

## Report on T526 and T542

### Study of scintillating fiber tracker for the MICE experiment

In order to study basic performances of scintillating fiber trackers, we have performed two test experiments T526 and T542. Results of these experiments are applied to the tracking detector for the international Muon Ionization Cooling Experiment (MICE). In the MICE experiment to minimize the effects of the background x-rays from RF cavities and the multiple scattering, the smallest fiber that yields enough light for efficient tracking will be used. Candidates for photon detector are the Visible Light Photon Counter (VLPC) that is a baseline option and the multi-anode photomultiplier tube (MAPMT).

Main purposes of the test experiments were measurement of (1) light yields (2) timing resolution and (3) the cross talk effects with small fibers. In the T526 experiment, we used MAPMT (Hamamatsu 5900U-00-L16) as a photon detector. A SCSF-78M (Kuraray) fiber with 300um-phi yielded 0.5 photo electrons for MIPs, and r.m.s. of timing distribution was 3.0 nsec. It was dominant by emission time distribution of scintillating photons. With such a small fiber, cross talk to neighbor fibers was not negligible.

SCSF-3HF (Kuraray) fibers have been investigated in the T542 experiment. A PMT (Hamamatsu R7899MOD) that has an extended green photo cathode was used. Dependence of light yields and cross talks on the concentration of the secondary dopant (3HF) have been studied. Figure 1 shows light yields of 350um-phi fibers for some concentration. No evidence of cross talks was observed.

Based on these results, formulation of fiber was selected and a prototype of the MICE scifi tracker has been constructed.

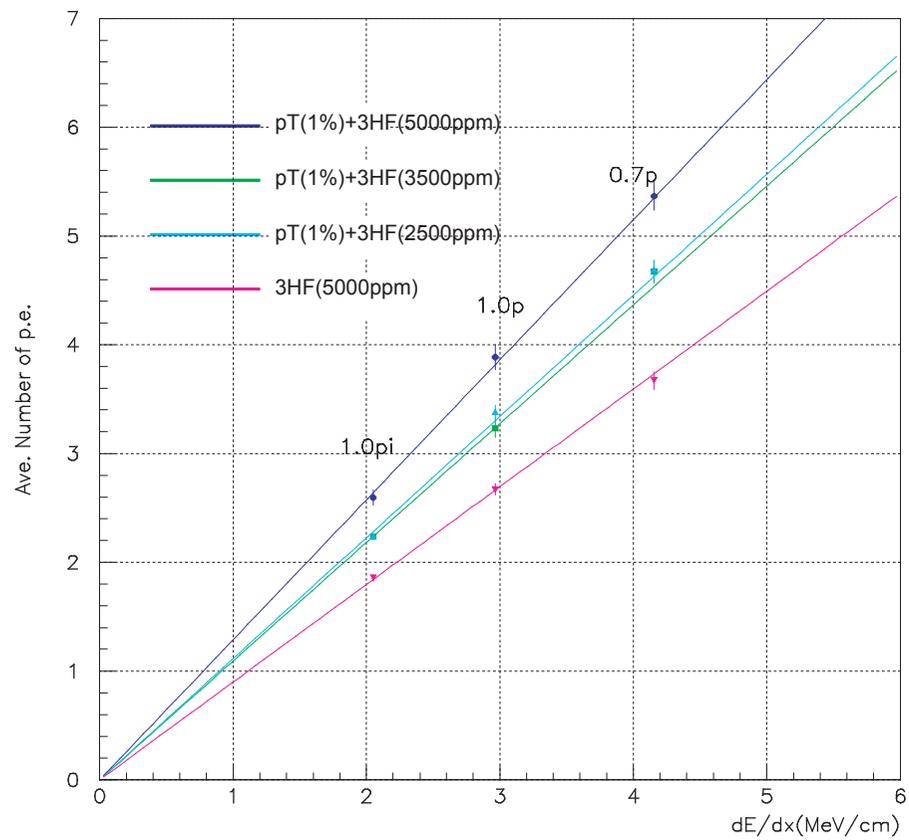


Figure 1. Average numbers of photo electron for 350um-phi SCSF-3HF fibers as functions of the expected energy deposit in a fiber.