The Current Status of Beam Test

2016/11/03 @ DESY

LCTPC-Asia/Japan group
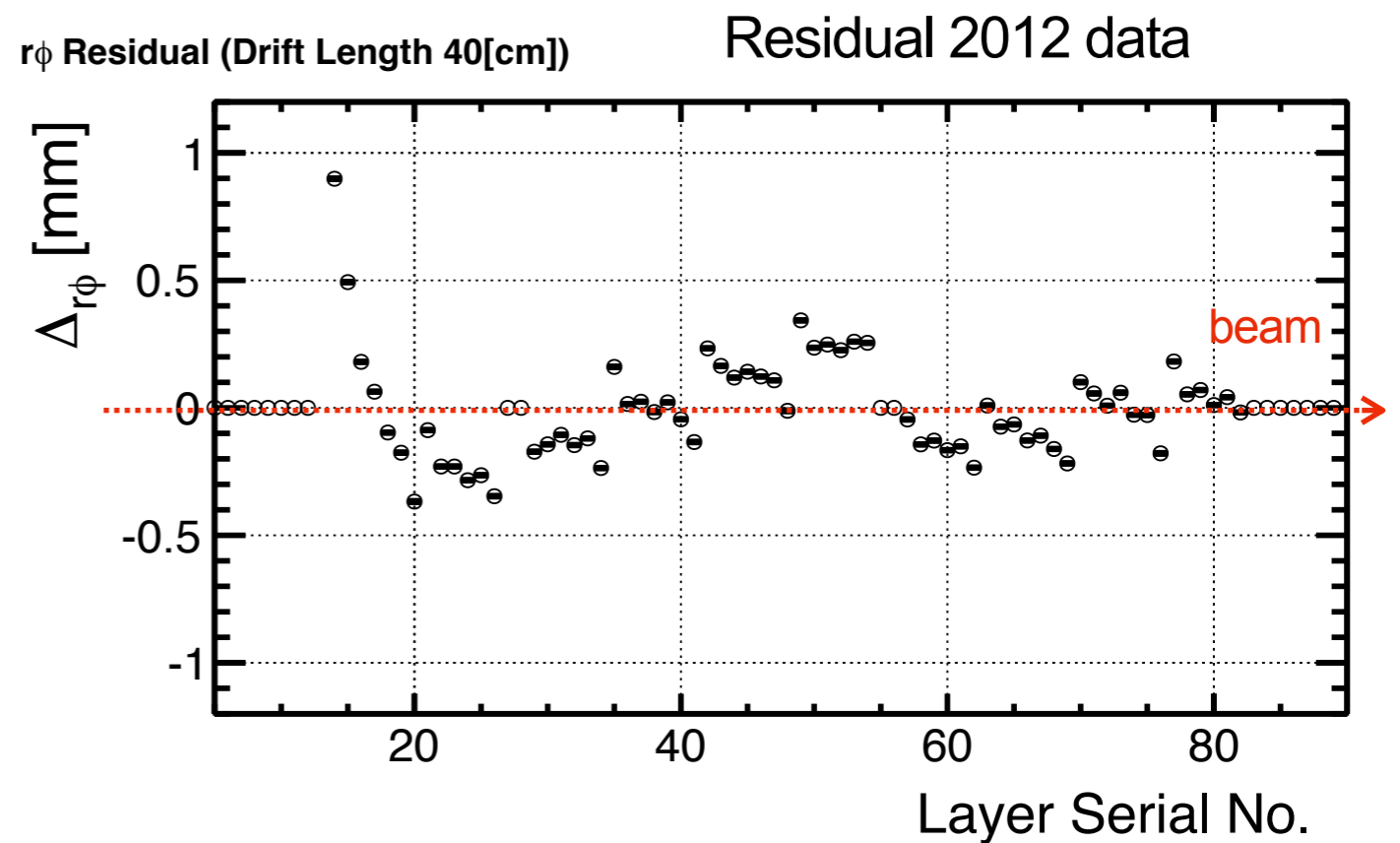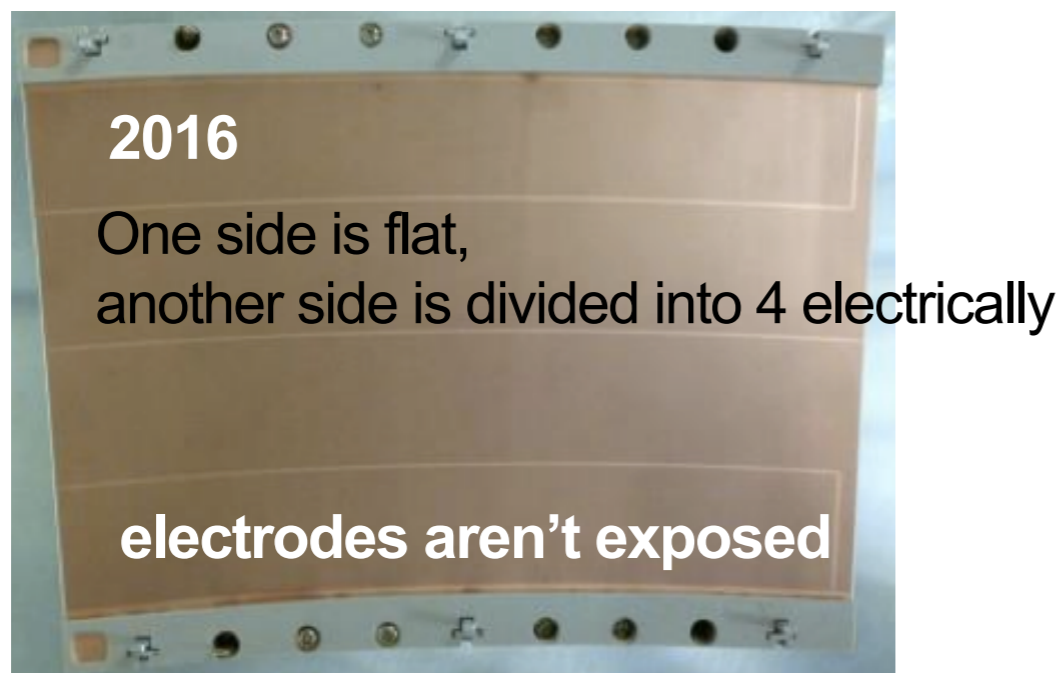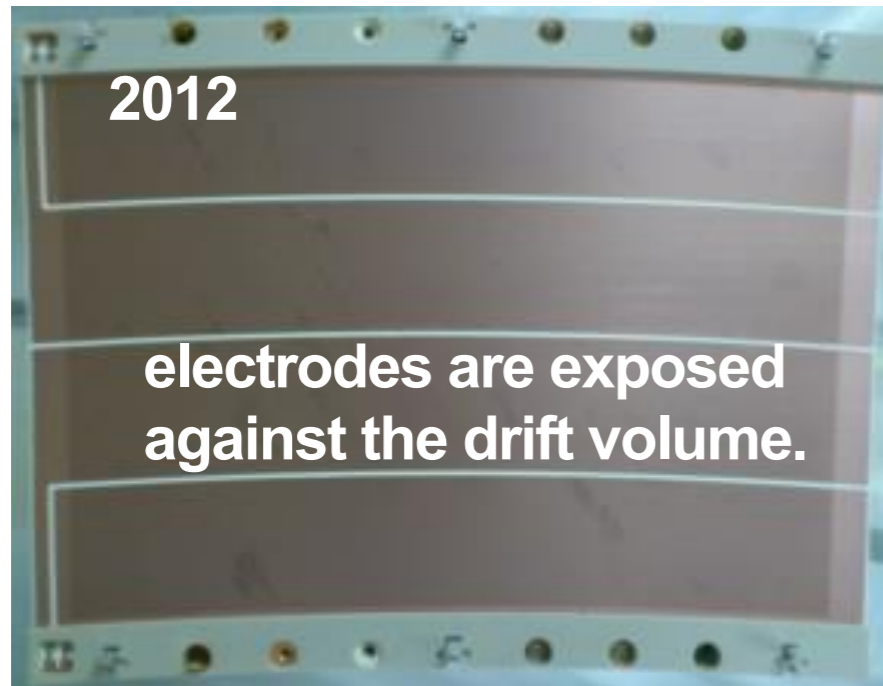### Tomohisa Ogawa

- Objectives of beam test

- The situation until today

- The Plan for Remaining Days

ilc *international linear collider*

The Main Objective of Beam Test

- **The required $\sigma_{r\varphi}$ is ~ 100 [um] 2.2 m ahead (with a gating-device) at 3.5T.**

- Question:

- Can we really achieve the required "$\sigma_{r\varphi}$" with the gating module for ILD-TPC ?

