sTGC production, QA and schedule

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Comments from review

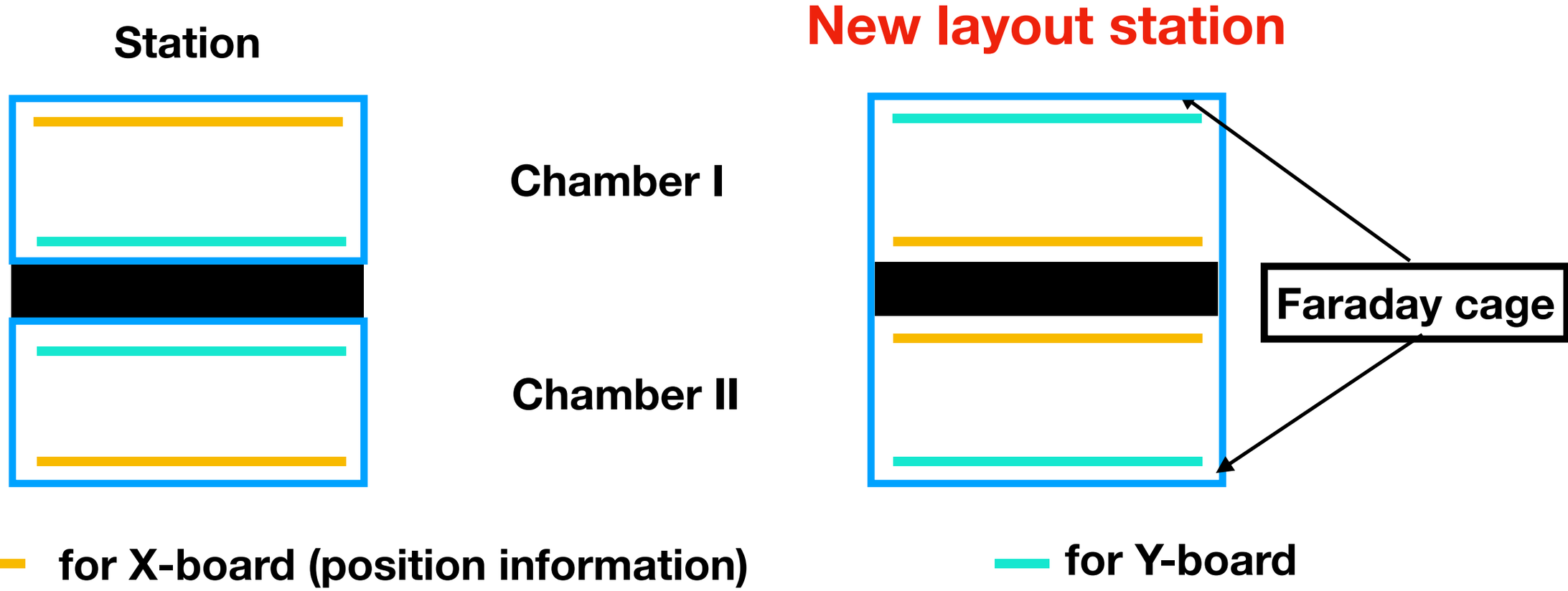
- The chip capacitors have not undergone the extensive QC tests and years of use in the field: Changed to the traditional Murata capacitors

- The potential crosstalk for strips with longer trace
  - Tested based on the pentagon prototype showed the signal distributions on the readout pads with both longest and shortest traces are comparable which indicated small impact of crosstalk

- Does the performance of the sTGC meets the physics requirement?
  - The 60*60 sTGC module shows a resolutions of $\sigma_x(\sigma_y) = 144\mu m(135\mu m)$. The testing of the pentagon modules is ongoing and some preliminary results will show in following slides

- New mapping between sTGC and electronics have been set down
  - Neighbor on mode for electronics

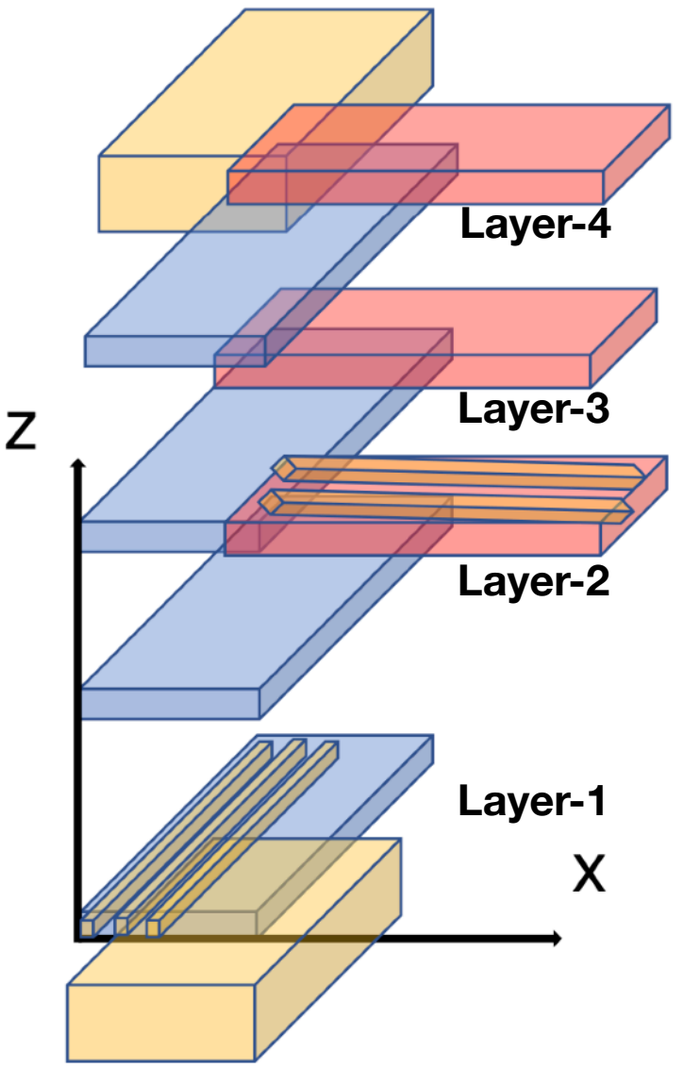
Station with new layout



- Disconnection of Y-board graphite plane with copper surface for new station
- Connection of two sTGC chamber Y-board copper surface which serve as Faraday cage
- Y-board signal share the ground with graphite plane, through HV

