Forward Tracking Hodoscope Status Report

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SANE Collaboration Meeting XIII

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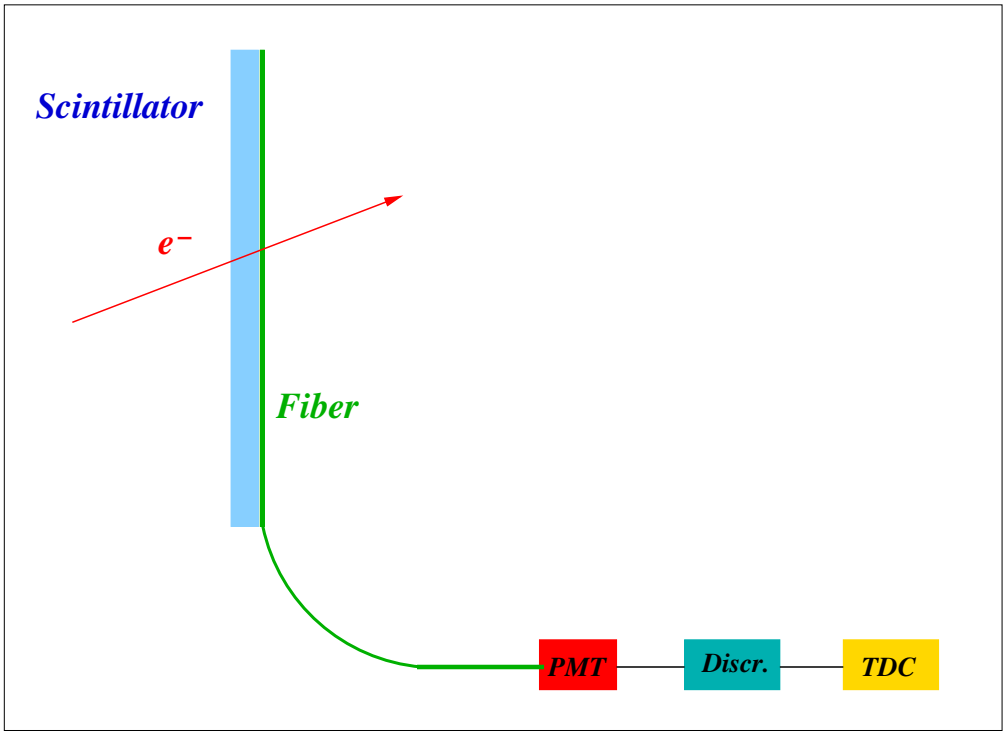
Tracking Hodoscope Design

- *Bicron BC-408 Plastic Scintillator (λ_{emit} ∼425 nm) 3 mm × 3 mm square bars.*
- *Bicron BCF-92MC multi-clad blue-green WLS Fiber (λ_{abs} ∼415 nm, λ_{emit} ∼492 nm) 1.2 mm ∅, 2.5 m long.*
- *Located 50 cm downstream of target directly in front of gas Čerenkov.*
- *Size: 40 cm (vertical) × 22 cm (horizontal).*
- *Position resolution: $\sigma_y \sim 0.9$ mm.*
- *133 bars along vertical and 73 along horizontal.*
- *Two Y planes offset by 1.5 mm for redundancy (266 bars).*
- *One X plane (73 bars).*
- *Total of 339 bars.*
- *WLS fiber glued on to scintillator surface along length of bar.*
- *Bar/Fiber unit wrapped with VM2000.*

Readout System

- *Single-ended readout system with multianode PMT.*
- *Discriminator plus a TDC per channel.*
- *Expected total rate from (events + bgnd.) $\sim$ 3-4 MHz, $\sim$ 10 kHz per counter.*



