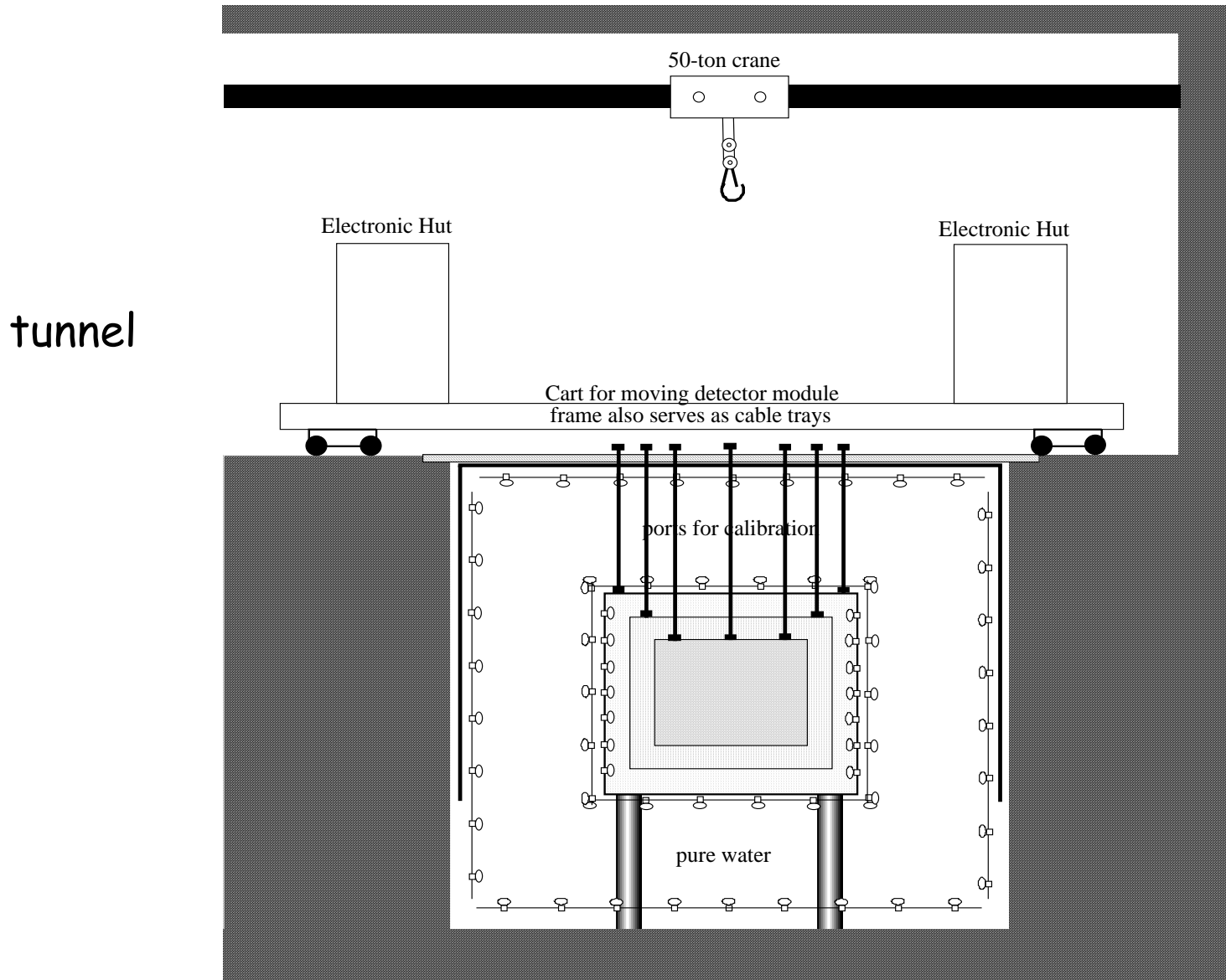


Veto with Plastic Scintillator Strips

Daya Bay Phone Meeting
Changgen Yang
2006/01/25

Conceptual Design of a Water Pool-based Detector Configuration

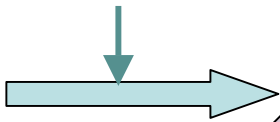