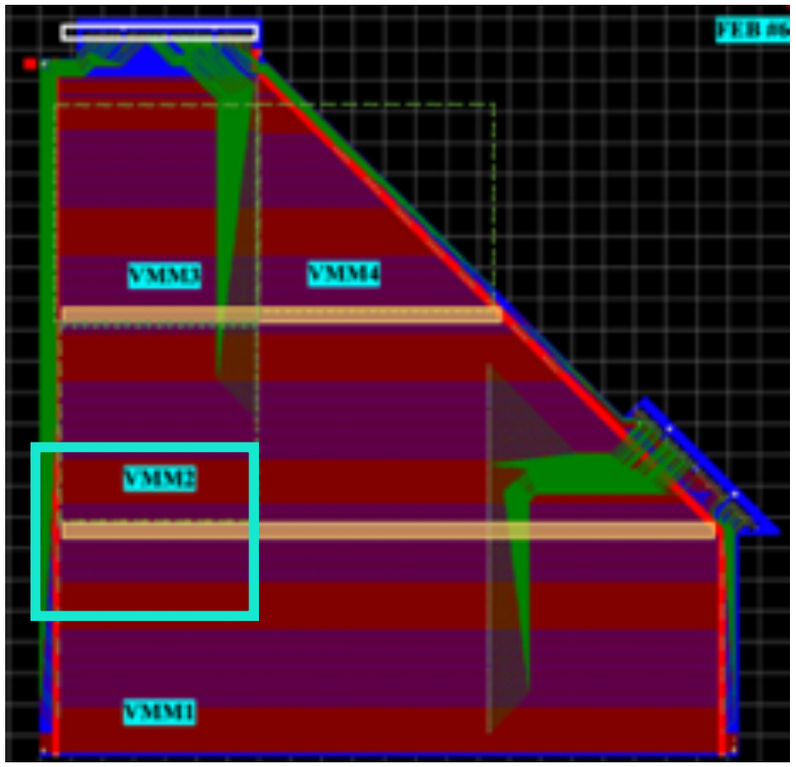
sTGC testing

32 strips read-out on the marked area:
sTGC + adaptor + TPX ele.