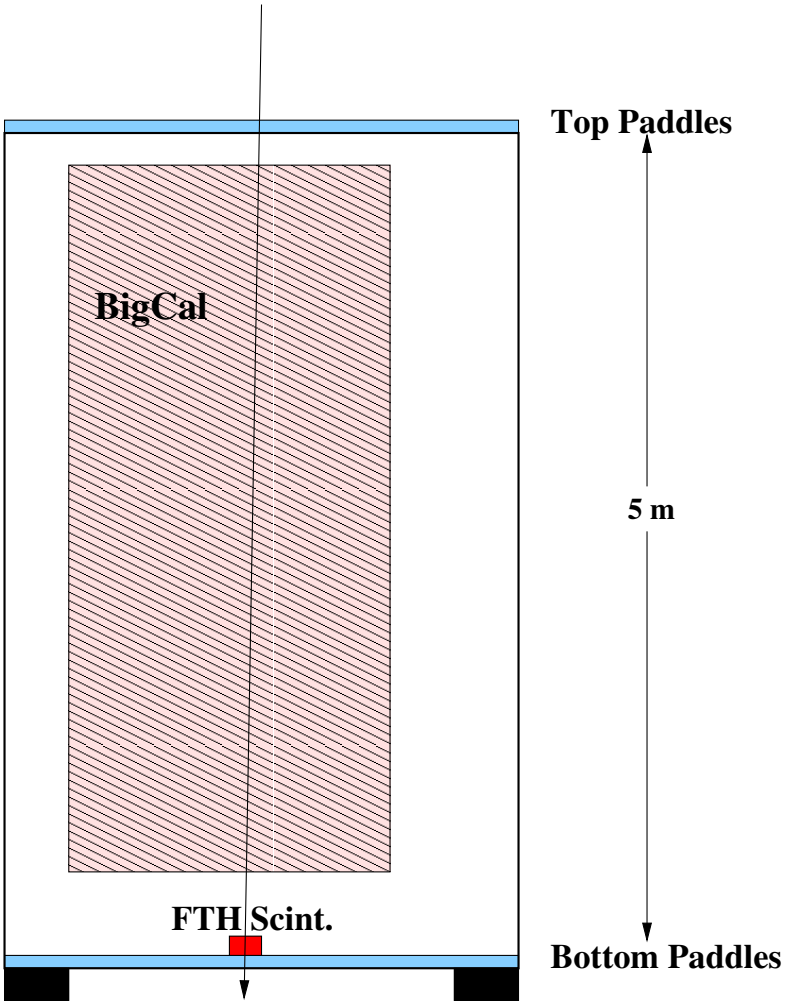
- *Hodoscope not included in event trigger.*
- *Offset Y-planes' coincidence (software) for reliability.*

Acquisition of Hardware and Electronics

• *Hamamatsu H8804 64-channel PMT*	*5 modules*
• *Y-plane scintillators* *(3 mm × 3 mm × 22 cm)*	*290 bars*
• *X-plane scintillators* *(3 mm × 3 mm × 40 cm)*	*80 bars*
• *Multi-clad WLS fibers* *(1.2 mm ∅, 2.5 m long)*	*370 fibers*
• *Accessories:* *DYMAX UV glue, VM2000 paper*	*need additional*
• *TDC's available from Hall C*	*all channels*
• *Discriminators from LEGS/BNL*	*all channels*
• *64-channel PMT signal cable*	*1 bundle on order*
• *Cables to Hall C counting room*	*TBD*

Scintillator Test Setup

- *Cosmic ray tests of scintillator w/ and w/out fibers.*
- *Study p.e. yield and fiber's light collection efficiency.*
- *Use BigCal test setup for GEP-III in Test Lab.*
- *Top and bottom paddles generate trigger.*
- *Rate very low, $\sim$ 1/5 min.*



Expected Number of P.E.'s

- *TESLA project forward calorimetry test results.*
- *$6\times6\times30$ mm^3 BC-408 w/ 1 mm $\varnothing$, 21 cm long WLS fibers.*
- *Direct readout: PMT attached directly to scintillator*

