

# Scintillation fiber detectors for T2K/T2HK near detector

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T2HK Near Detector/Beam meeting

# Ideas 1

- Scintillation fiber camera (SFC)
  - Fine segmented detector with 1 ~ 1.5 mm scintillation fibers
  - FGD with better resolution
    - 10m (FGD) -> 1.5mm (SFC)
  - Motivation
    - A detailed understanding of the neutrino interaction around the vertex. Competitive to Ar detectors.
    - Have an advantage to high-pressure gas detector in S/N

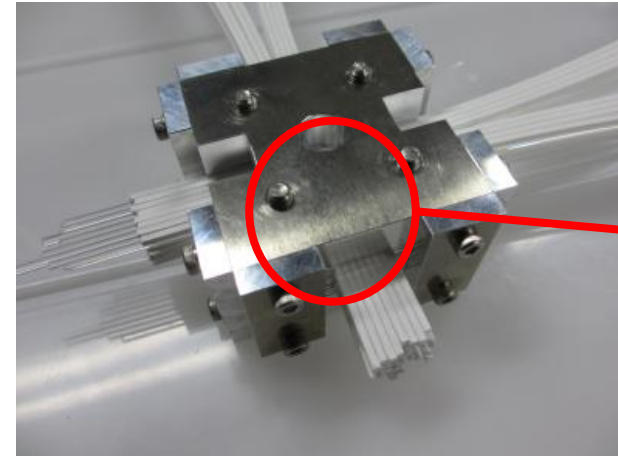
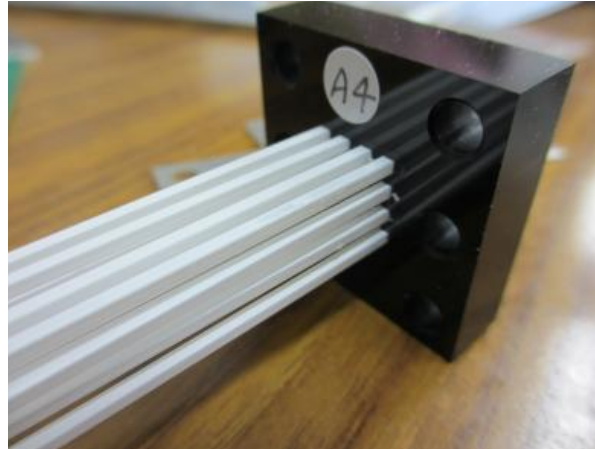
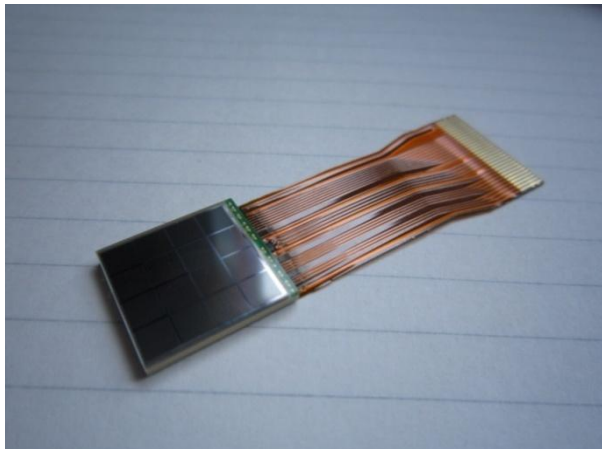
# Idea 2

- Water target detector w/ thinner tracker region
  - Soak 1~1.5mm scintillation fibers in a water tank
  - Water region (Signal) >> Tracker region (BG)
  - Motivation
    - Cross section on Water can be measured more precisely.

# R&D status (1)

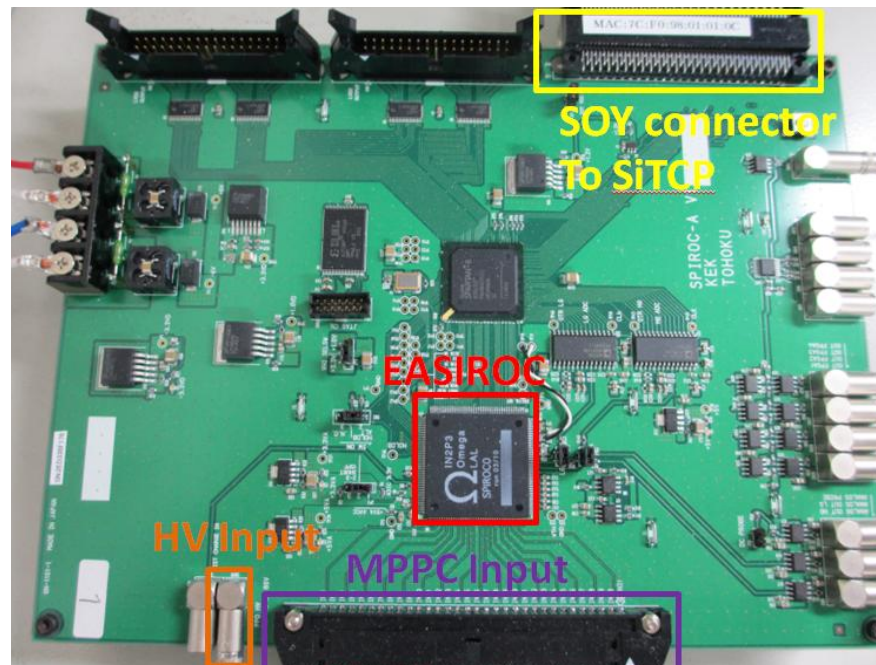
- 64 ch detector
  - 1.5mm x 1.5mm scintillation fibers x 64
  - Monolithic array MPPCs (16ch) x 4