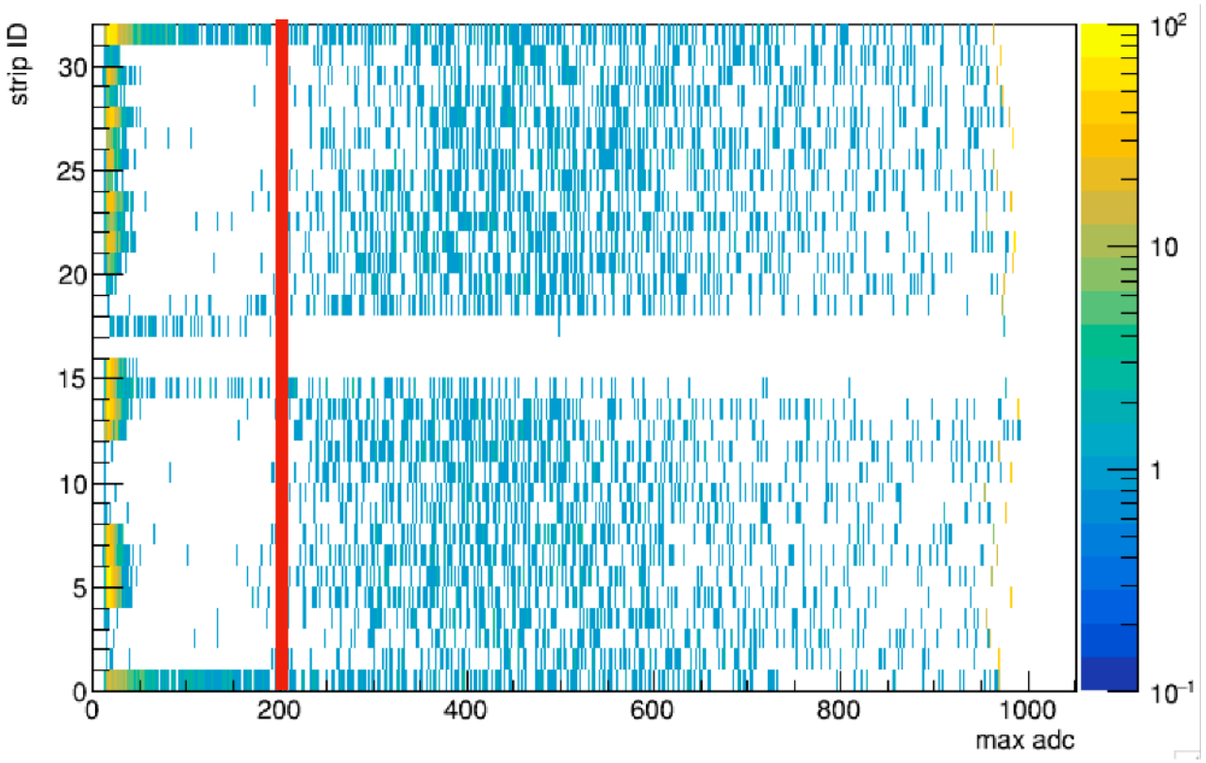
Testing system

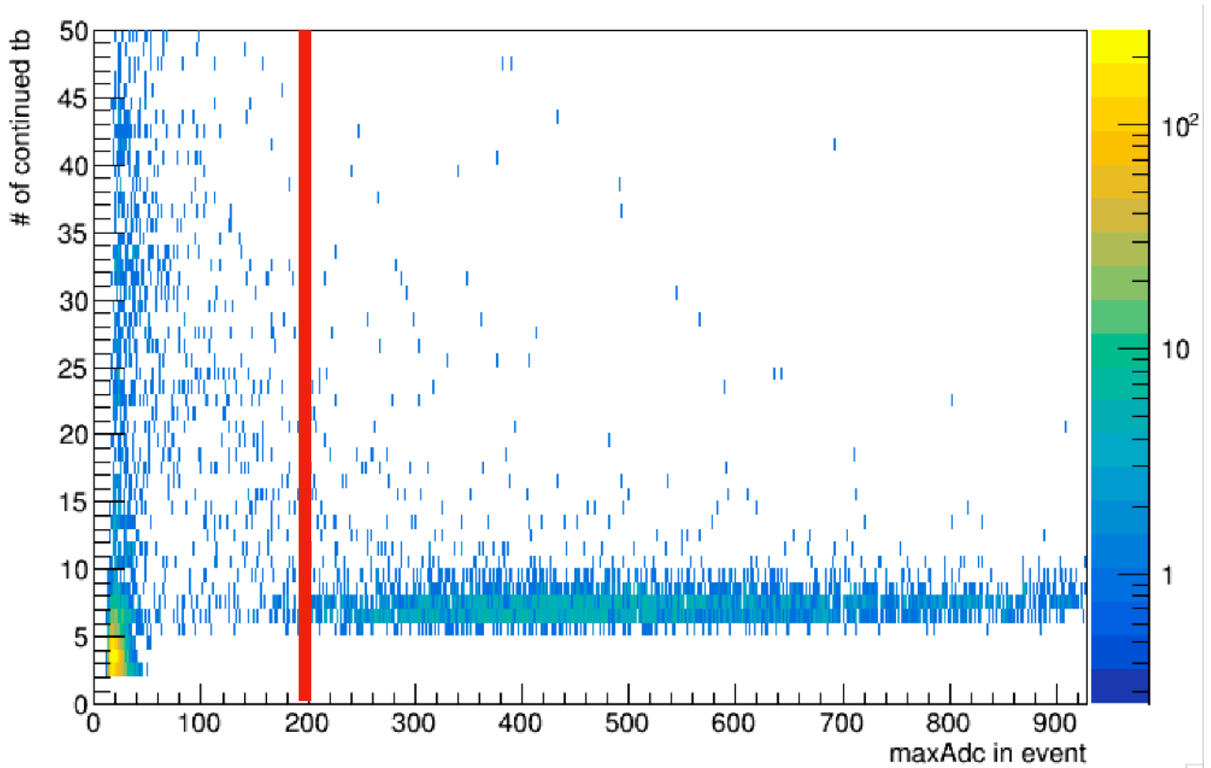
adaptor board



Station layout:
Lay1, Lay2 and Lay4 (old)
Lay3 (new)