  $\langle N\rangle_{p.e.} \sim 390 \pm 50$ *per MIP.*
- *Fiber readout: PMT attached to WLS fiber*

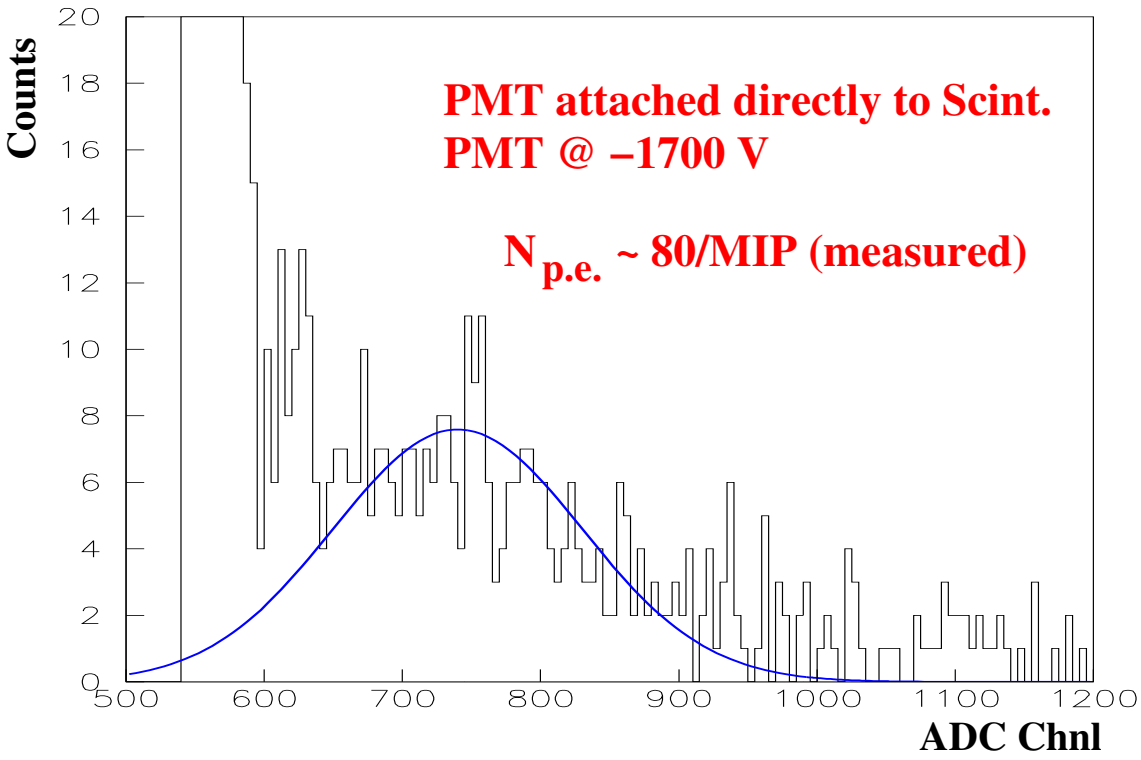
  $\langle N\rangle_{p.e.} \sim 27 \pm 3$ *per MIP.*
- *Values for obtained light yield vary within $\pm$ 15 %.*