Monolithic array MPPC  
(3mm x 3mm/each ch.)



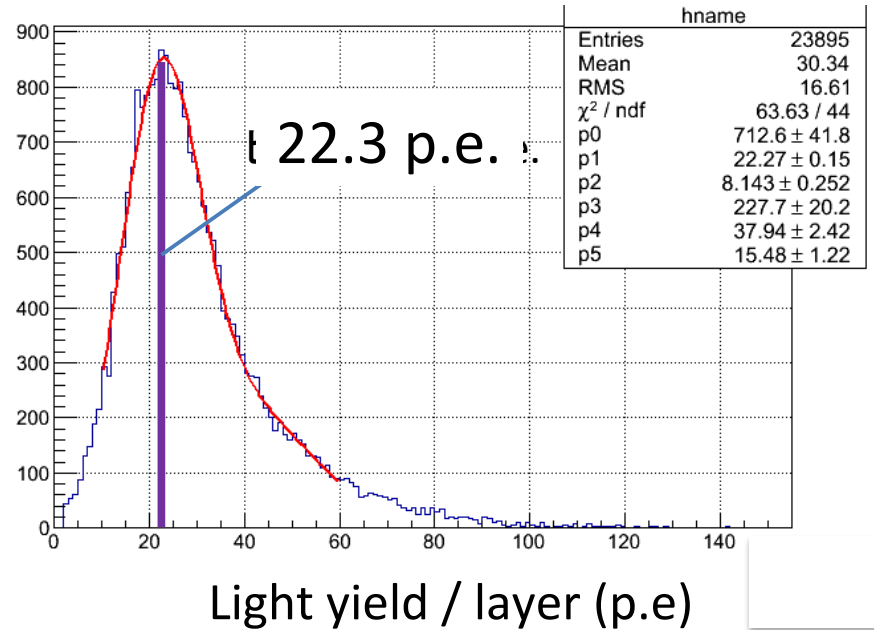
# R&D status (2)

- Readout electronics
  - EASIROC board
    - EASIROCD is a ASIC enveloped for MPPC readout in ILC

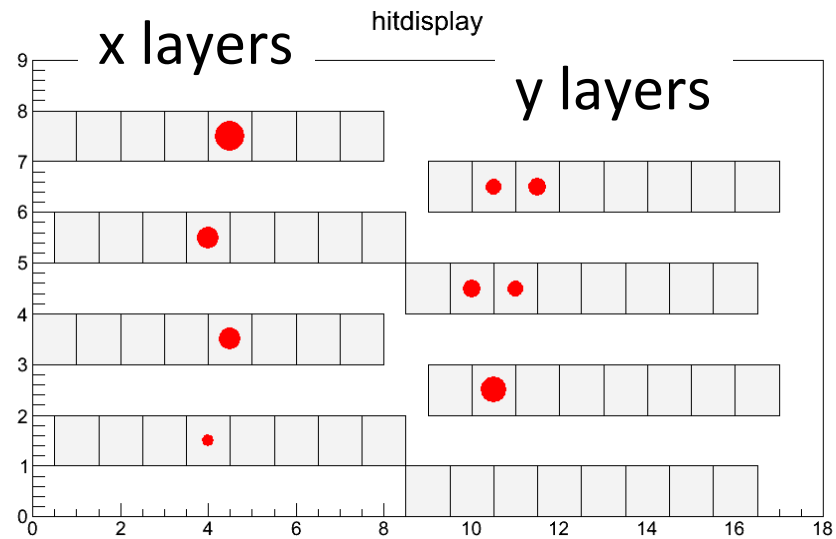


# R&D status (3)

- Tracking demonstration w/ 2.28 MeV  $\beta$  ( $^{90}\text{Sr}$ )
  - Light yield / layer  $> 20$  p.e.
  - $< 10\text{mm}$  tracks can be reconstructed.



12.8  
mm



# Summary/Plan

- Two ideas for T2K/T2HK near detector.
- R&D is ongoing.
  - Tracking demonstration w/ small detector was done.
  - What's next
    - ~1000 ch detector