The Tail-Catcher/Muon Tracker for the CALICE test beam

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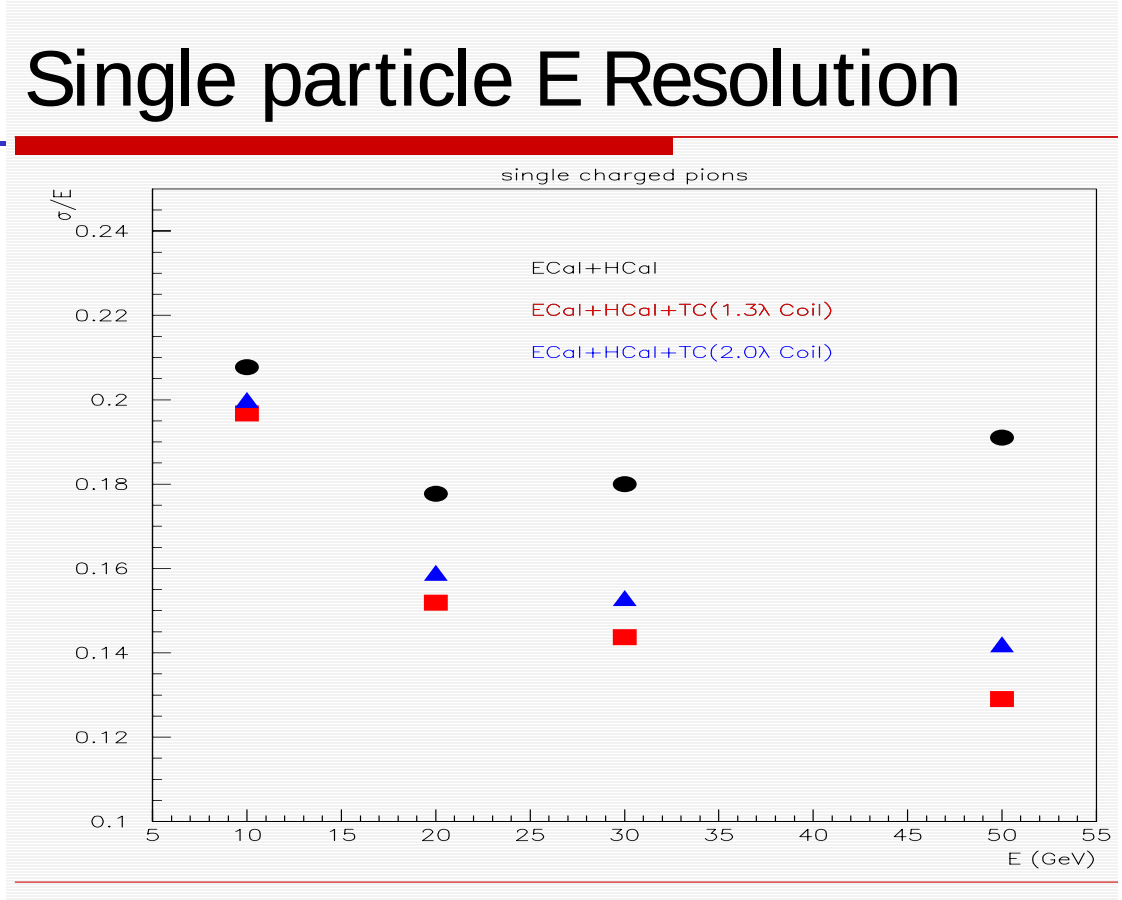
Introduction

- NICADD is building the Tail-Catcher/ Muon Tracker to study hadronic punch-through and muon tracking in the (relaltively thin) CALICE test beam module.

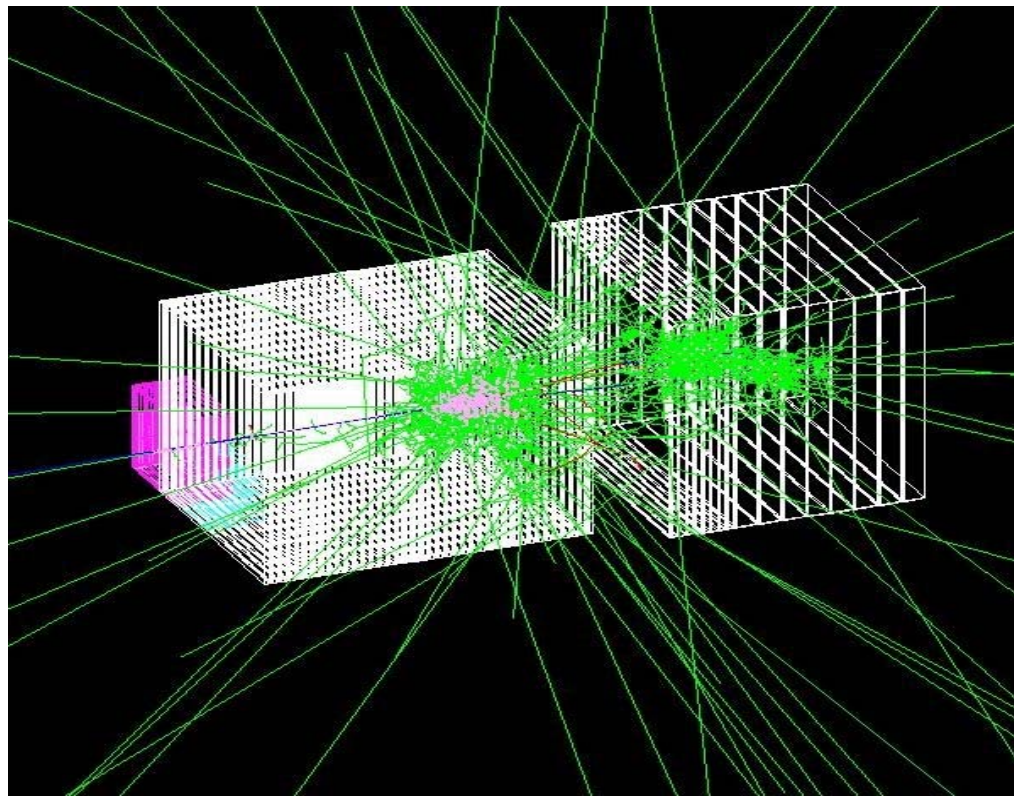


Goals

- Provide a reasonable snapshot of the tail-end of the shower for simulation validation
- Prototype detector for a generic LCD muon system
  - correcting for leakage
  - understanding the impact of coil
  - muon reconstruction and ID
  - fake rate

TCMT design

- "Fine" section (8 layers): 2 cm thick steel
- "Coarse" section (8 layers): 10 cm thick steel
- 5mm thick, 5cm wide strips
- 1.2 mm-diameter Kuraray Y11 fibers
- Tyvek/VM2000 wrapping
- Alternating x-y orientation
- Si-PM photo detection
- Common readout w/ Hcal
- Along beam: 142 cm
- Height: 109 cm
- Weight: ~10 ton