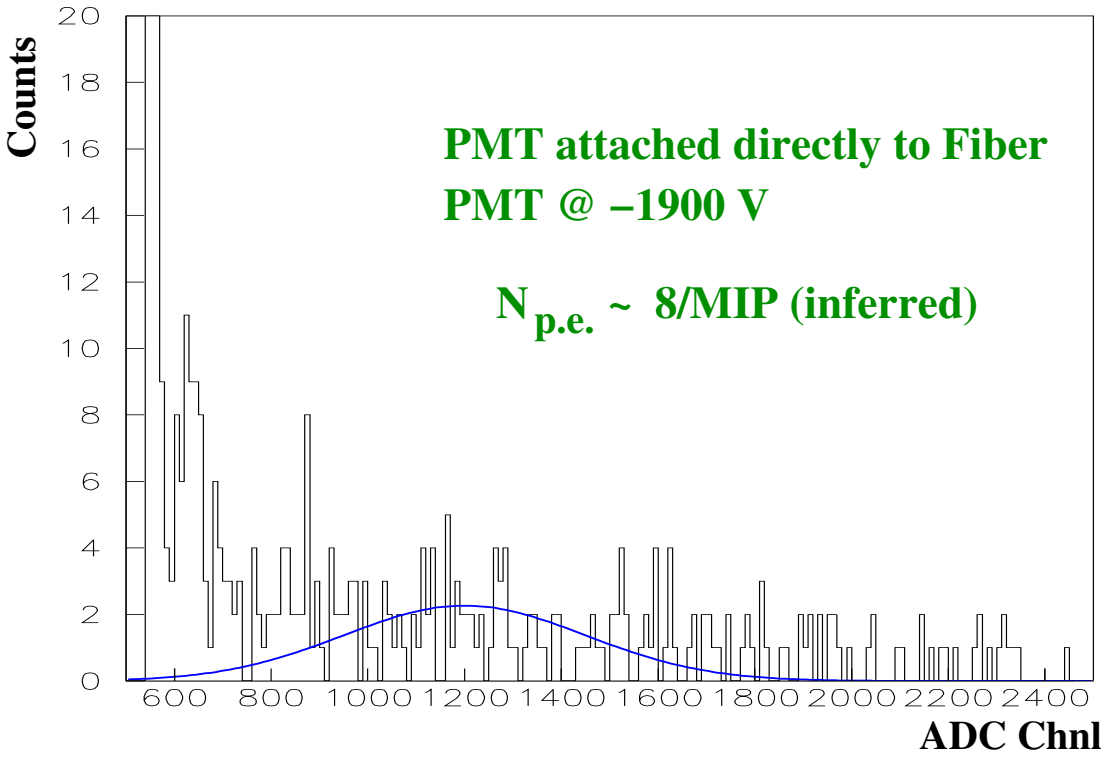
- *Expectation for SANE: WLS fiber attached to PMT*