ADC cut study

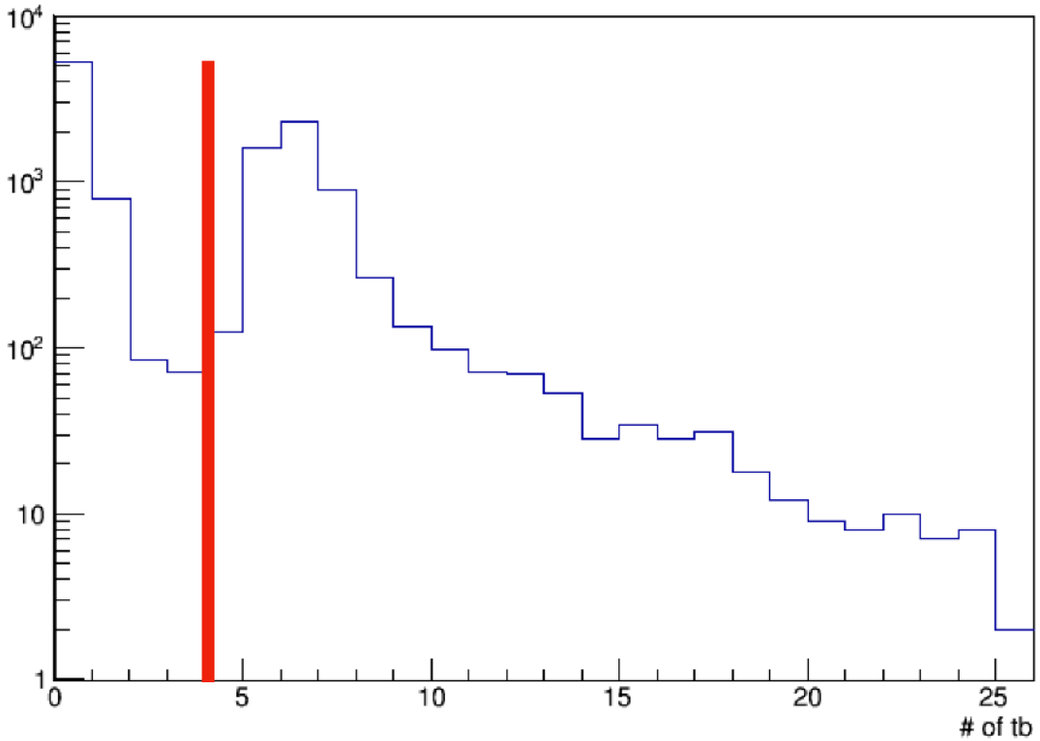




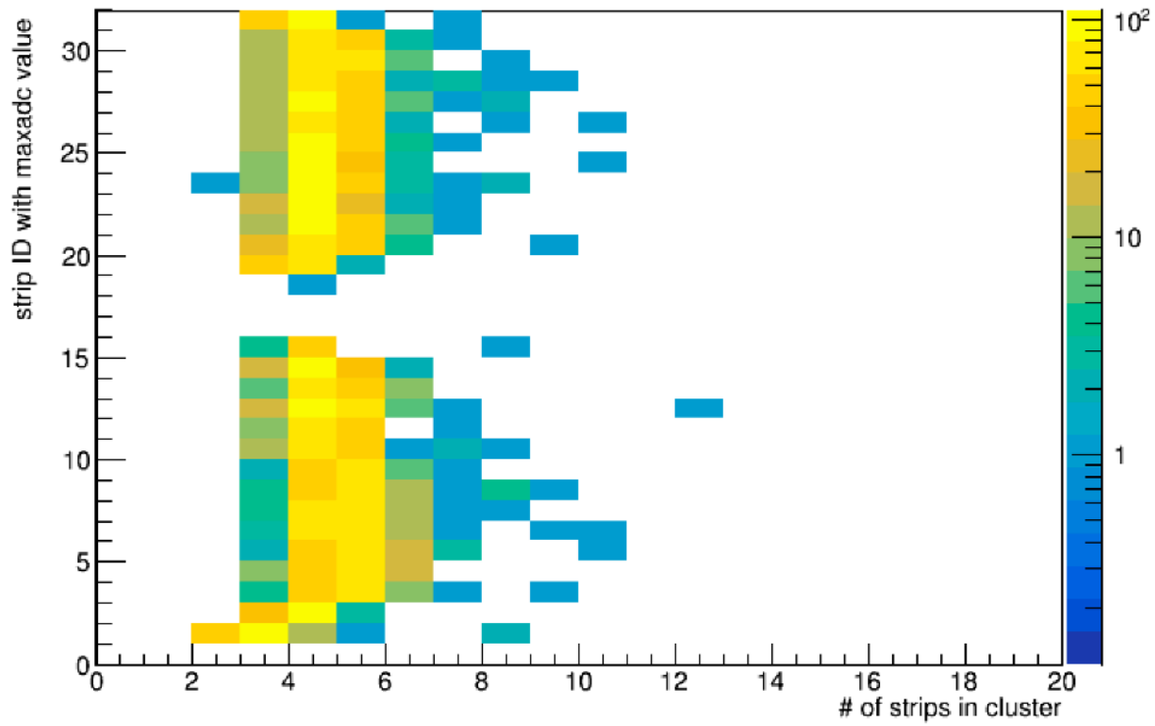
- Well separated signal events from noise events with **max_adc > 200**
- To remove the noise, adjacent TimeBin ADC_Cut >=16

TB cut study

Number of continued time-bin for a strip



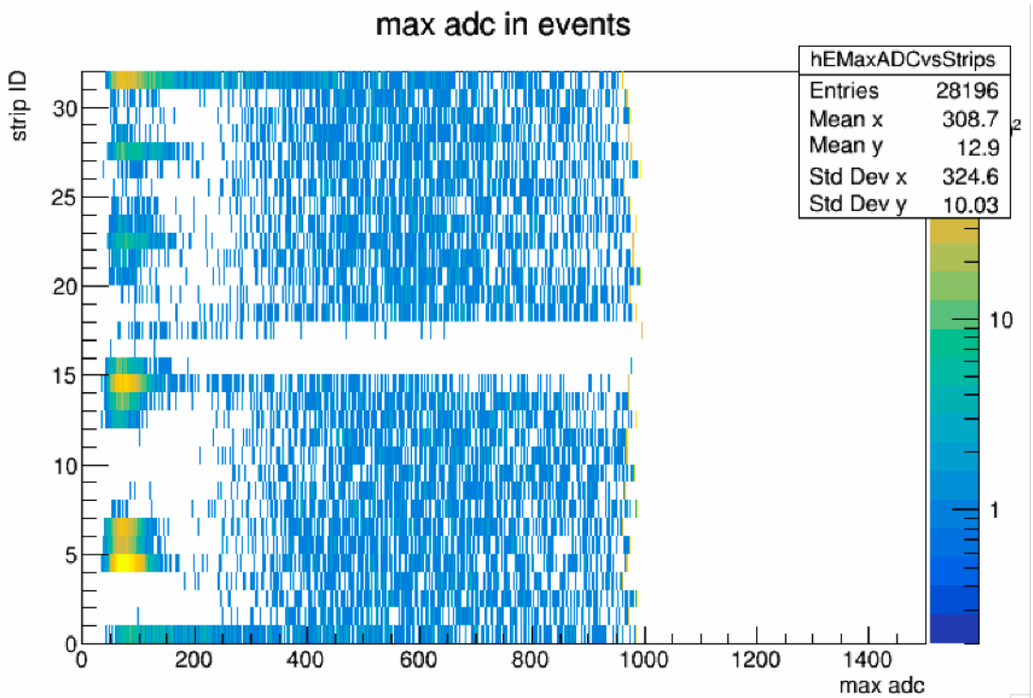
Number of strips in a cluster vs central strip ID