Conceptual design of an underground water pool-based experimental hall

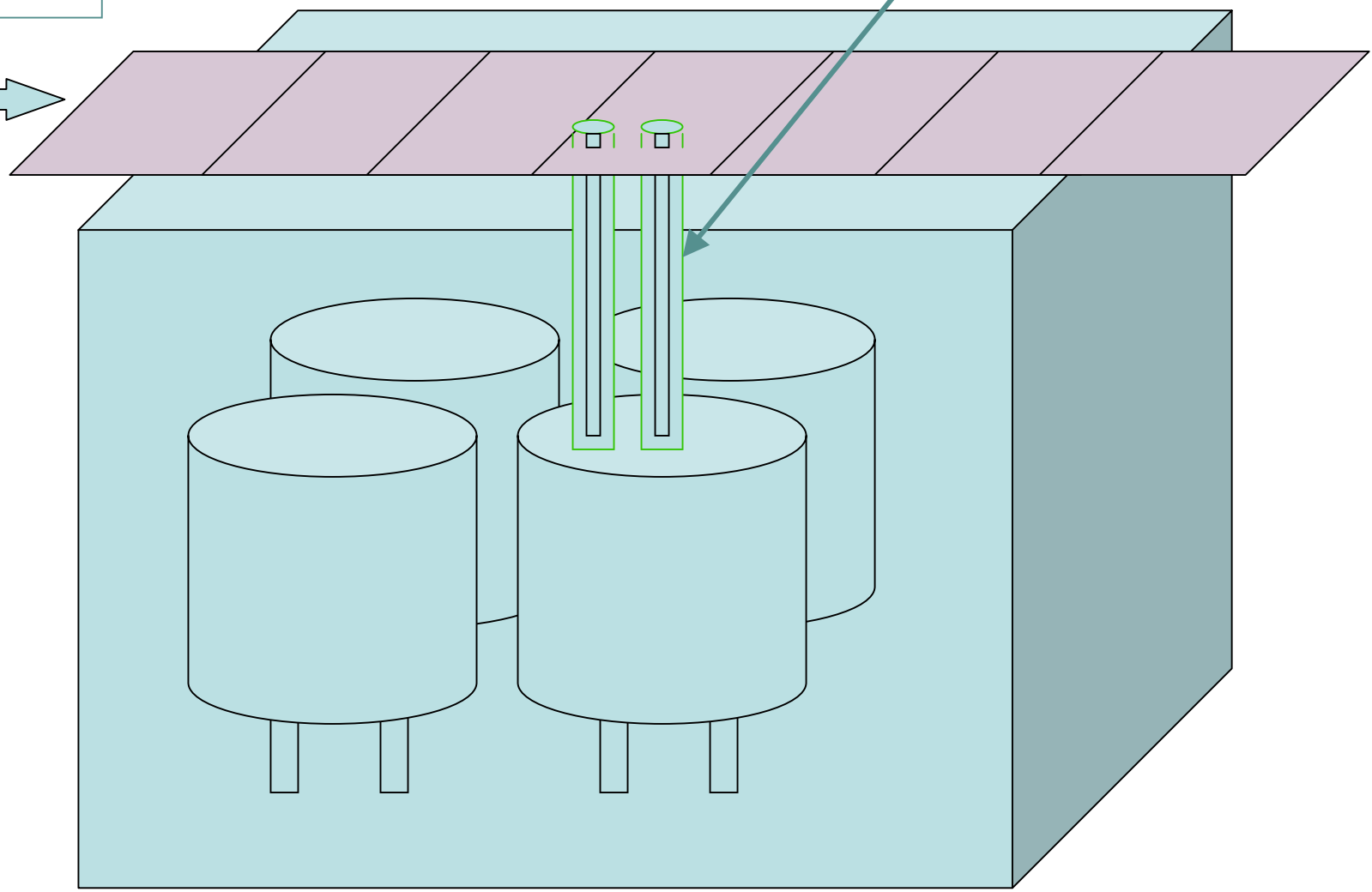
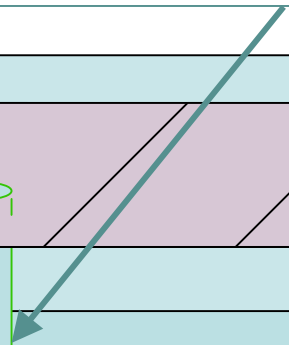
Advantages of a Water Pool-based Configuration