  $\langle N\rangle_{p.e.} \sim 15$ *per MIP,*

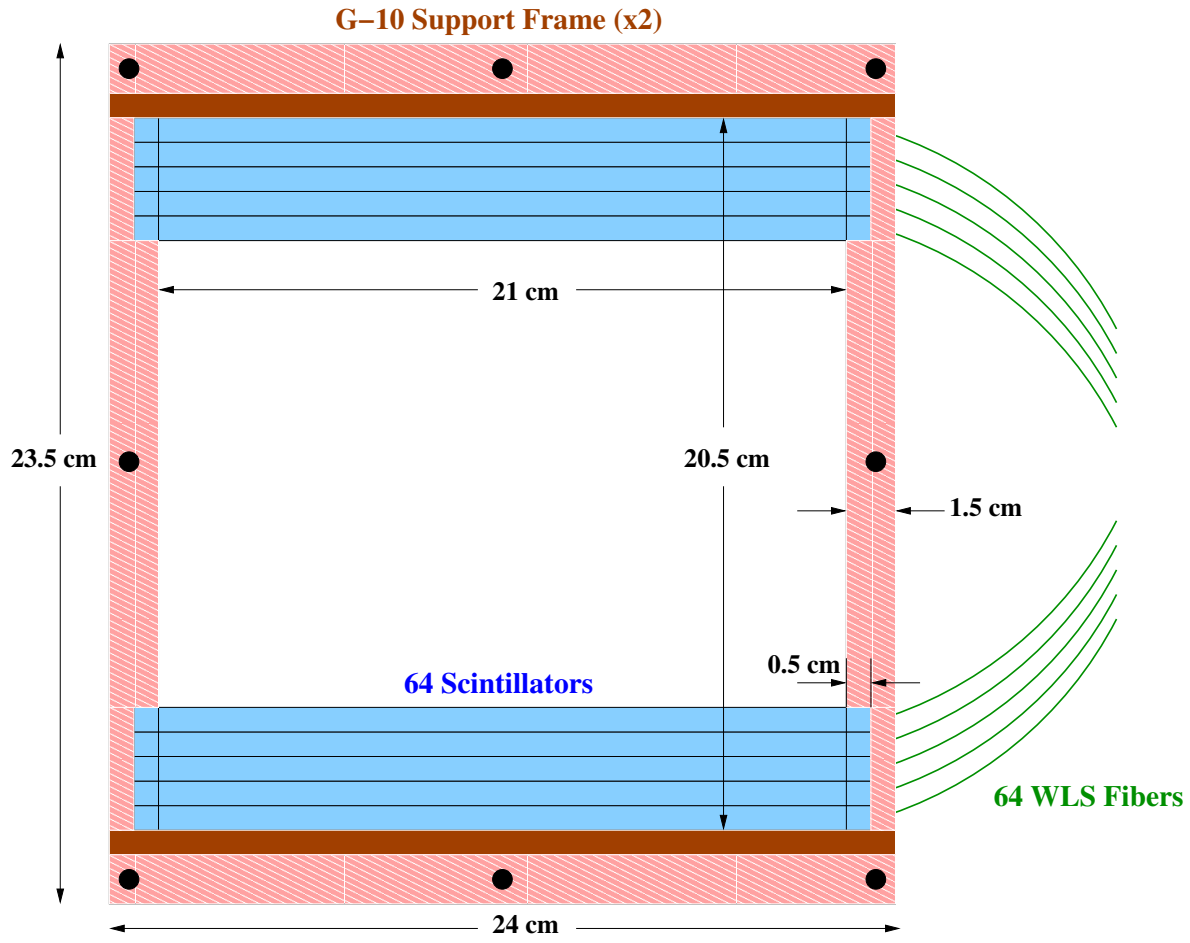
  ~ 10 *per MeV.*

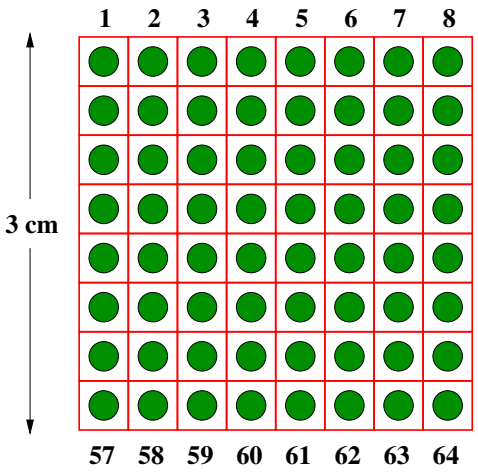
Scintillator Test Results

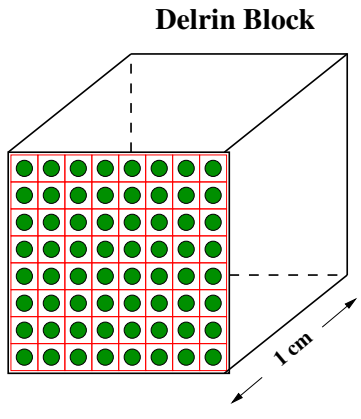




Detector Mount Support Frame







Current Status

- *64-channel Y-plane prototype in progress.*
- *Two CNU undergraduate students on-board.*
- *Preparations underway for prototype test with pions in SOS during E04-01/E06-09 in May, 2007.*
- *Need to acquire signal cables for all channels.*
- *Build complete hodoscope during summer of 2007.*