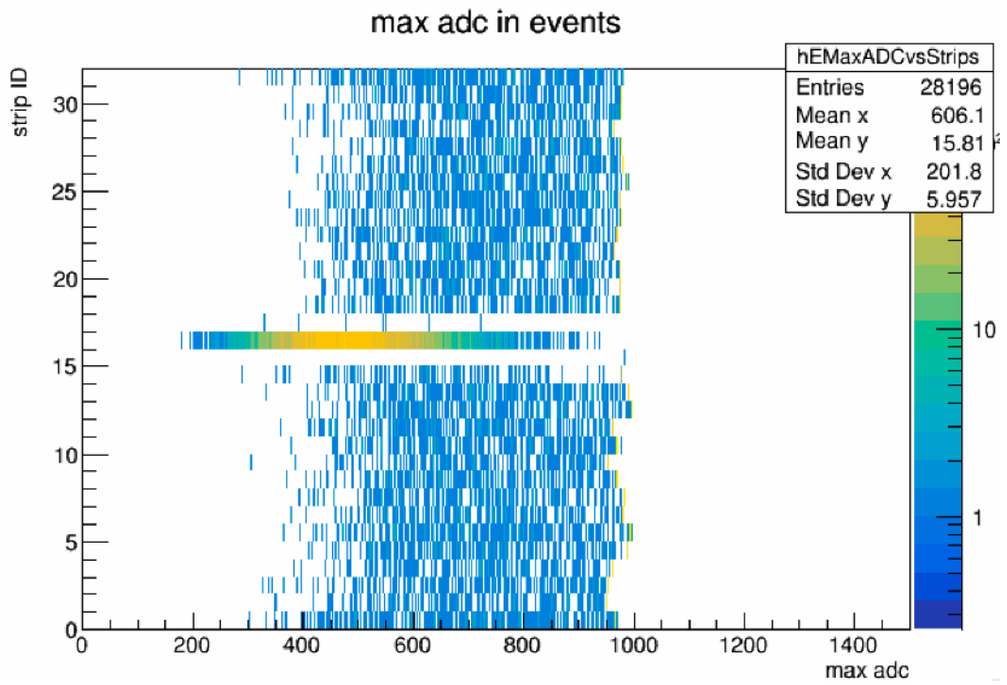
- Noise normally show less than 4 time-bin
- 4-5 fired are dominated case for a cosmic ray in a sTGC chamber
  - Note: tight adc cut(adc >16 for at least 4 time-bin) may result small signal rejection