- Could be cheaper and faster to assemble
- Easy to accommodate bigger detector modules
- Easy to have 3-m thick of water to further reduce the neutron
- Reduce ambient radiation, e.g. ^{222}Rn , in the air or dust from entering the detector
- Muon veto and detector modules form one single active element
- Better veto efficiency (less wall)
- Could gain overburden by stacking shielding materials above the pool
- Easier to perform calibration with more open space.
- Large volume of water helps to keep the temperature of the detector relative stable
- Easier to circulate and purify water in the pool
- Better EH&S environment

Access to do
Calibration ...

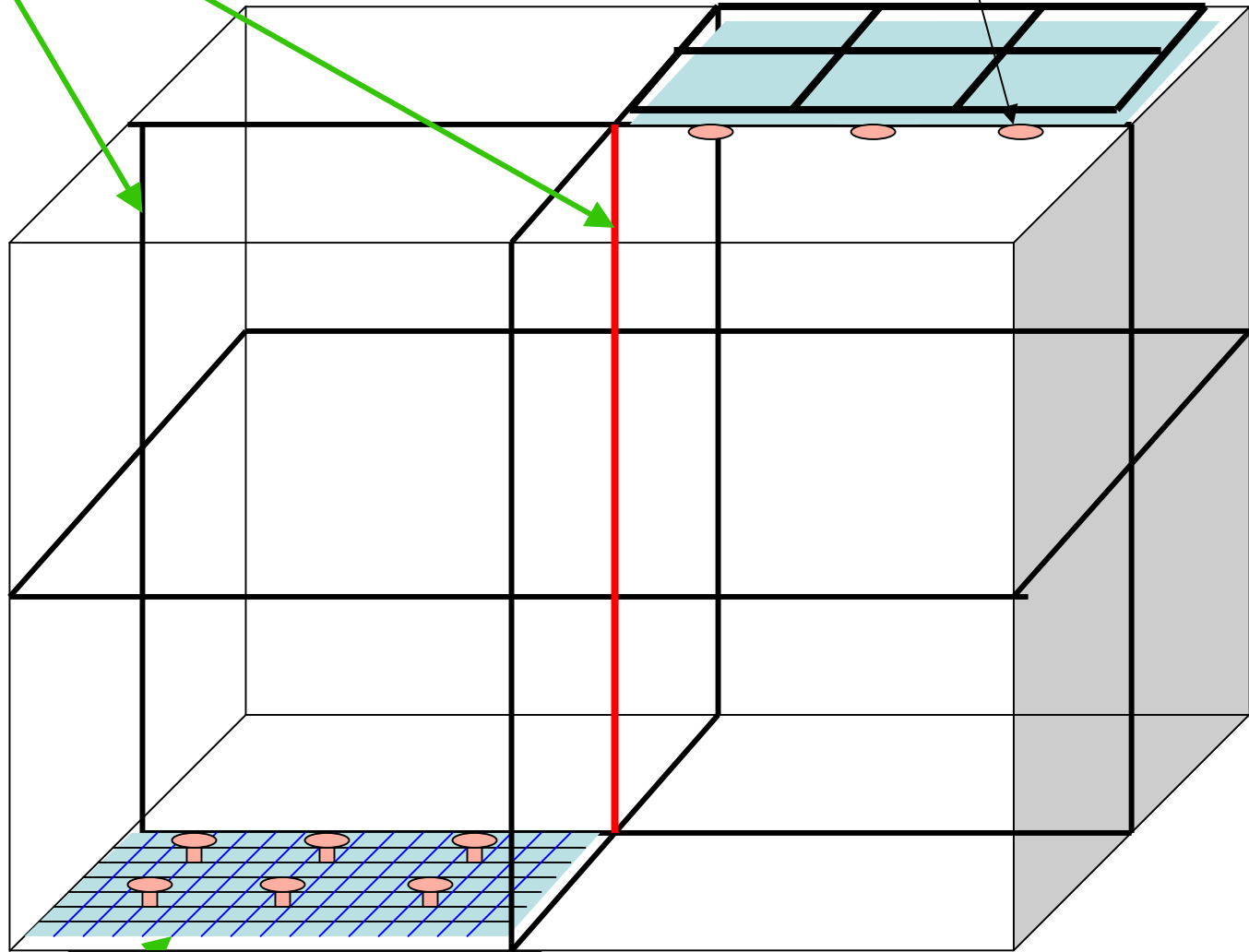


Calibration, cables ... come through these support tubes



Support Structure(SS bar)

Are these PMTs necessary?/Reflection Tevyc?



