

Scintillating Fiber Detectors for Precise Time and Position Measurements Read Out with Si-PMs

We present the development and performance of compact scintillating fiber detectors read out with silicon photomultipliers for tracking and timing to be used with different particles (electrons, protons, heavy ions) at very high particle rates (in excess of a MHz per SciFi readout channel). The compact size, fast response, and insensitivity to magnetic fields make these detectors suitable for a variety of applications. Several fiber layers are staggered into ribbons. We are considering different readout scenarios in which a) each fiber is individually coupled to a single photo-sensor and b) fibers are arranged in columns and coupled to Si-PM arrays.

In particular, we will present the SciFi tracker / time of flight detector, that will be used by the Mu3e experiment at PSI to reduce combinatorial backgrounds in the search for the lepton flavor violating decay $\mu \rightarrow e e e$ at very high rates. The design and performance of this detector will be discussed. We also present the SciFi beam position detectors that will be used by NA61 at CERN to track the incoming heavy ion beam particles. We will discuss the performance of this detector and saturation effects due to the very high light yield obtained with incident heavy ions.

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Track Classification: Scintillating Detectors