Signal from sTGC

Old

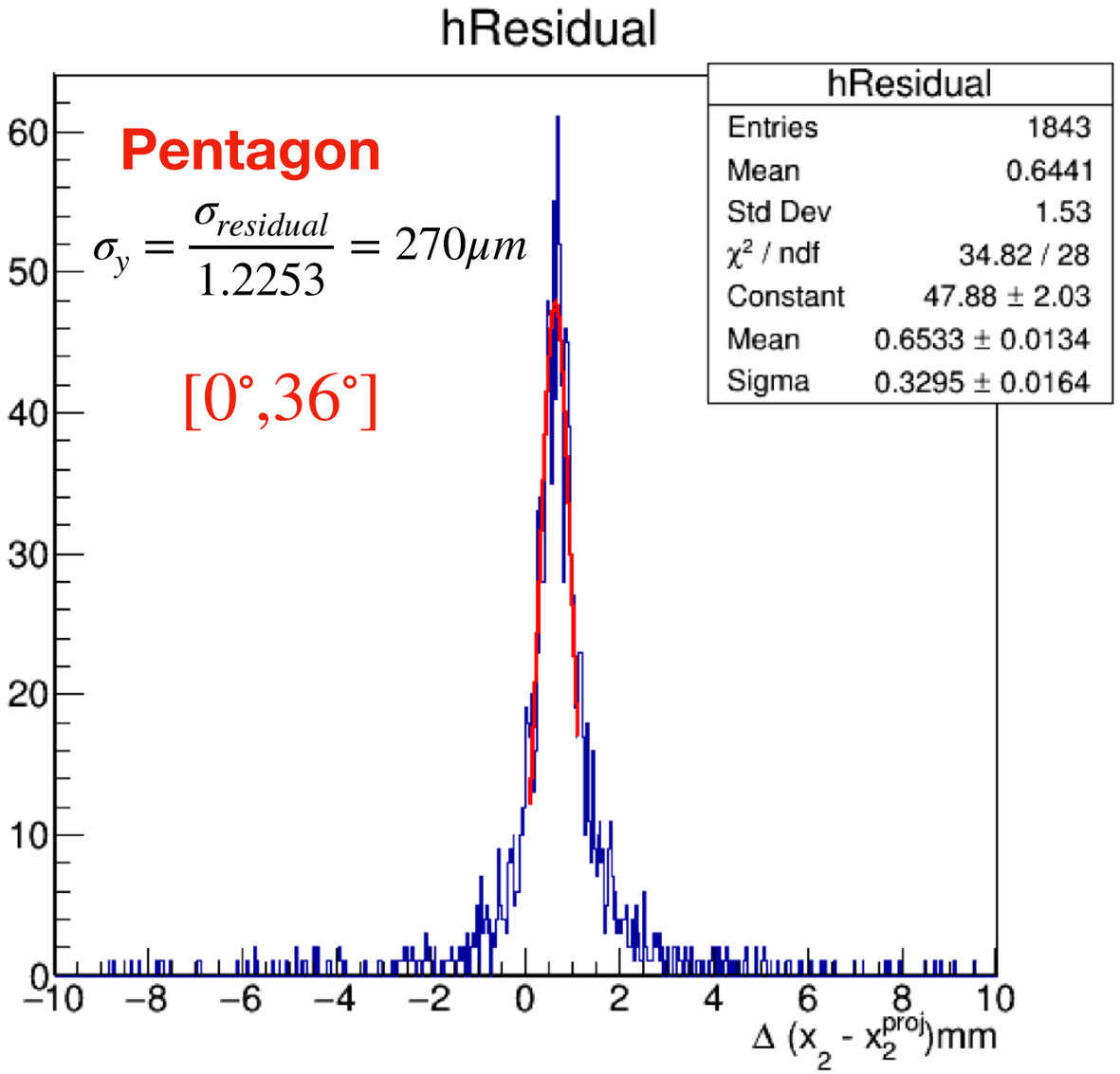


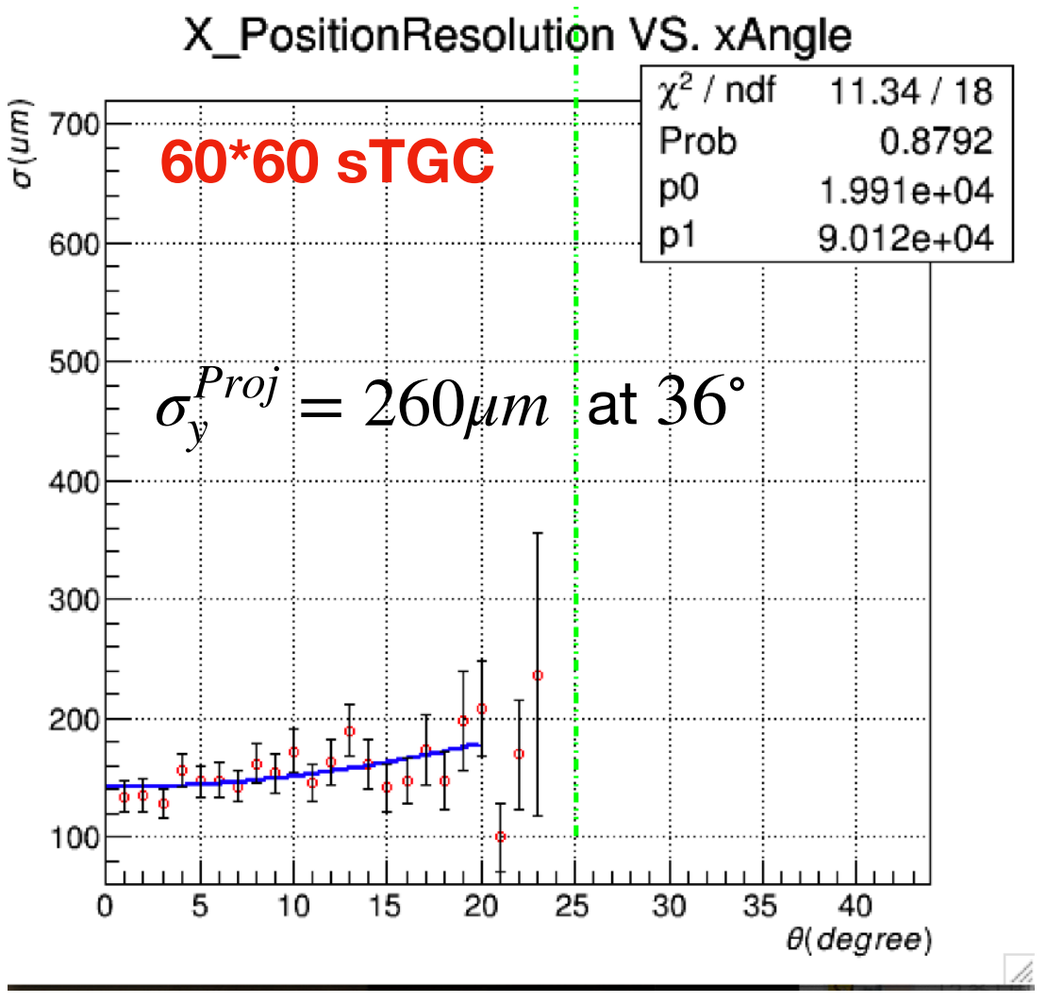
New



- The supporting structure is clearly shown in both station
- The station with new layout shown much less noise on strips compared to old one
- Hot strip with strip ID of 16 is shown on new layout station
  - The reason is under investigation
  - With hit cluster selection criteria, only 10 counts are show in this area