Veto Module

Veto Module is fixed on the support structure

Experimental Scenarios (Far Site)

- 4 far detectors
- Water(Swimming)-Pool (15m X 15m X 10m)
- Veto detector: modules (size: e.g., 7.5m X 7.5m, too big?)
- Veto module:

X + Y scintillator strip with fibre + Cerenkov PMT

16cm reso.?
but necessary

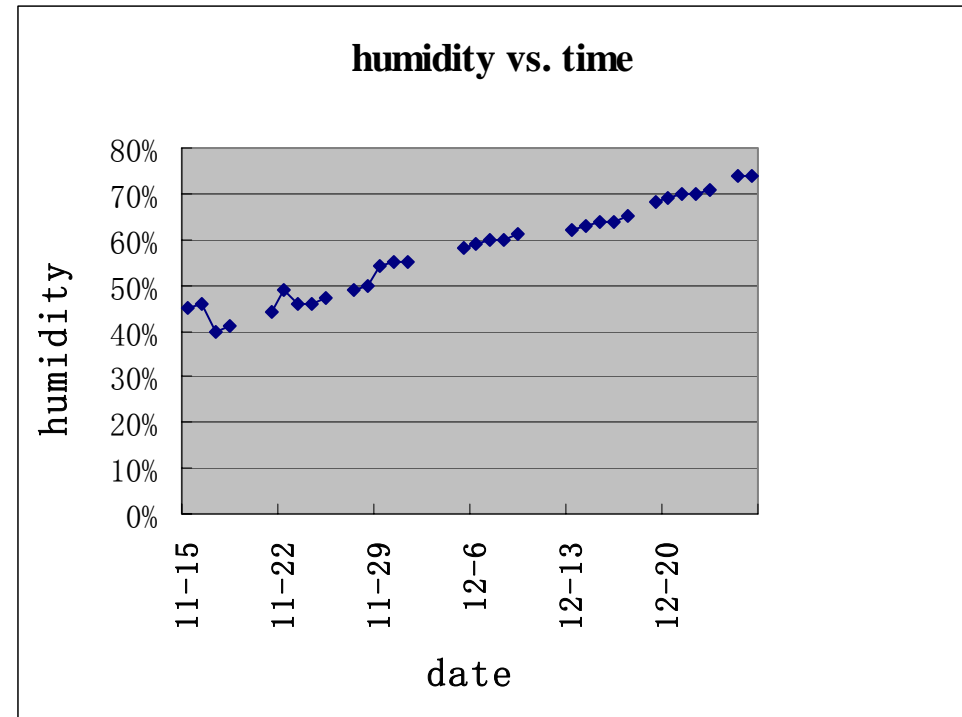
(Keep access hole for calibration, support structure and so on,
how to keep >98% efficiency? some overlap?)

Modules on top of pool need reinforce structure
- Scintillator strips are sealed in PVC/HDPE envelope
- Veto covers all direction with good track information
- Light tight problem solve by other method (turn off all lights/black cloth cover?)
- Simple + easy to control + cheaper ...