- Confirm that the degradation of "$\sigma_{r\varphi}$" is proportional to 1/sqrt(transmission).

- **Get a proof that the spatial resolution "$\sigma_{r\varphi}$" with a gating-GEM is less than 100 [um].**

- **Comparison of "$\sigma_{r\varphi}$" by using a module equipped with and without a gating-GEM.**

Additive Objectives of Beam Test

- **Check track distortions which comes from exposed electrodes.**

2012

electrodes are exposed against the drift volume.

2016

One side is flat,
another side is divided into 4 electrically

electrodes aren't exposed

rϕ Residual (Drift Length 40[cm])

Residual 2012 data

$\Delta_{r\phi}$ [mm]

beam

Layer Serial No.

- Distortions are expected to be less small than that of 2010/2012 beam data.

Back side :
0.5mm electrode boundary

Additive Objectives of Beam Test

- **Create a Z-resolution formula as Ryo & Keisuke did for position resolution in 2012.**

- Nobody knows

  feasible Z-resolution formula.

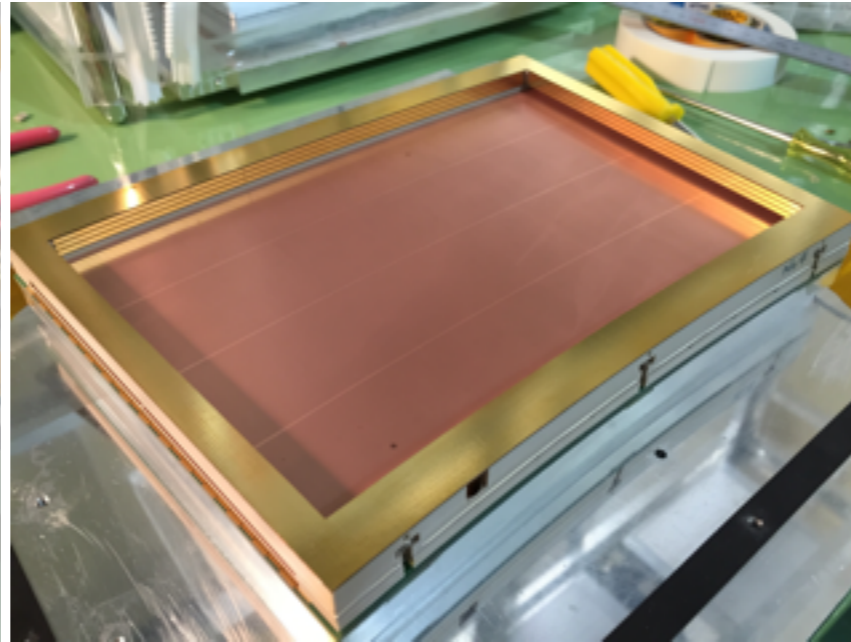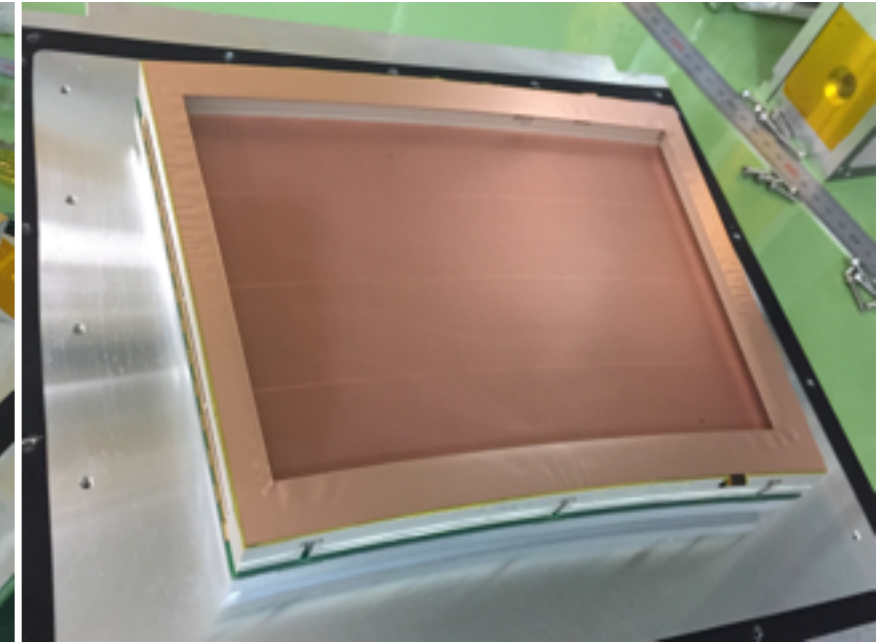# The Current Status of Beam Test (Dead FEC?)