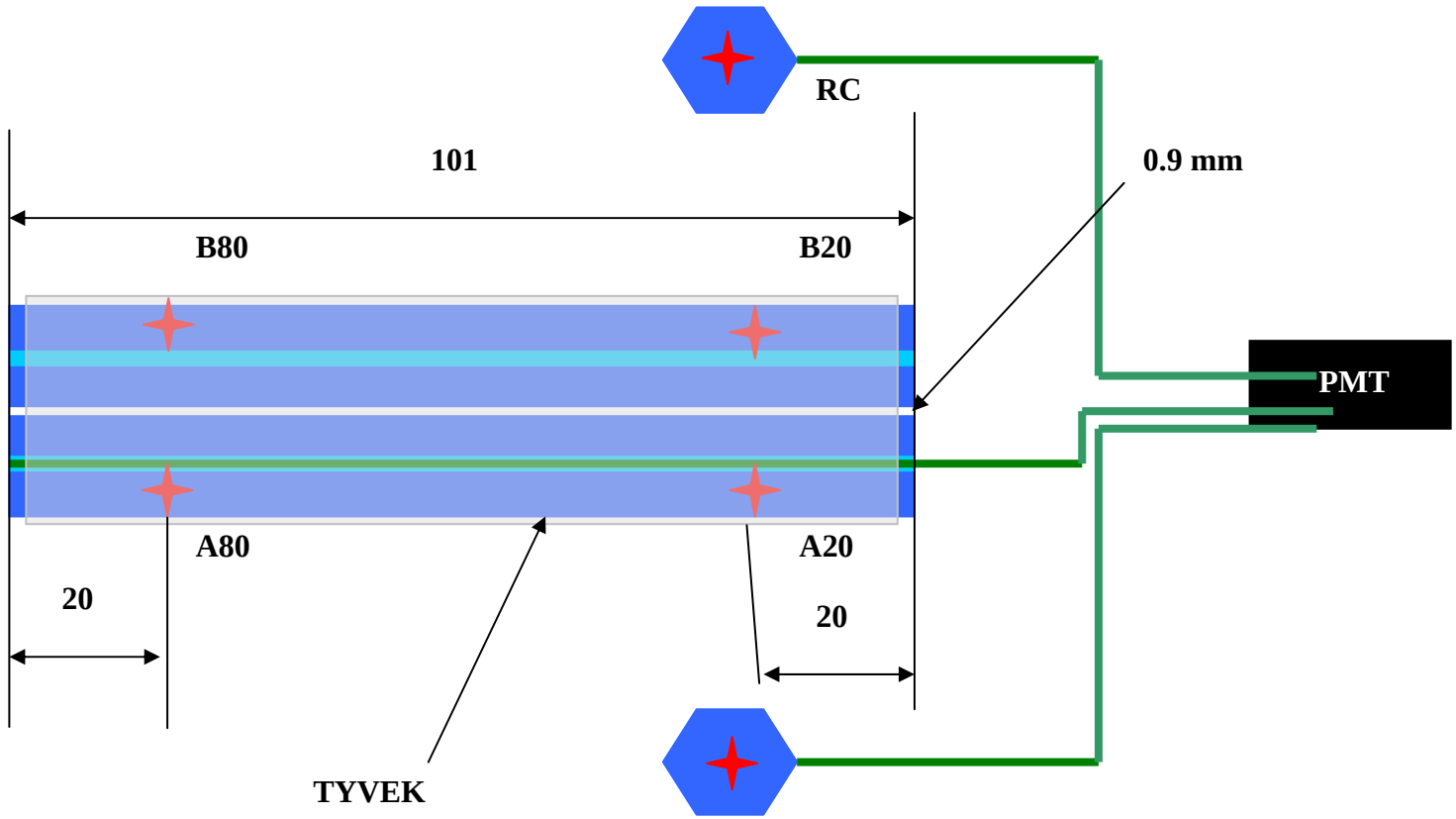


The strips

- Each 10 cm wide strip divided in 2 halves, one fiber in each half.
- All strips have been produced and passed QC tests (see A. Dychkant's talk for details).

Initial uniformity calibration

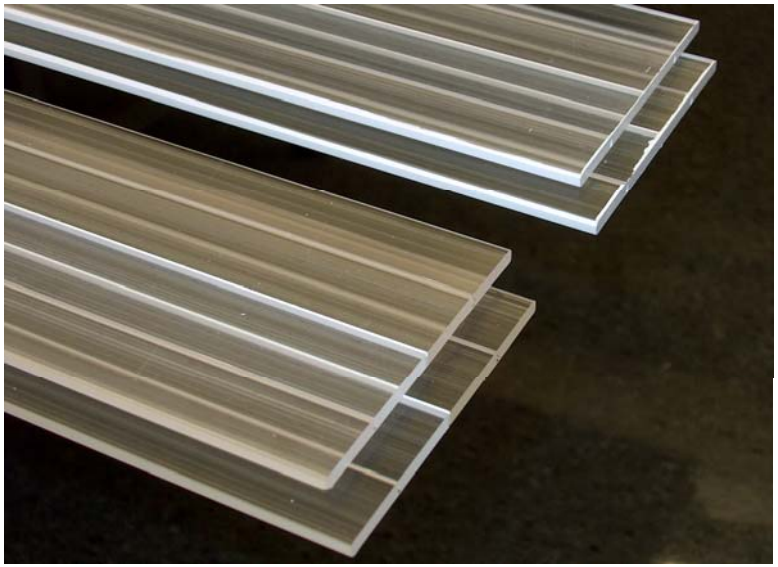
- Ref cells + strip response to Sr-90 measured w/ PMT.