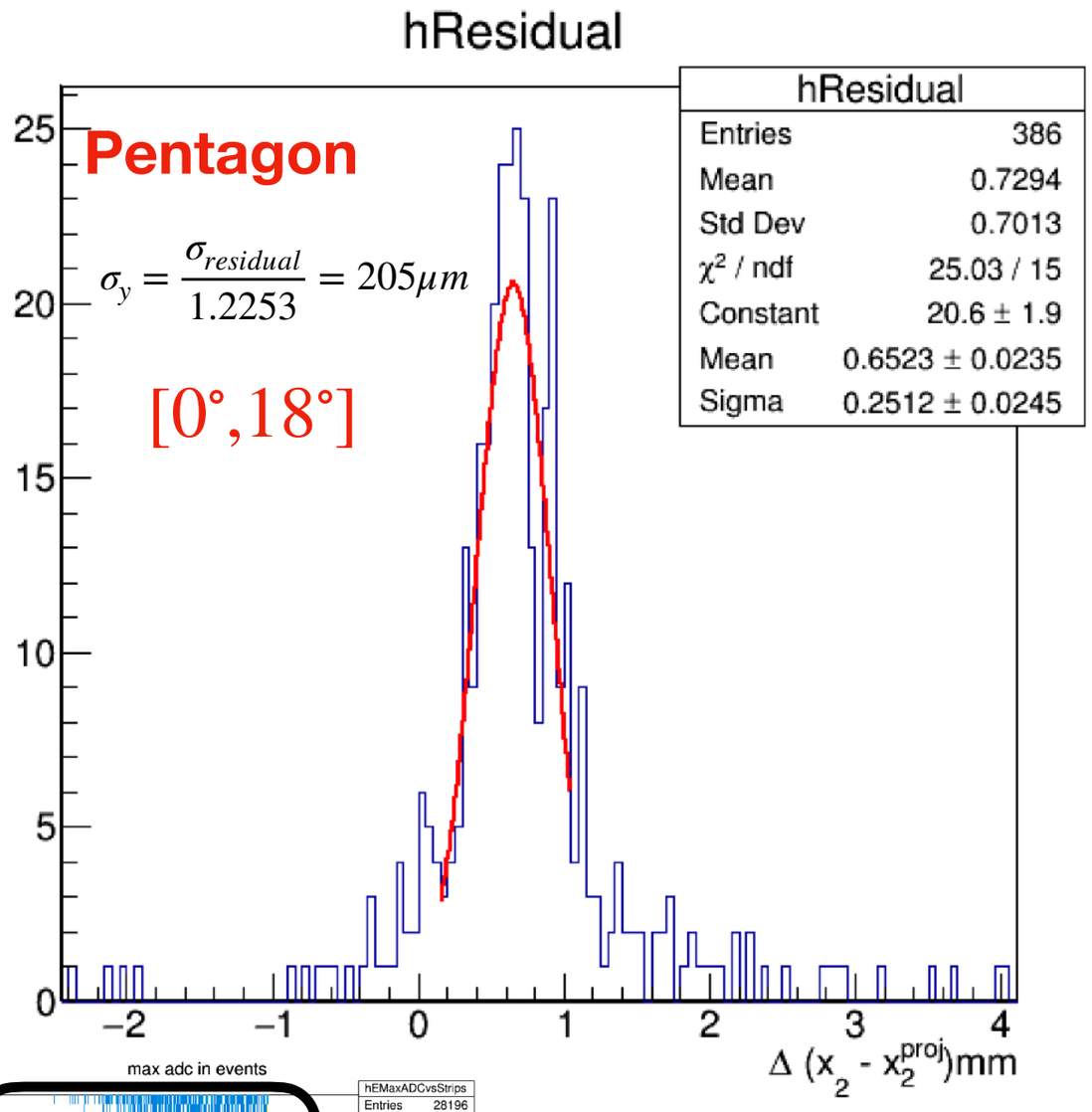
Position resolution

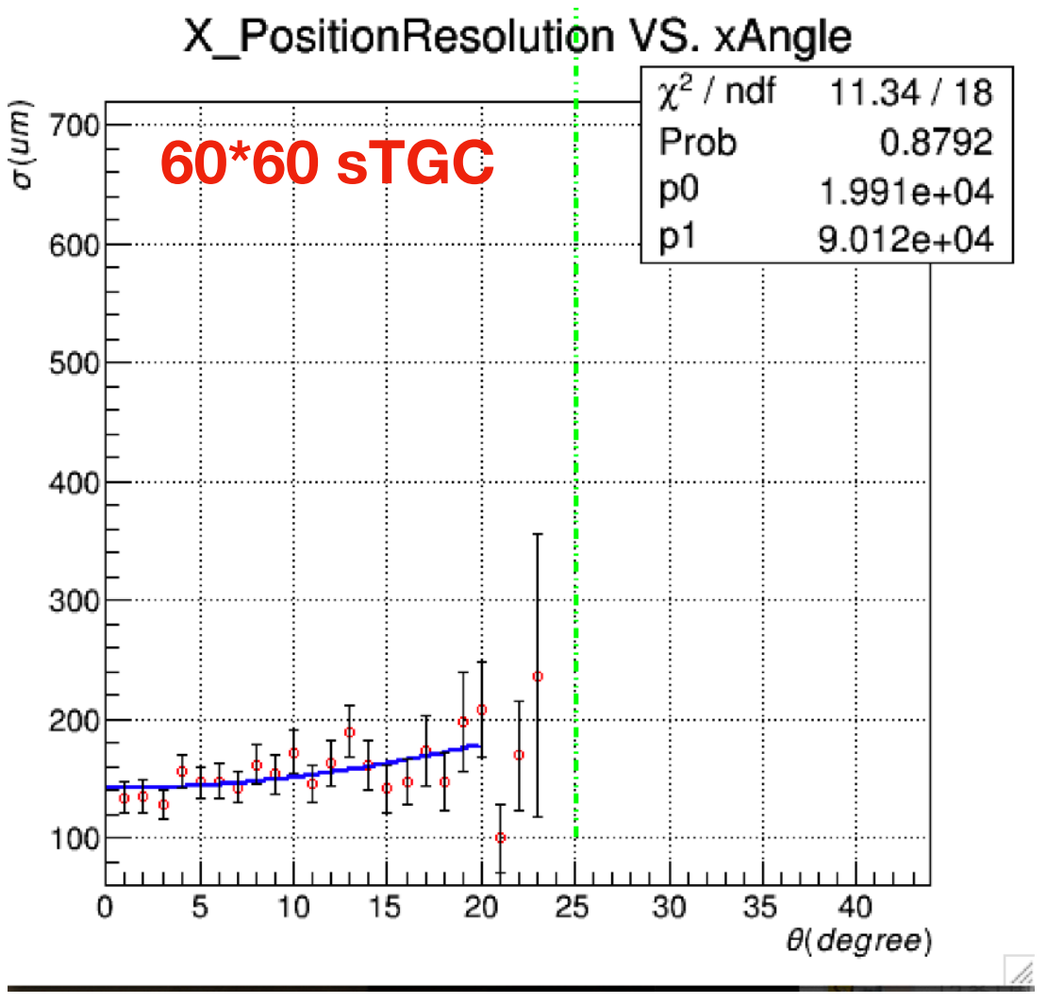


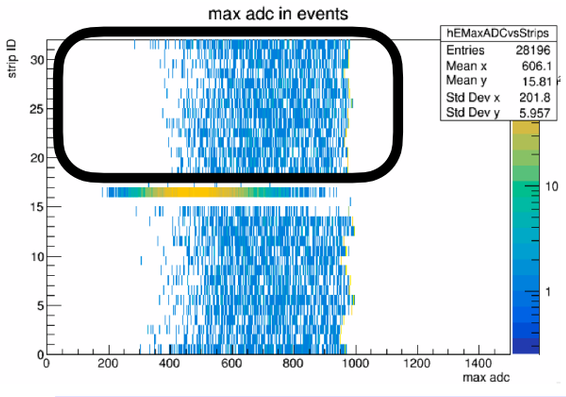


- Raw distribution without corrections: offset, rotation and shift
- Angle_Y is [0°,36°] and Integral in X direction
- Comparable resolution with Pentagon and 60*60 sTGC