- A side view of our module
- A view of the field shaper
- A view of the gating-GEM
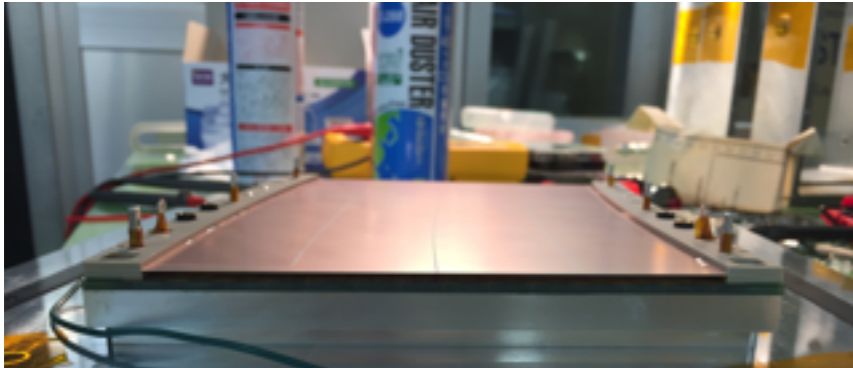
- Pole to stretch GEM

- Covered by electrodes
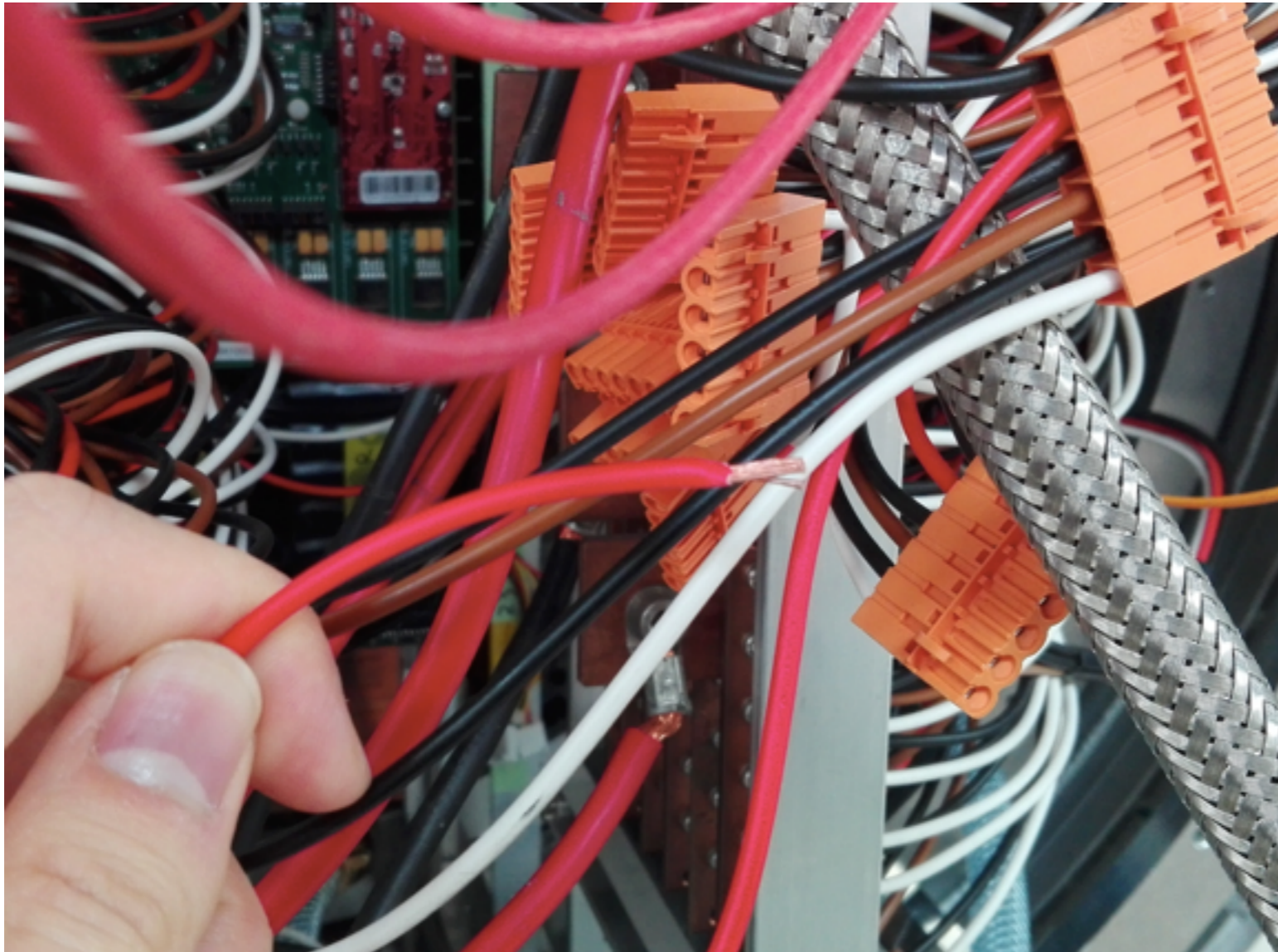- No cover