Waterproof for scintillator strips

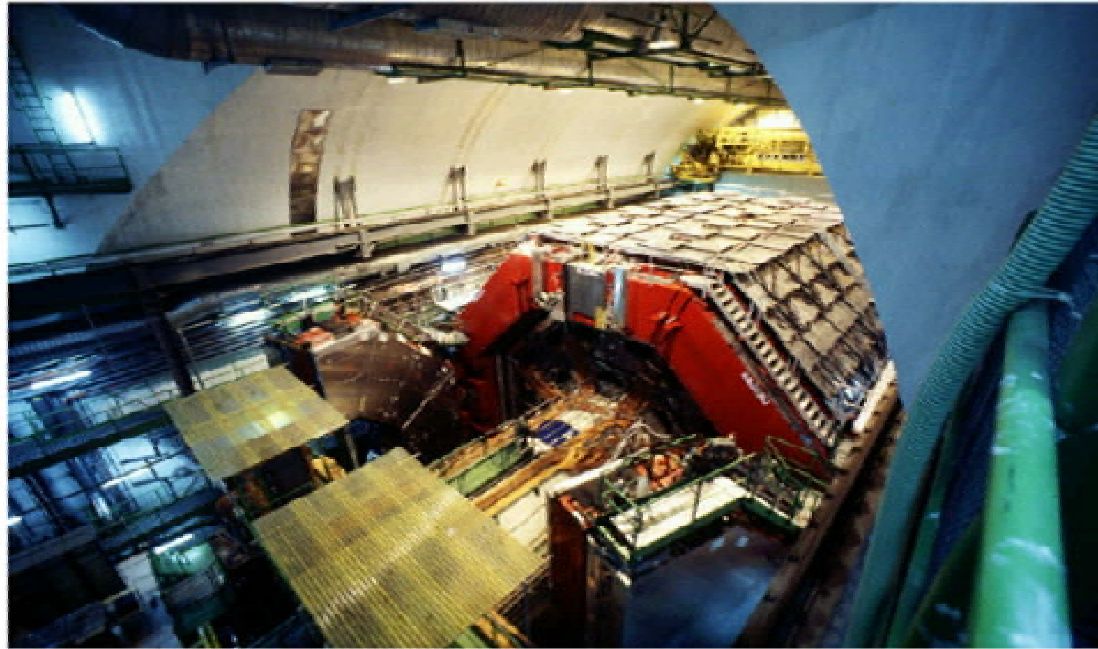
- PVC Envelope (need some kind of envelope anyway)
Water absorption rate: 0.07~0.75
melt point: ~ 60 degree
Price: Cheaper, ~ 9 Yuan/kg
Density: ~ 1.6
Thickness: 3mm
- HDPE Envelope
Water absorption rate: 0.01
melt point: Higher (70~100 degree)
Density: ~ 1
- PVC/HDPE Box are reinforced by out-side structure

Waterproof of the box



Plan to make another box with a tube to flush air for testing.

The L3+C Detector



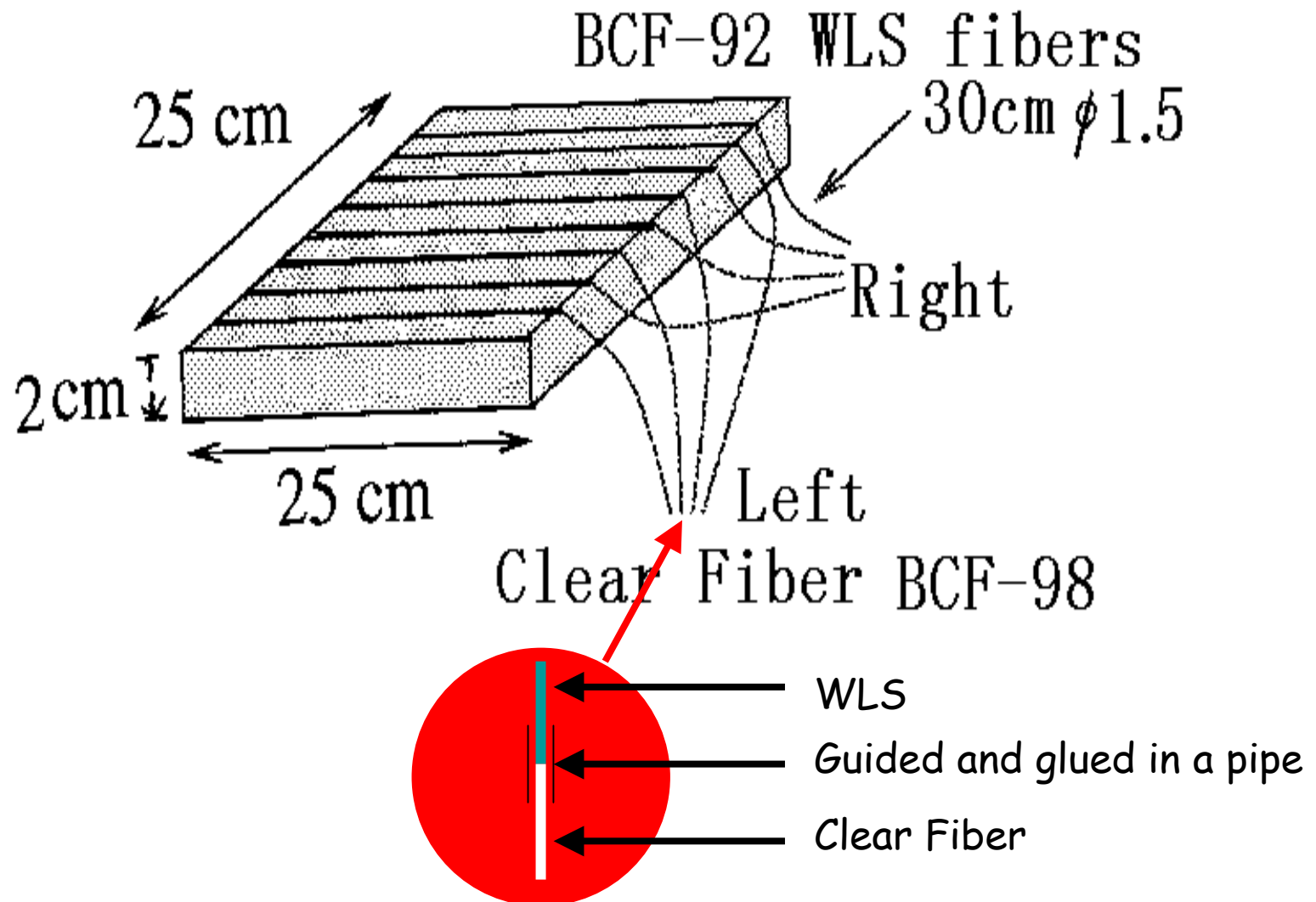
Detector:

- Magnet (0.5 T , 1000 m^3)
- High precision drift chambers
- t_0 - detector (202 m^2 of scintillator)
- 50 scint.s at surface (air shower detector)

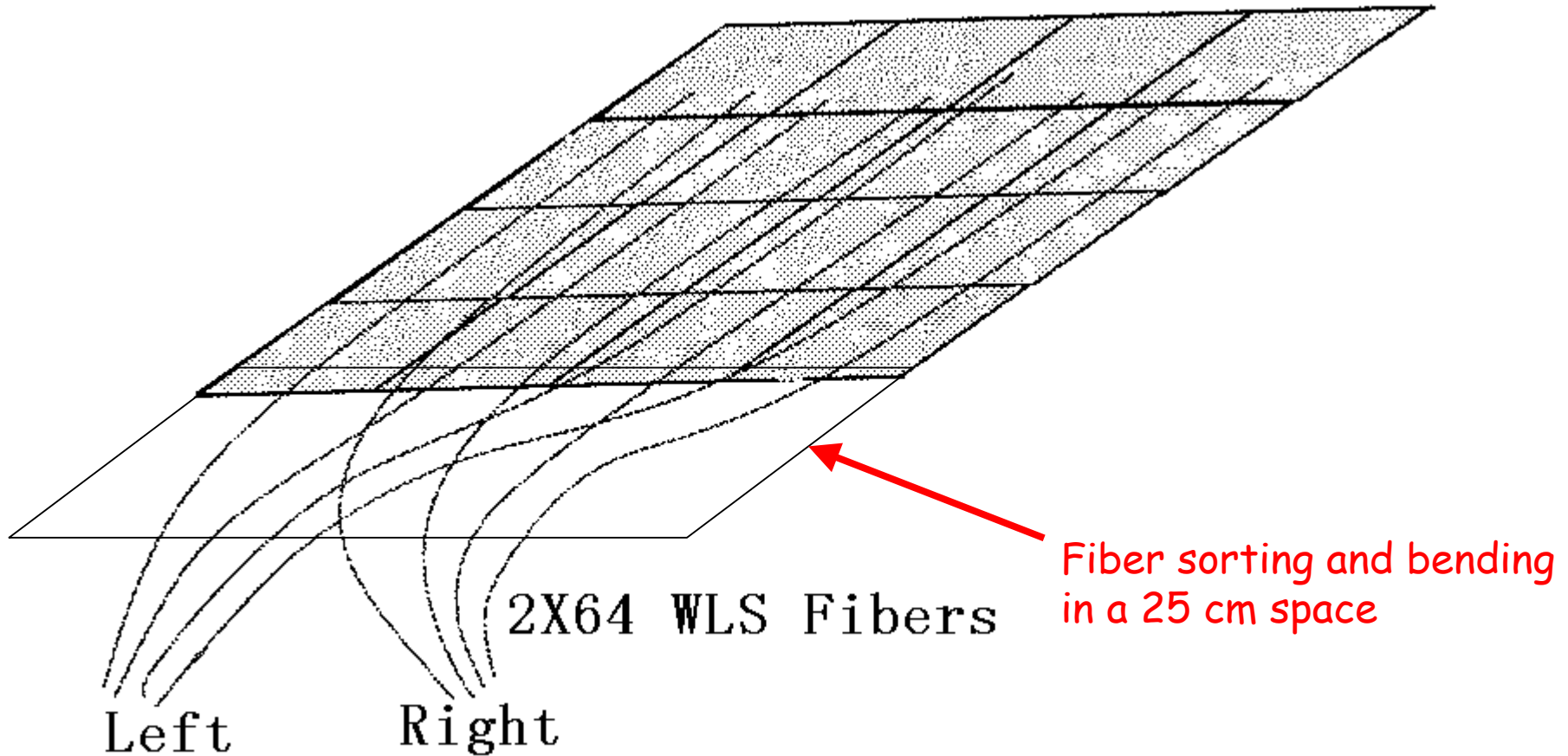
L3+C T0 Detector Module



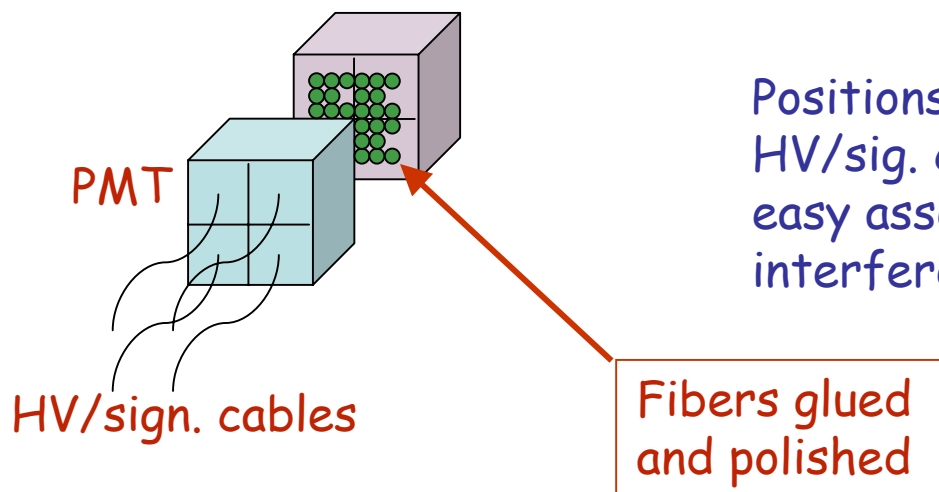
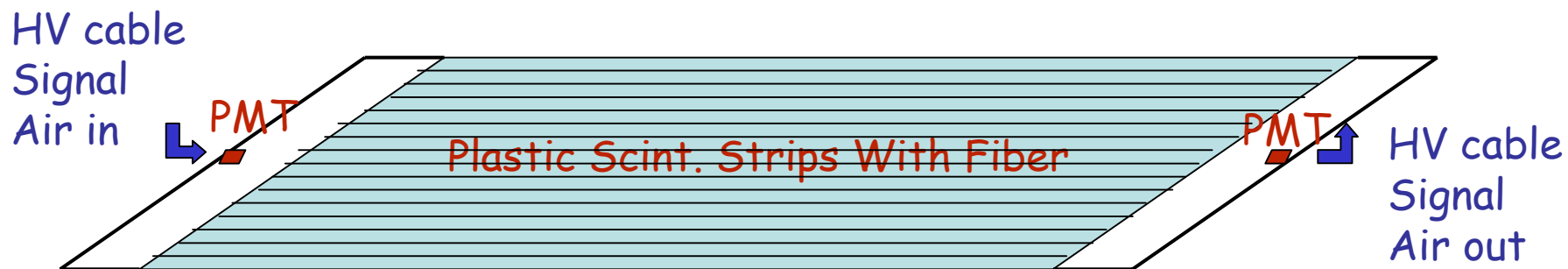
Scintillator tile