Position resolution



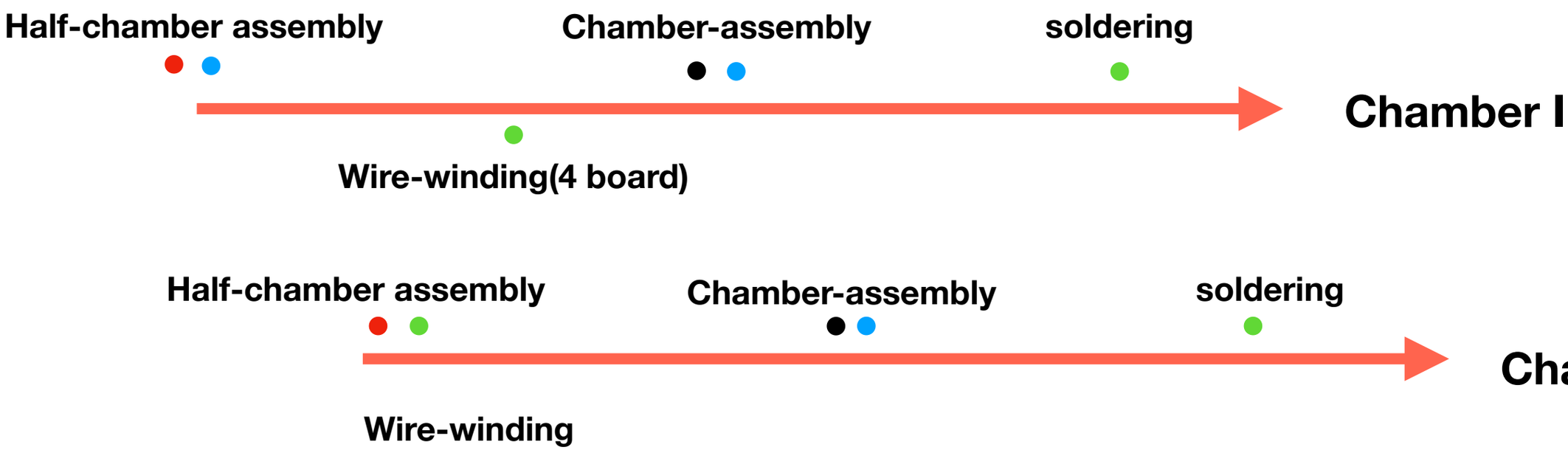


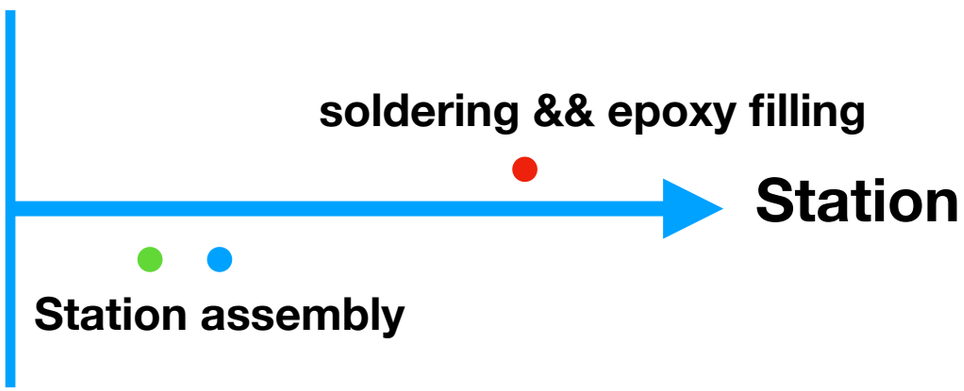


- Raw distribution without corrections: offset, rotation and shift
- Double peak structure is there
  - More statics is need for a differential study

Station production

- 3 full time involved technician and 1 half-time involved technician





Experience from prototype production：

- 5 working days per-station

Station production status

- sTGC chamber supporting frame production will finish by this week
  - Cleaning of material and QA will start shortly after delivered (this week)

- X-board drawing has been send to vendor at 2021/1/6, ~3-4 weeks for production
  - Inspection, graphite coating and half-chamber will have first in X-board
  - 2-4 sets of X-board half-chamber production are schedule before Chinese new year

- Y-board drawing has been send to vendor at 2021/1/15, ~3-4 weeks for production

- Tooling and modification on station assembly table will be finished by today
  - All preparing work will be down by this week

Station production schedule

	Year 2021																				
	1/22	1/29	2/5	2/12	2/19	2/26	3/5	3/12	3/19	3/26	4/2	4/9	4/16	4/23	4/30	5/7	5/14				
Vender mass production																		Vender Fabrication			
Mass production				holiday	first station													Production			
Holiday: Chinese New Year, 2/10-2/17																					

- The mass production starts this week
  - Supporting frame QA and clean, the PCB board will be produced in 2-3 weeks
- Around 90 working days
  - ~ 16+2 stations (5 working days per-station)
- The first station will produced after Chinese New Year around Feb-20
  - Testing with new electronics if we have it
- 16 sTGC stations will be delivered around 2020/05/15
  - Two weeks delay compare to original schedule
- Potential risk
  - the schedule is arranged according to current COVD-19 status in China

Summary

- The testing results show promising position resolution, more differential study is ongoing
- The final design drawing has been sent to vendor for production
- A new layout of sTGC is suggested with minimum changes on assembly procedure, but benefit a Faraday cage
- The mass production starts this week
  - 90 working days for production which can produce 16+2 station with
- The first station will come around Feb-20; 16 sTGC station will be delivered around Mid-May

Thank you!!