American Linear Collider Workshop  
Cornell University  

MAPMT's & Front End Readout:  
Initial Tests and Issues for System Calibration  

Scintillator Based Muon System R&D for a Linear Collider  

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Motivation

economy of MAPMT's makes possible the large channel count needed for a fine-grained scintillator detector

<1000 channel readout needed for a prototype system

develop expertise to specify a larger system

General Considerations

1 pC charge = gain of $\sim 6 \times 10^6$

1 pC in a 5 ns pulse into a 50 ohm load = 10 mV amplitude

advanced testing and characterization of M-16 and M-64 phototubes by MINOS collaboration, HERA-B RICH detector
Charge calibration system for pmt anode pulses

pulse generator - HP 8082A
digital oscilloscope - Tektronix TDS 340
multi-channel analyzer - LeCroy QVT 3001

comparison of QVT versus oscilloscope measurement of charge
MINOS base

NIM HV supply - Bertan 375 X
Voltage vs Current for Photo-multiplier Tube
Fabrication of 16-hole fiber guide for pmt face

MINOS M-64 pmt

MINOS 64-hole coupler
Near Term Work Plan

• noise response of Hamamatsu M-16 pmt with MINOS base

• measurement of M-16 anode charge for single photo-electrons

• dependence of above on pmt HV and anode channel

• fabrication of led-driven clear test fiber

• pmt response to led pulse with timing gate

• purchase 4-8 pmt's for prototype detector

• calibrate and monitor long term stability of these pmts
In-Situ Calibration and Stability of a Large Scale System

• experience from CDF:
  
  end plug calorimeters have scintillator/fiber/pmt construction
  
  long term gain changes from accelerator injection losses
  
  led, laser and radioactive source calibration

• led and source calibration recommended for Linear Collider Muon Detector