Chamber w/
the gating-GEM

Chamber w/
the field shaper

- We judged this FEC was dead
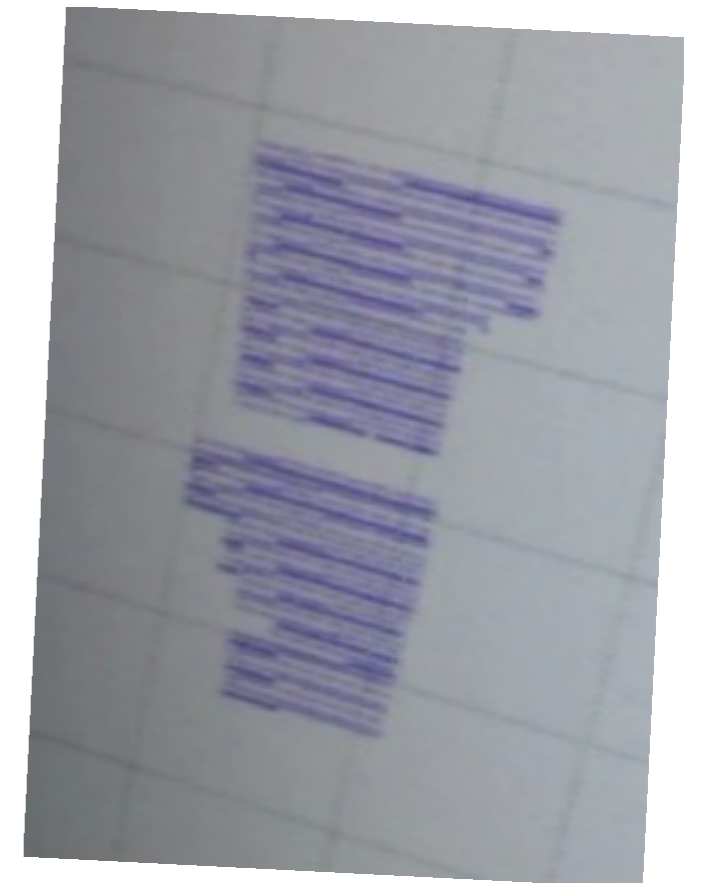 because pedestal levels were ~ 500

  Yesterday, we decided to exchange this FEC.