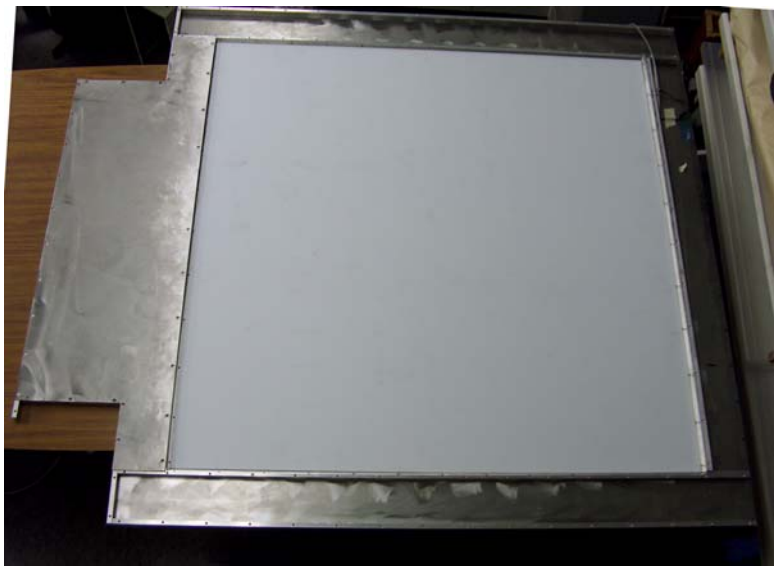


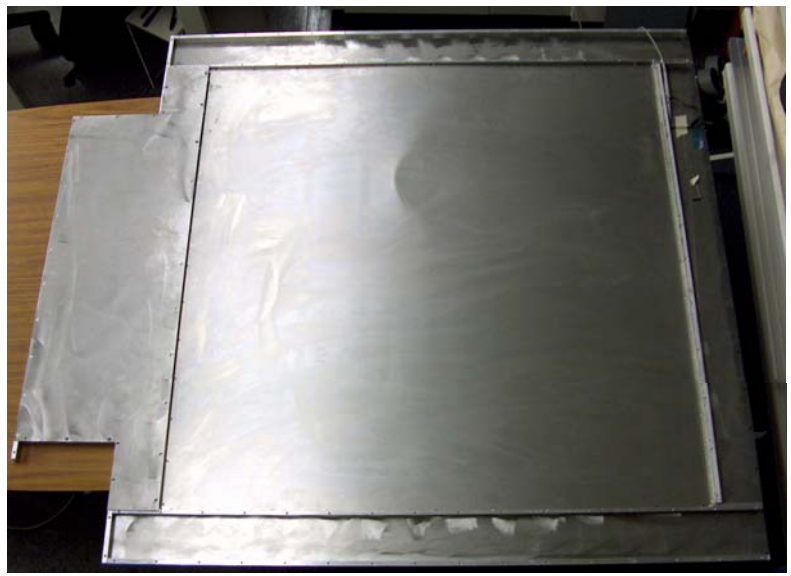
Quality of extruded scintillators

- Extruded scintillator has many potential advantages (see Dr. Kim's talk in session 2).
- Our R&D at the NICADD/Fermilab extrusion facility over the past 2.5 yrs confirms this
  - Savings in cost does not compromise reliability,
  - The response and clarity are good enough that they do not limit segmentation,
  - Uniformity is excellent in both geometry and resoponse.

