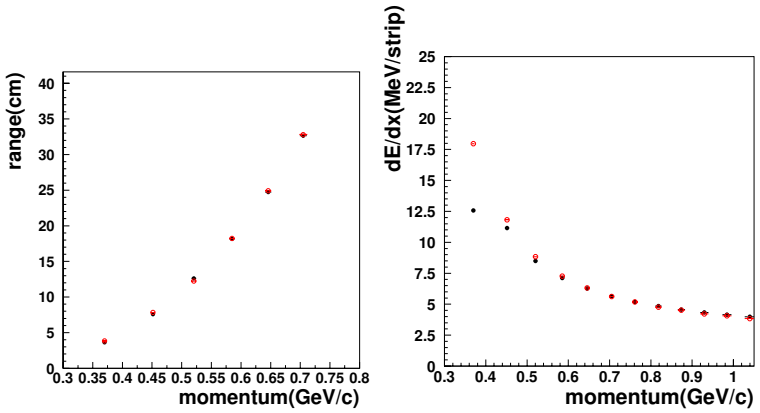

Figure 1: Measured range (left) and dE/dx (right) of protons in scintillator as a function of momentum. Black (red) points represent data (MC).