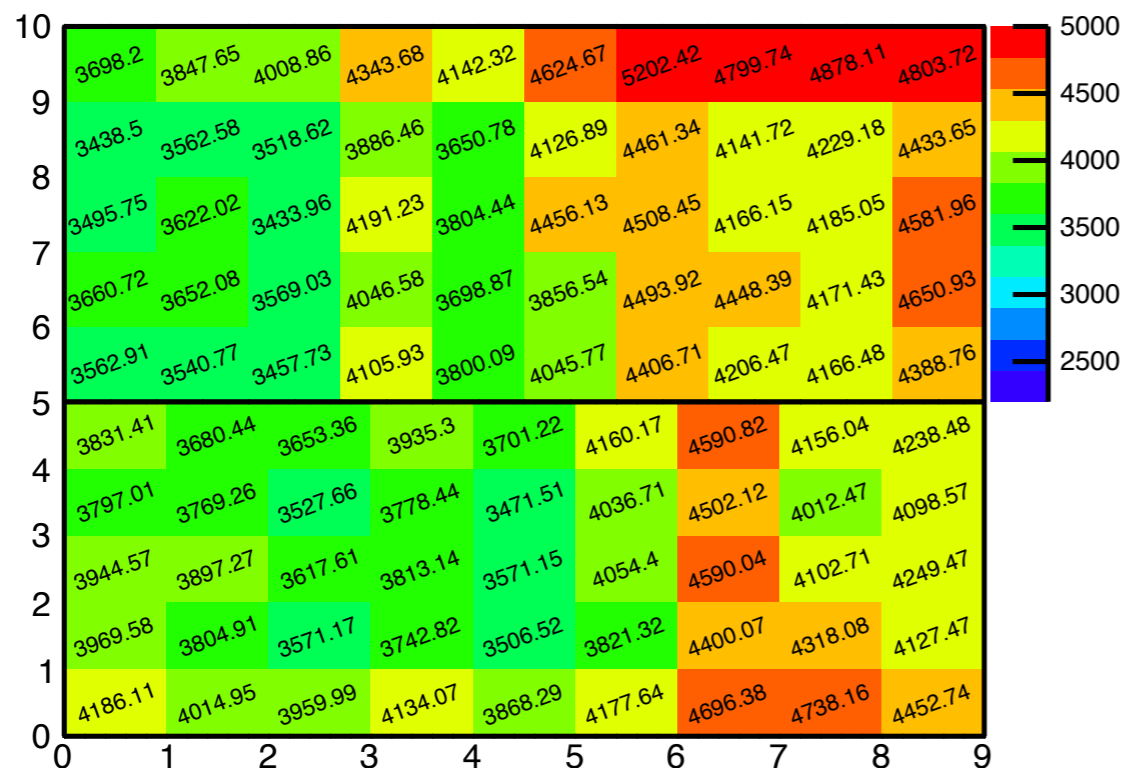# The Current Status of Beam Test (Dead FEC?)