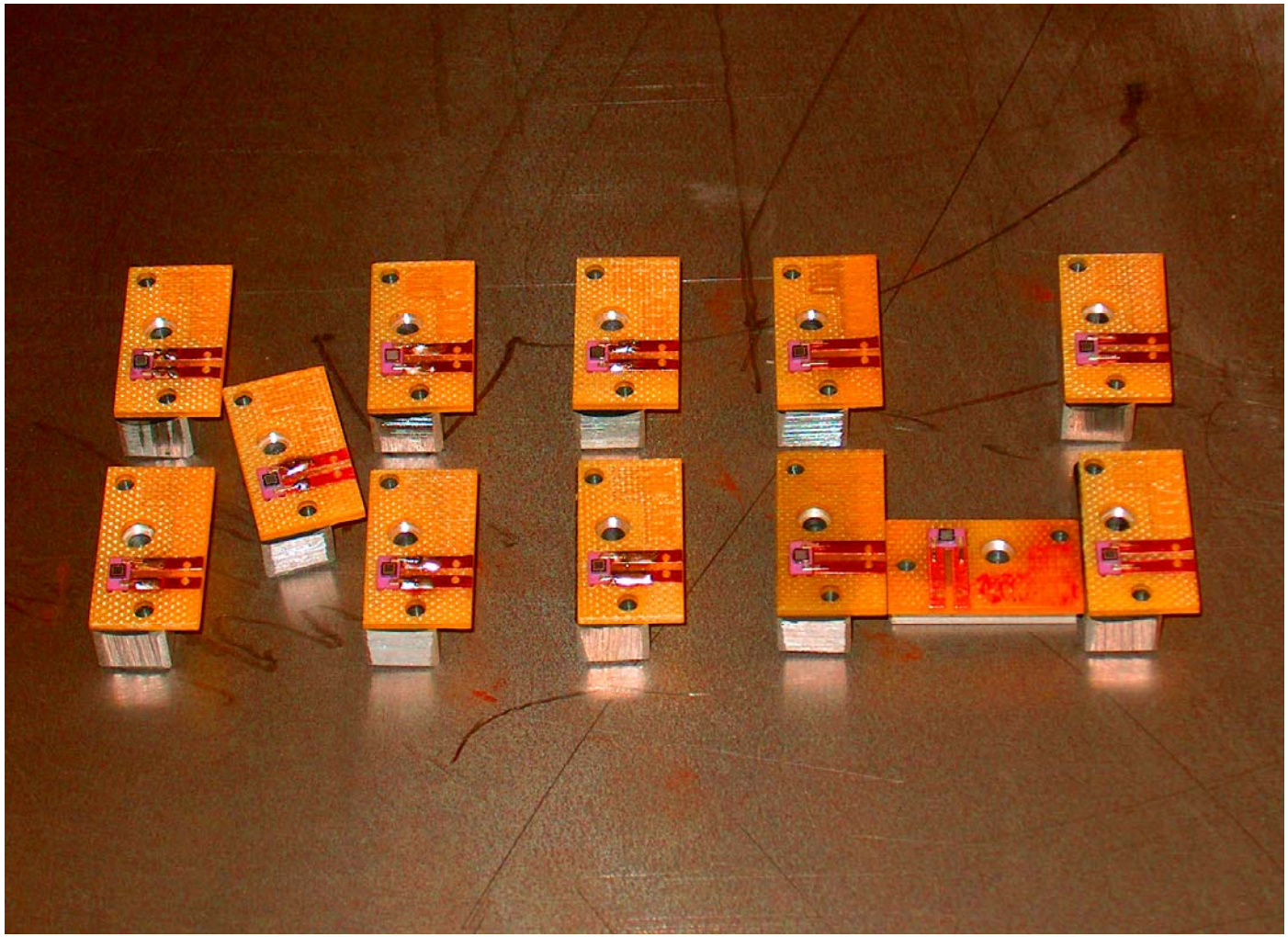
Cassette assembly



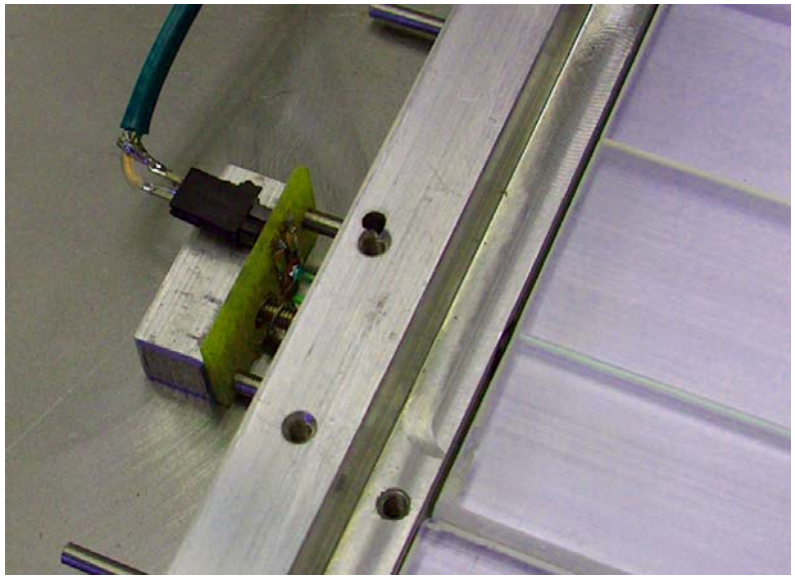


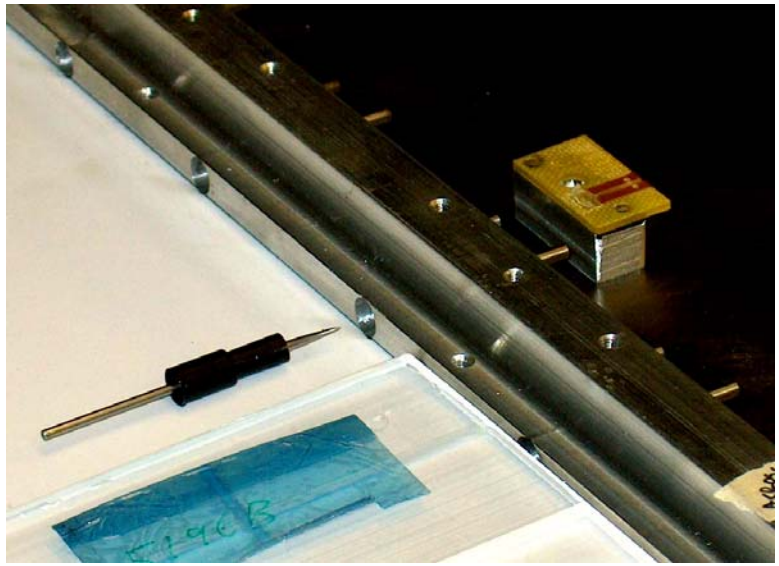


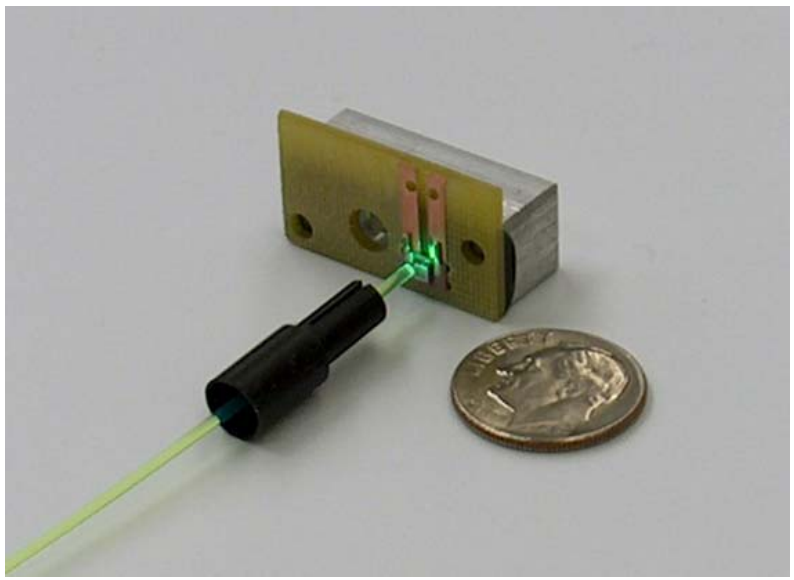
SiPM's with holders

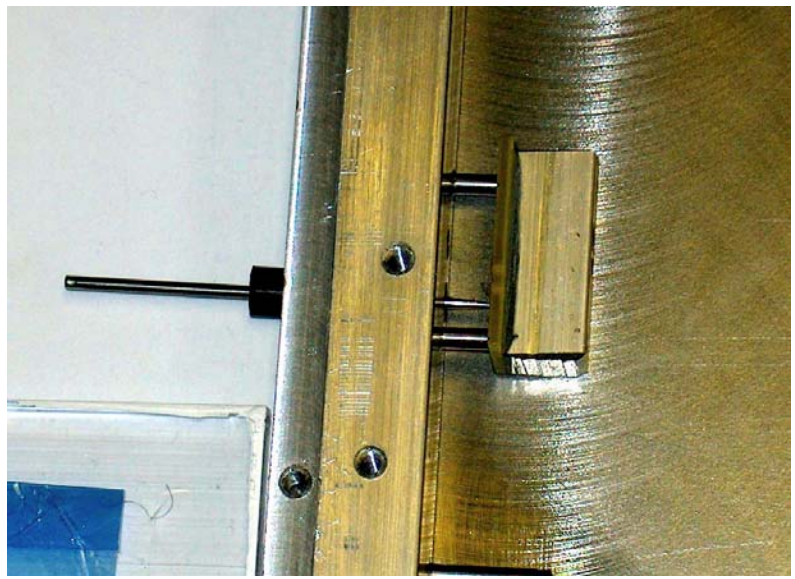


