Test of π/μ identification by the Emulsion Cloud Chamber (T512,T523)

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We have performed an experimental study of π/μ identification in the end of their ranges using an Emulsion Cloud Chamber(ECC) detector with secondary beam (IT π2) produced by the KEK PS. This is very useful to reject background in OPERA [1] to study long baseline neutrino oscillation by ν_τ appearance. They will be identified by dE/dx measurement by automatic emulsion readout system called Ultra Track Selector(UTS) [2] at the scanning laboratory of Nagoya University, Japan.

We obtained hundreds of stopping π and stopping μ in Oct. and Dec. 2002 exposure by setting up ECC after Lead dump having the thickness of 58cm designed for stopping +1GeV/c beam particle. ECC target is consist of Pb ECC part for dE/dx measurement and bulk ECC part to detect decay topology. Tracks passing through both parts are identified independently to perform cross check. So far 21 stopping π and 44 stopping μ are identified by detecting $\pi \to \mu \to e$ and $\mu \to e$ decay in the bulk ECC by means of manual scanning. In parallel, the basic performance of UTS for dE/dx measurement is tested by exposing +1.2GeV/c beam to ECC in Nov. 2002. π and proton are clearly separated by pulse height analysis which reflects dE/dx through the total length of 3mm in nuclear emulsion along tracks (Fig.1). This result shows pulse height analysis have enough sensitivity to separate stopping π and stopping μ. We will finalize π/μ identification until August 2003.

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References

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[2] S.Aoki et al., Nucl. Instrum. Methods B **51**, 466 (1990);
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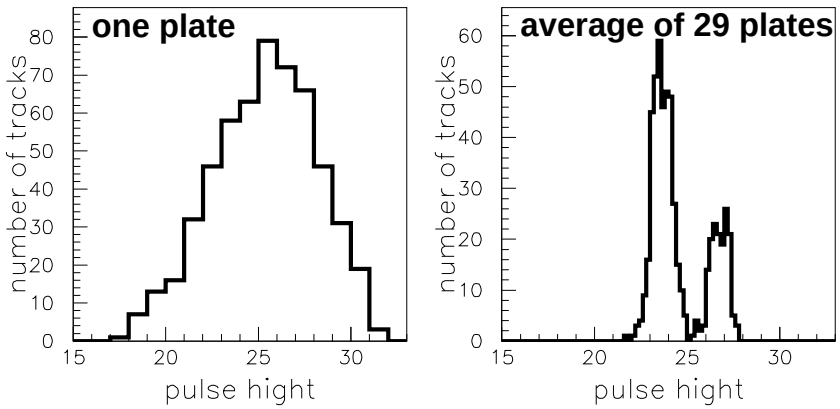

Figure 1: Pulse hight distribution obtained by 88μm(left) and $\sim$3000μm(right) emulsion. In right figure there are two peaks corresponding to π(lower pulse height) and proton(higher pulse height).