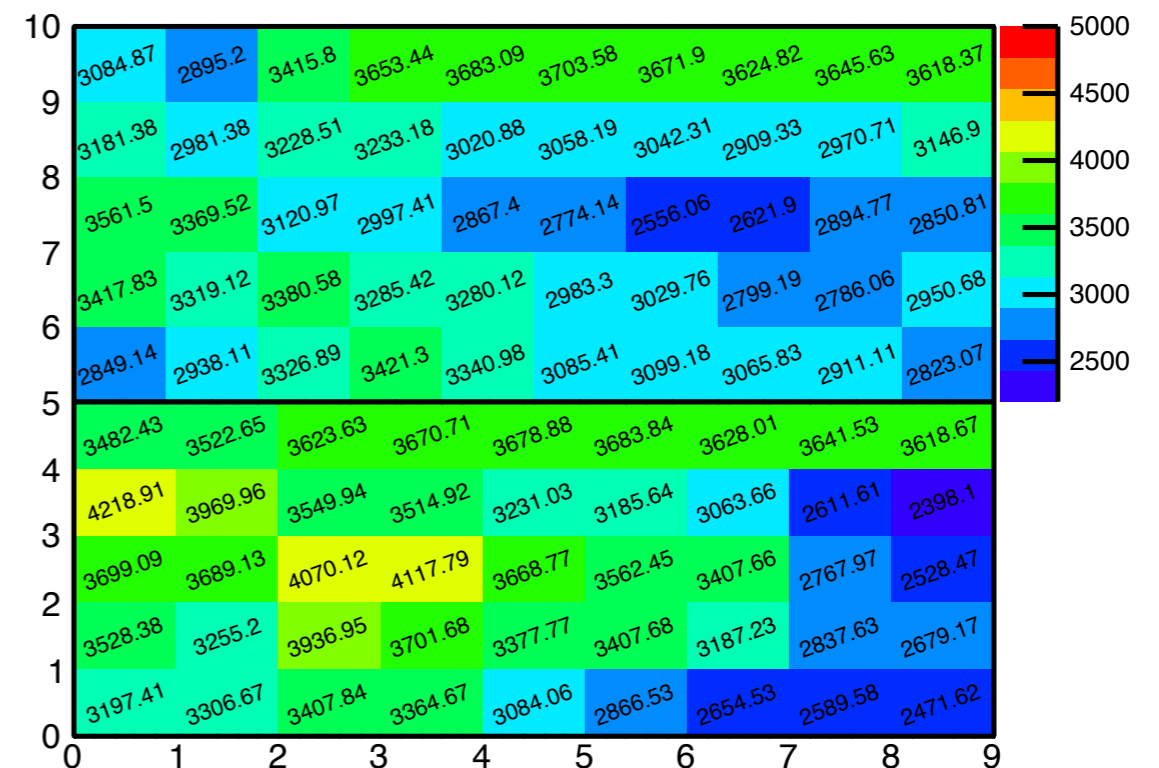One L.V. line had been off.

→ Solved !

The Current Status of Beam Test (Gas Gain)

- Gas gain measurement @ KEK

- H.V. configuration : **315 and 350** for **lower and upper GEM**

Chamber w/ the gating-GEM

Chamber w/ the field shaper

! Gain correction was applied for both modules because gas condition changed during measurement. (H2O, O2)

H2O: 670 → 450 ppm
O2   : ~ 25 ppm
T ~ 24, P ~ 1030

H2O: 550 → 450 ppm
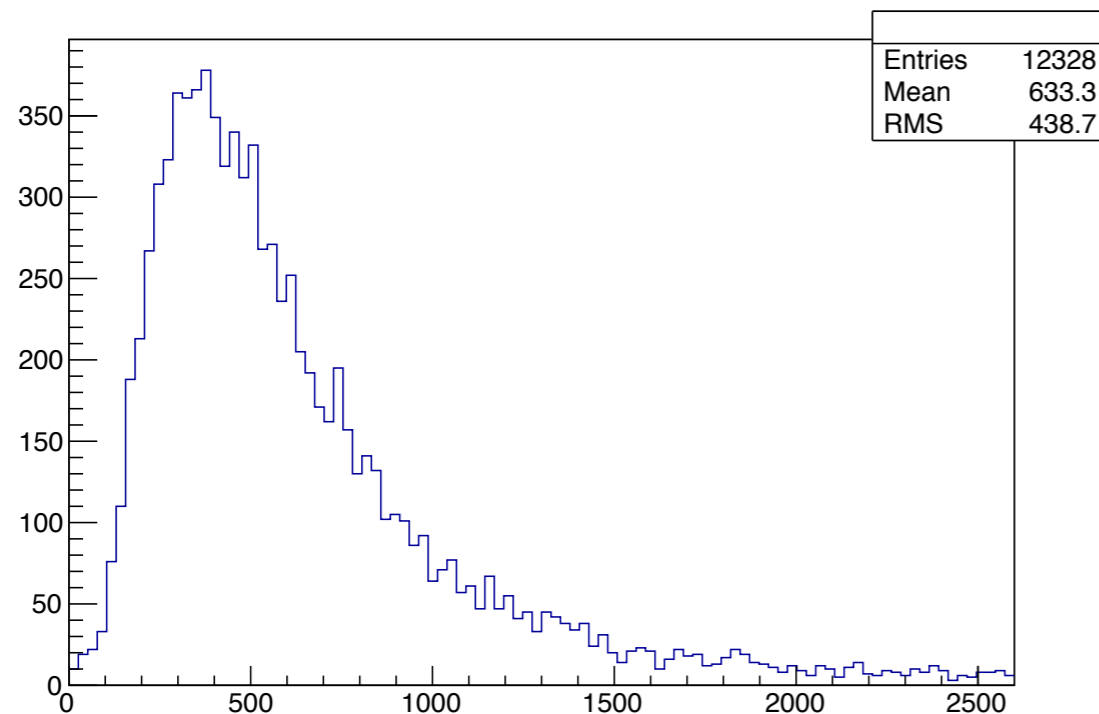O2   : ~ 70 ppm
T ~ 24, P ~ 1030