WLSF-SiPM misalignment is within 0.1 mm

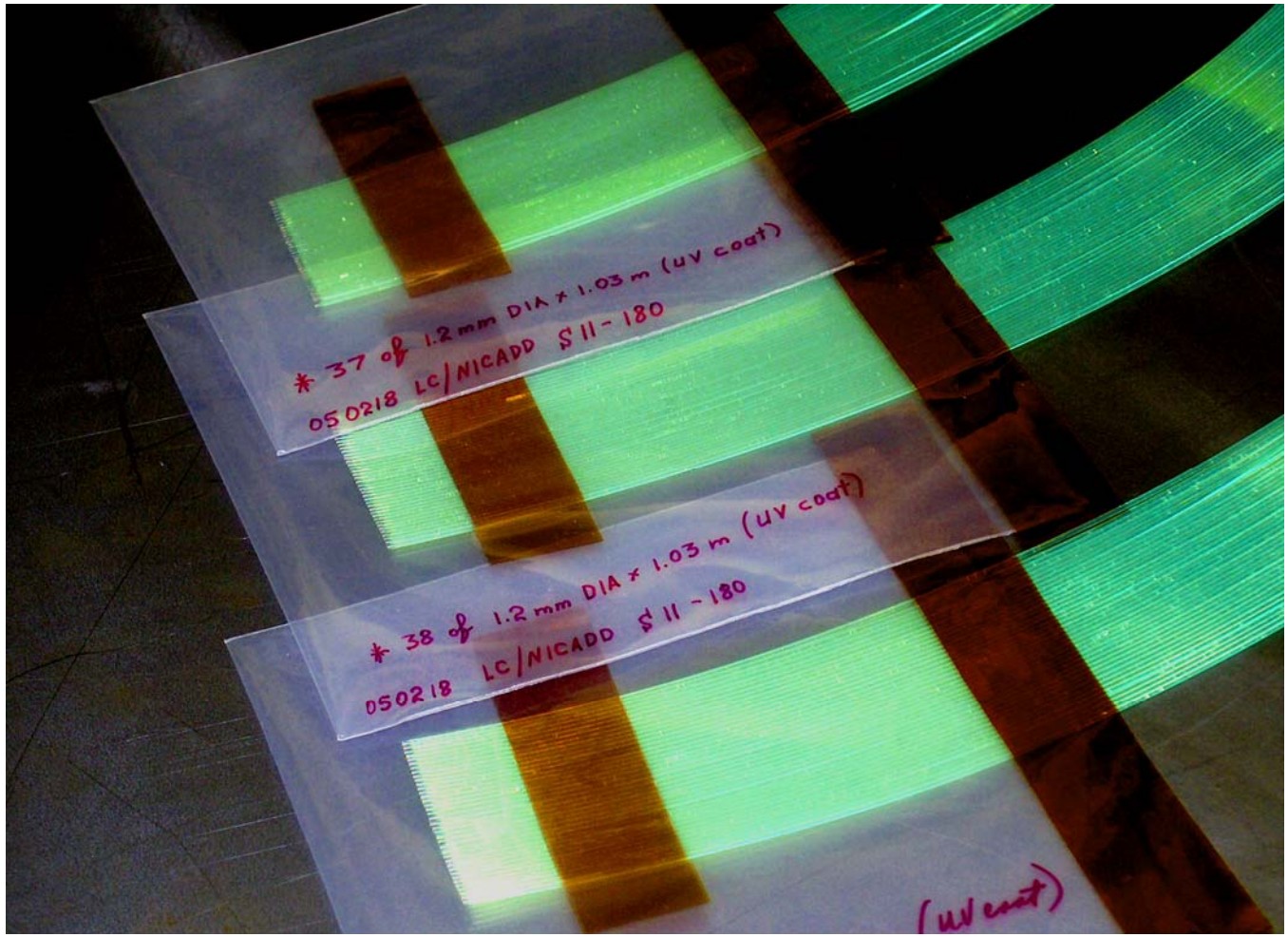






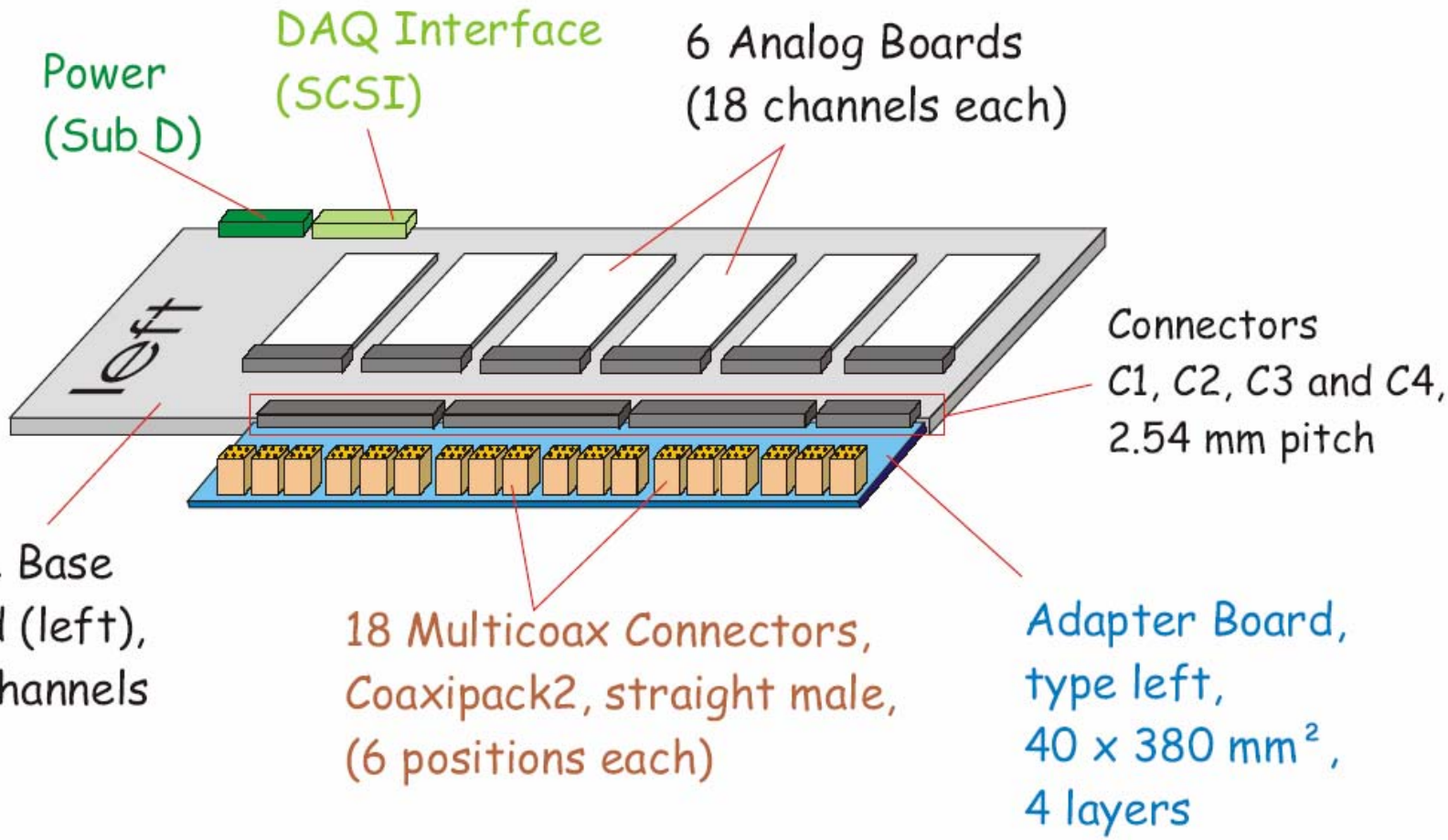


WLS fibers with UV-protected mirroring are ready for QC tests



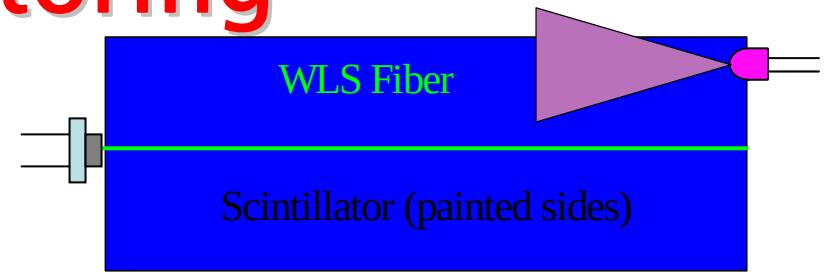