Cassette Consisting of 16 Tiles

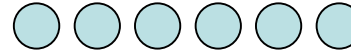


Bundled fiber to PMT and
fixed there with PMT



PMT A cell #1 #2 #3 #4

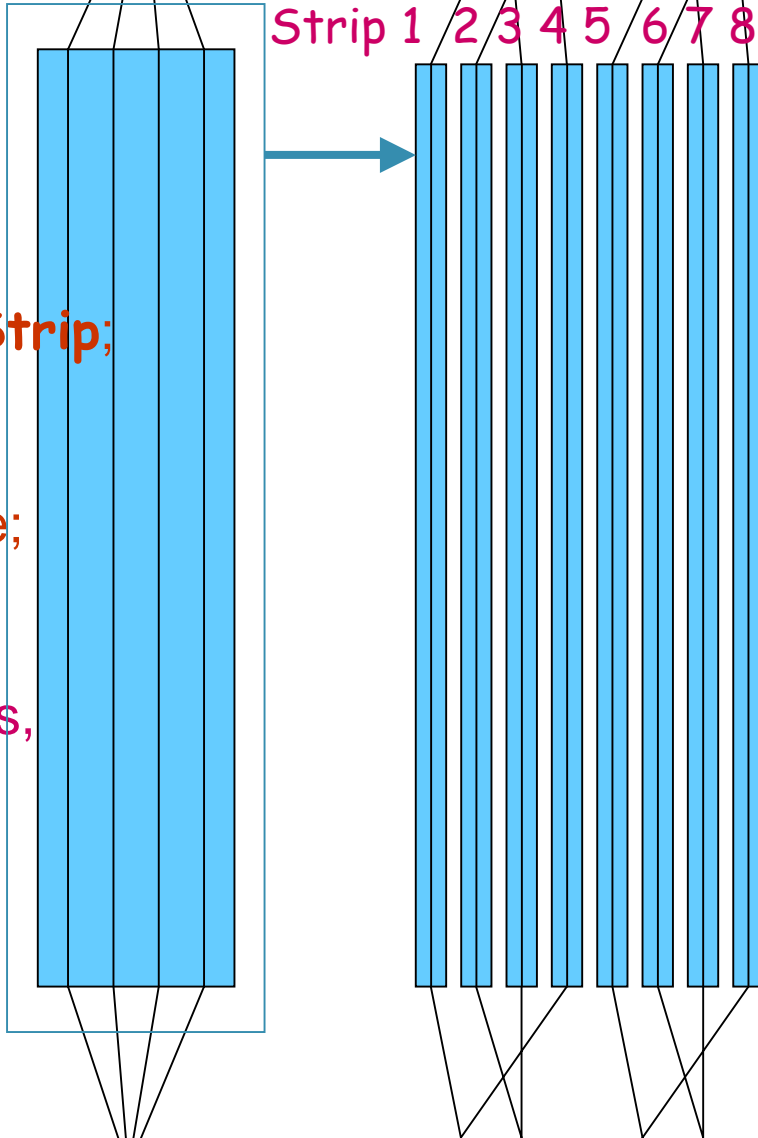
Strip 1 2 3 4 5 6 7 8



A scint. Strip;

7m long;
16 cm wide;
4 fibers;

Wider strips,
less gaps;
Higher eff.



PMT B cell #1 #2 #3 #4

8 scint. Strips;

7m long;
8 X16 cm wide;
8 fibers/PMT cell;

A1 + B1: Strip 1 fired
A1 + B2: Strip 3 fired
A2 + B1: Strip 4 fired
A2 + B2: Strip 2 fired

If one of the 4 PMT cells
fails, the fired strip still
could be identified;

Summary

- Veto cover **all direction with good track** information;
- **Simple/easy to mount/assemble**;
- Cheaper (without out SS container), but clean signals;
- High efficiency;
- A lot of optimization is needed.