- **Expected gas gain was around ~ 3000 at least
  with the configuration of 315 V and 350 V.**

The Current Status of Beam Test (Gas Gain)

- Assumed gas gain @ DESY

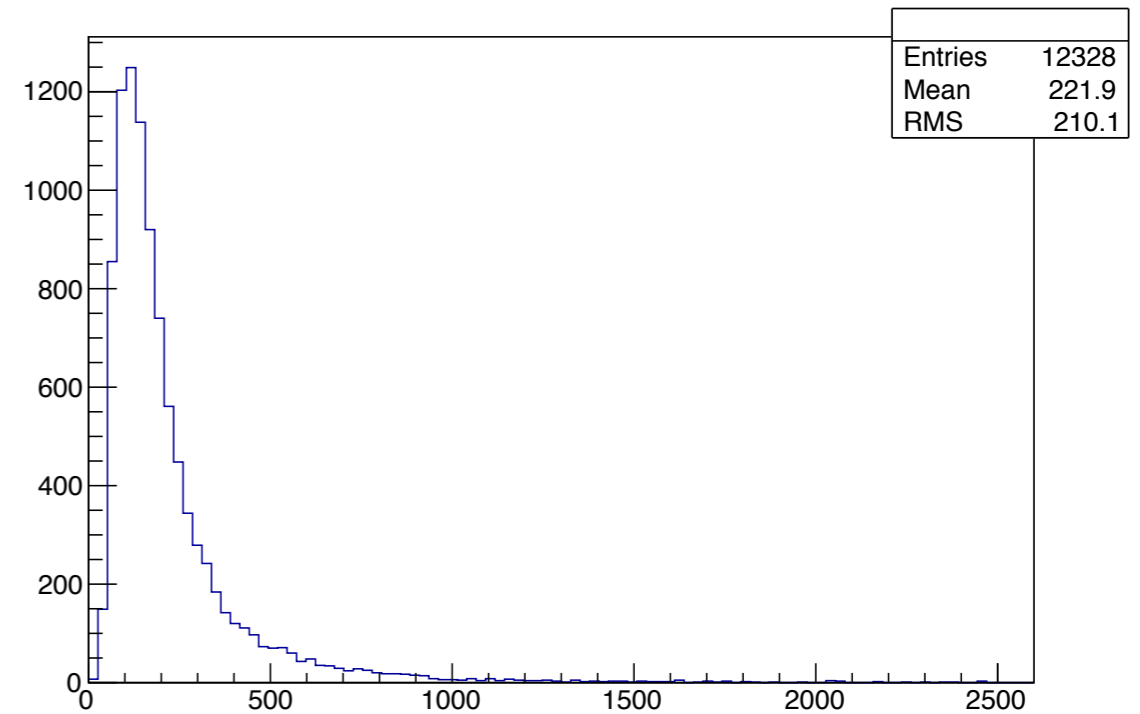- Hit charge distribution of one row on each module

Chamber w/ the gating-GEM   Chamber w/ the field shaper

- PCA16 and ALTRO config: 12mv/fc, 1.17 mV/ADC

- Assuming that The #N primary elec. of 5 GeV is ~ 160,

  evaluated gas gain are ~ 2000 and 1000

The Plan for Remaining Days

- Now we are retaking data passing throw the center region under 1 T and 0 T.
- Data taking with angles is planning.

- But we have to resolve gain problem especially for the module of the field shaper , otherwise we can not get reasonable spatial resolution, Z-resolution.

BACK UP

international linear collider

Gas Gain of Asian-GEM

Correction of Gas Gain

- **Gain correction**