Front-end electronics

M. Reincke (DESY)

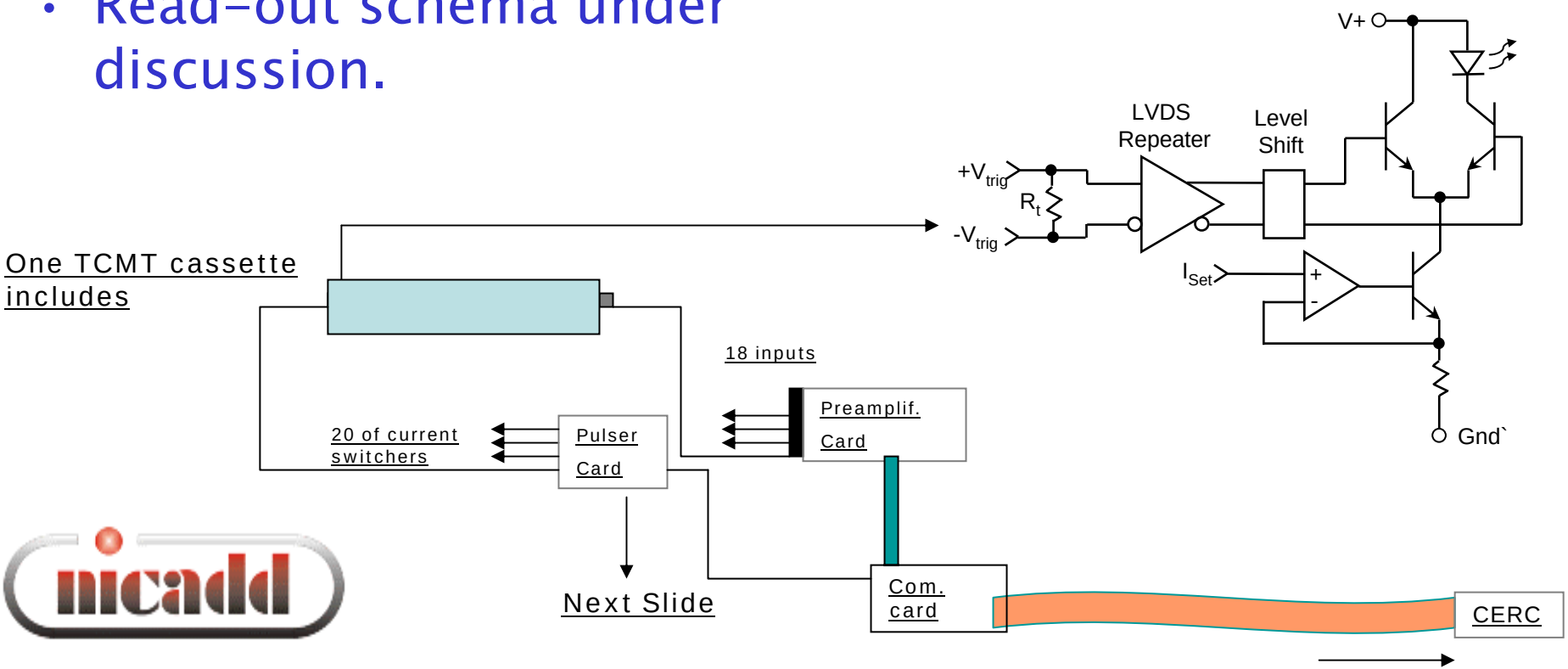


Calibration and monitoring

- Individual LED driver for each strip.
- Preliminary driver design has been proposed.
- Read-out schema under discussion.

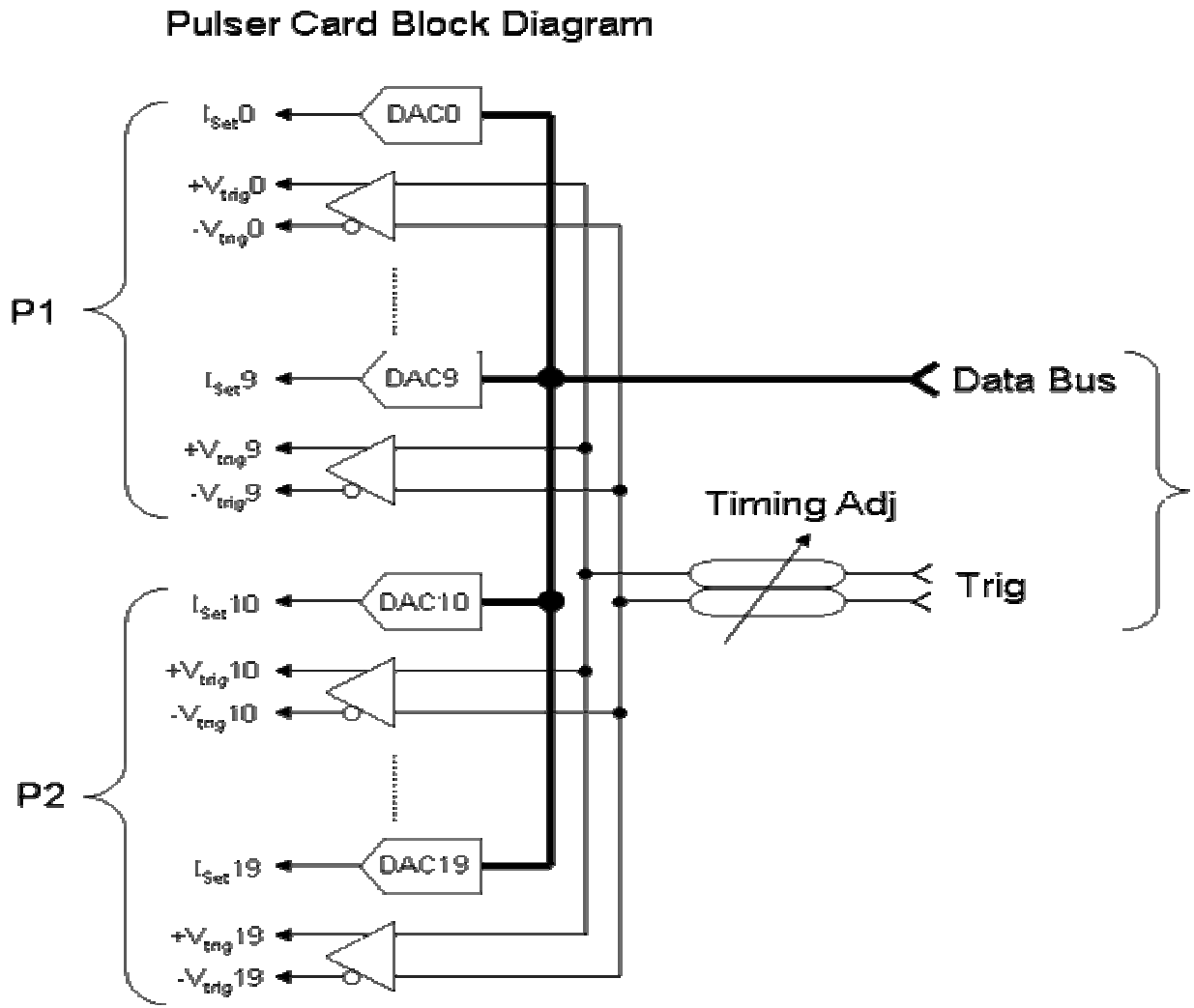


Block diagram of current switch at LED



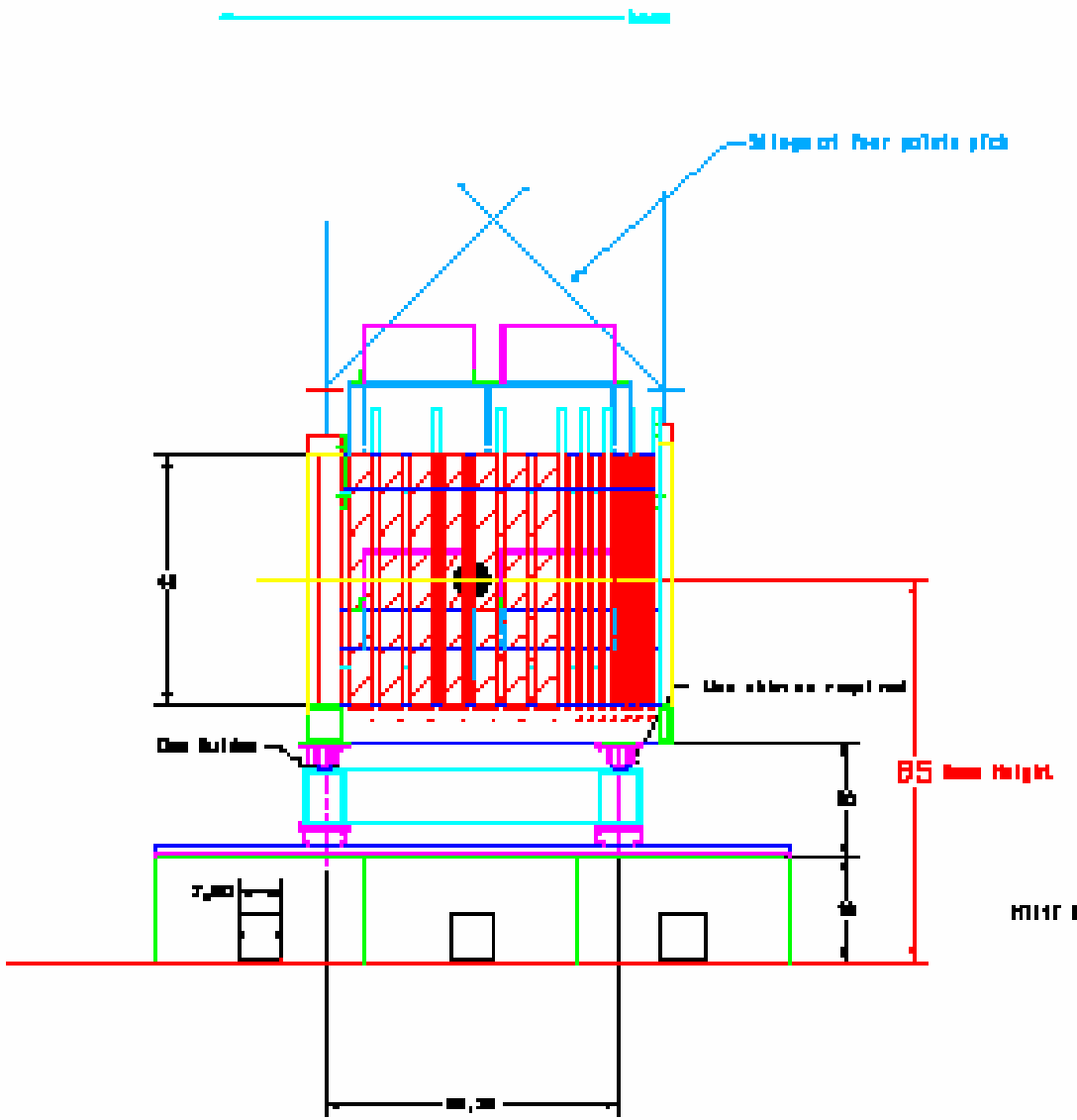
The LED driver

- Testing prototype channel this week

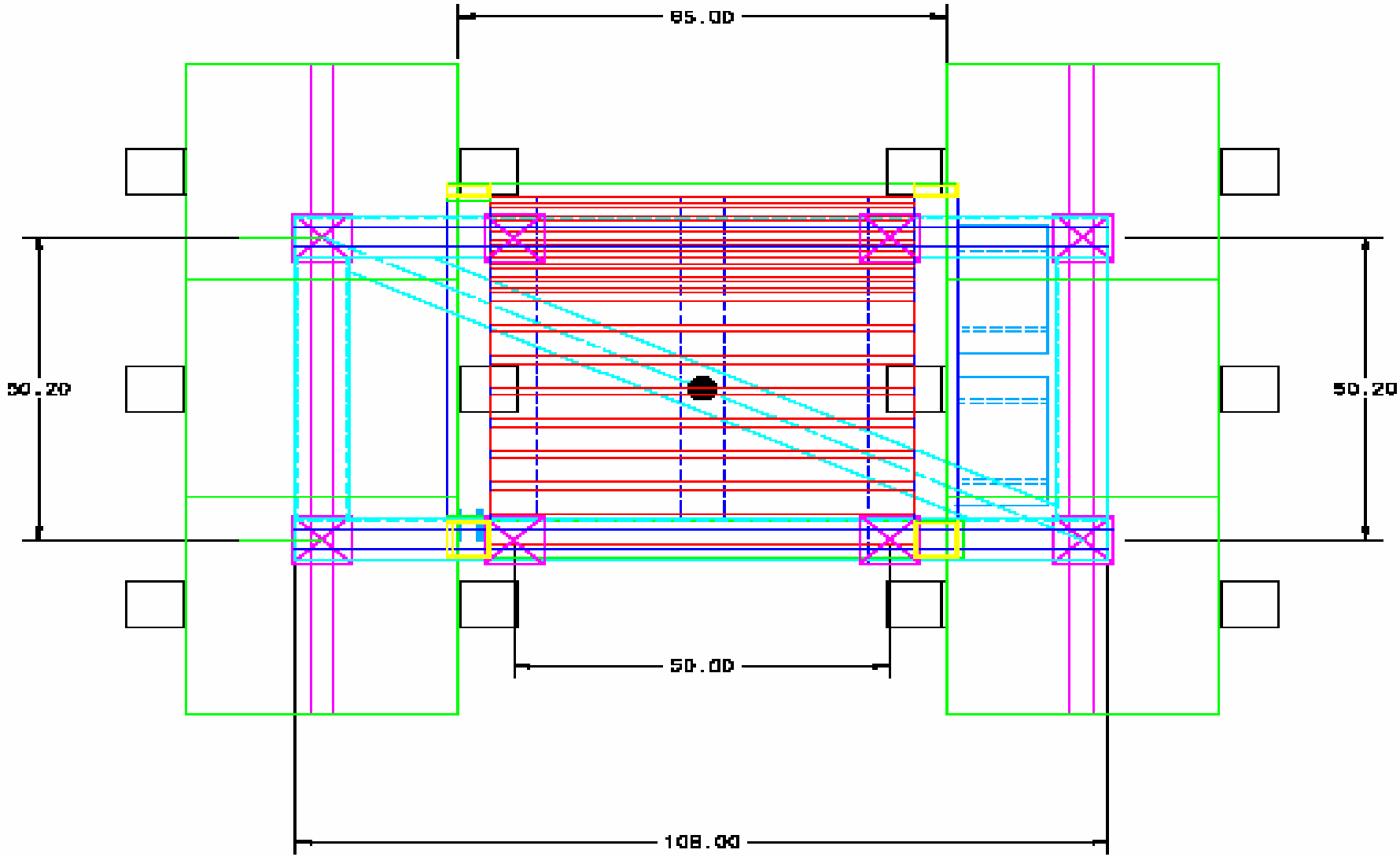


The TCMT stack at TB

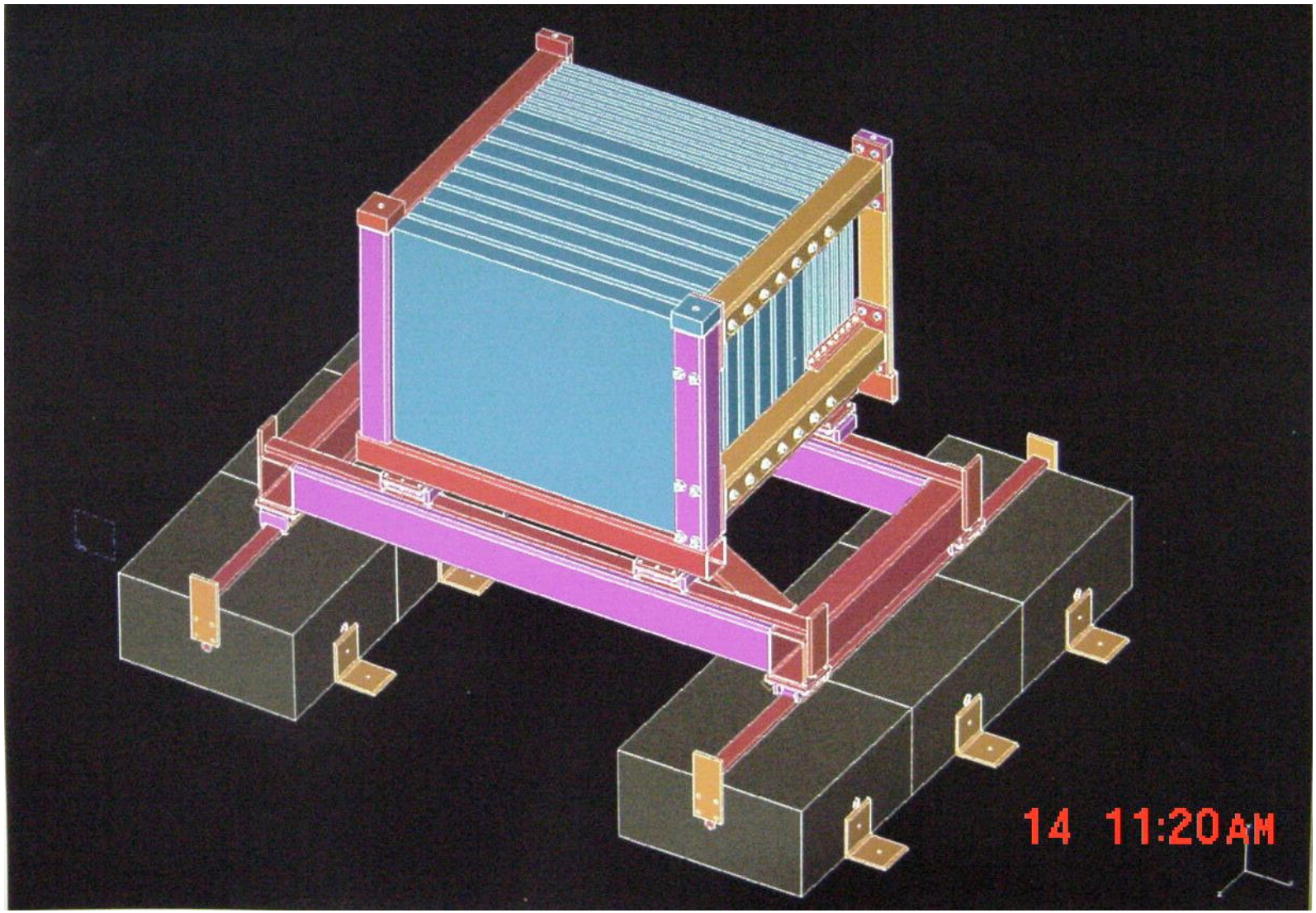
- 16 layers of NICADD extruded scint. Strips
  - 0.5 cm thick
  - 10 cm wide
- Steel absorber
  - 8 x 2 cm
  - 8 x 10 cm
- Lateral size:
  1m x 1m



The TCMT stack at TB (contd.)



The TCMT stack at TB (contd.)



TCMT schedule for 2005 beam test

- Mar-May: QC for WLS fibers, first full cassette assembly, cut absorber plates.
- Jun-Aug: Continue cassette assembly, testing with baseboard, start full-chain commissioning.
- Sep-Nov: Start extended calibration, data taking with CR triggers, CR tests with all cassettes in place.