



FTT module production status and testing

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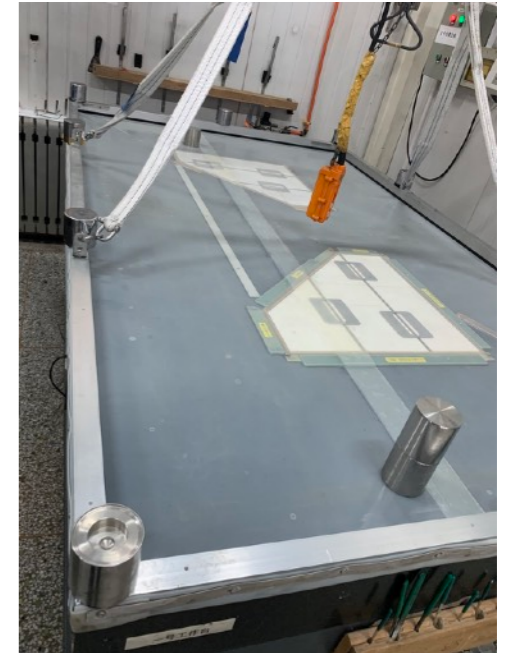
Shandong University

Outline

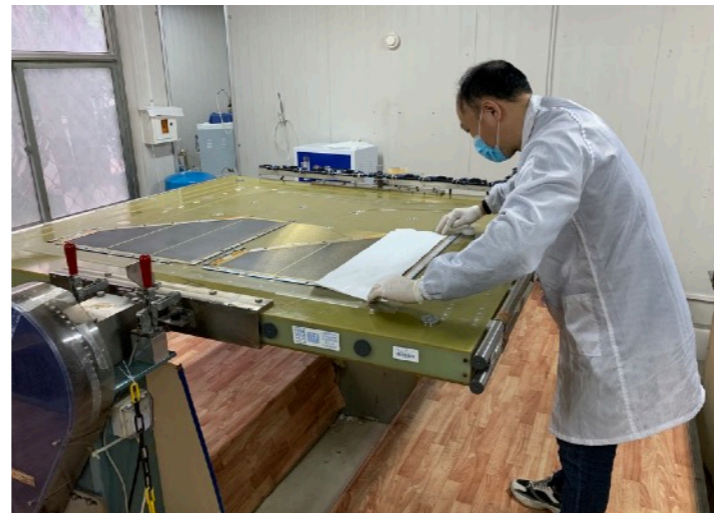
- **Station production status**
 - Half chamber production
 - Station production
- **Documents and Shipment preparing**
 - QC documents recording
 - Shipping box
- **Testing:** leakage current and detector efficiency
- **Summary**

Chamber production status

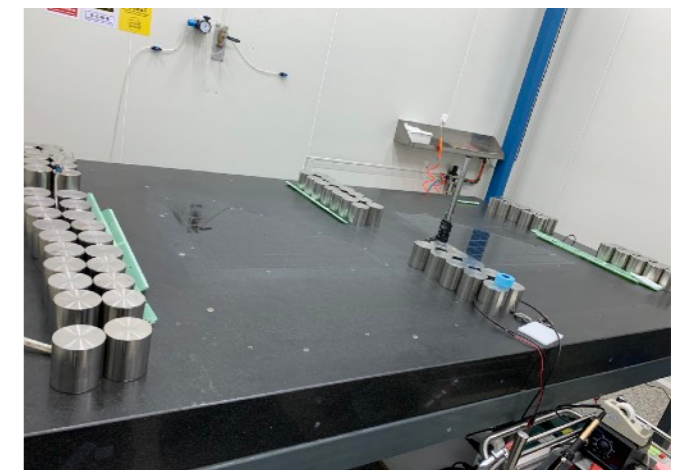
- Half-chamber assembly is the key factor affecting production flow
 - one pair of PCB boards assembly at each day, 12 half-chamber in a week — proceed without exception
 - Highest prior of each day's work — dedicated table and manpower
 - 80 half chamber are required in total — 74 are done by today, will be finished before May



- Wire winding for X-board
 - Every 4 X-boards
 - Wire quality



- Chamber production
 - Two chamber assembly simultaneously
 - The minimum requirement is 6 chambers a week, the highest record 11 chambers a week
 - 40 chamber are required — 35 are done



Chamber production

PCB board graphite coating issue:

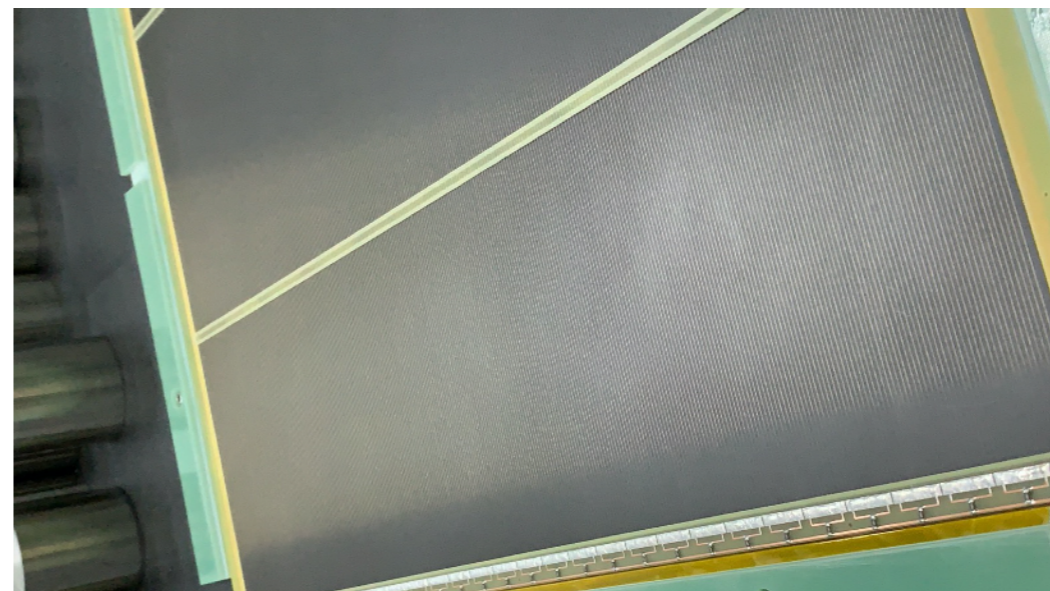
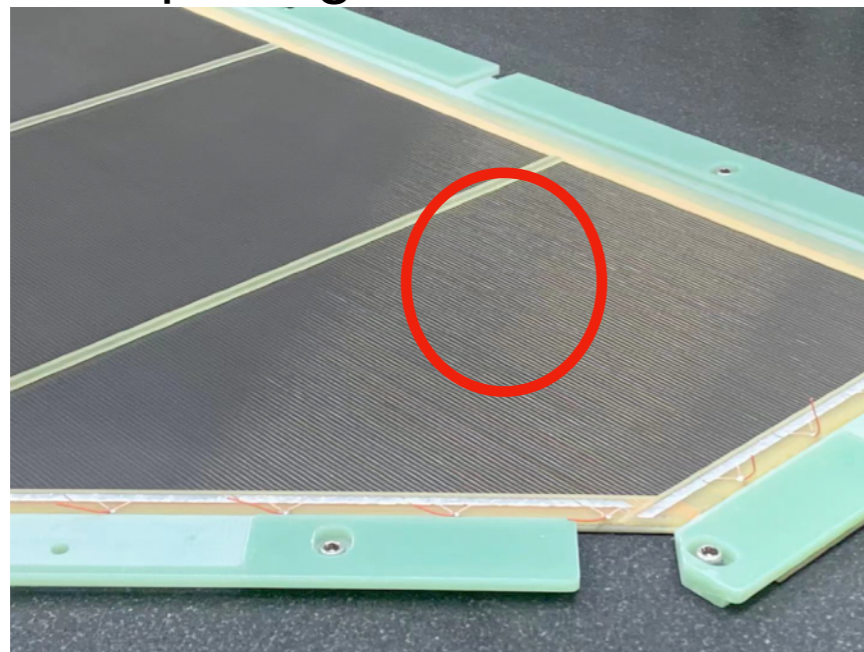
The sheet resistance is lower than $160-240\text{ k}\Omega/2.5\text{ cm}^2$ (20 PCB boards), due to initial pressure inside the graphite spraying machine



Clearing the surface with alcohol, and did the graphite coating again

Wire quality issue:

Gold-plating are not well coating on tungsten wire (affecting 4 chamber)

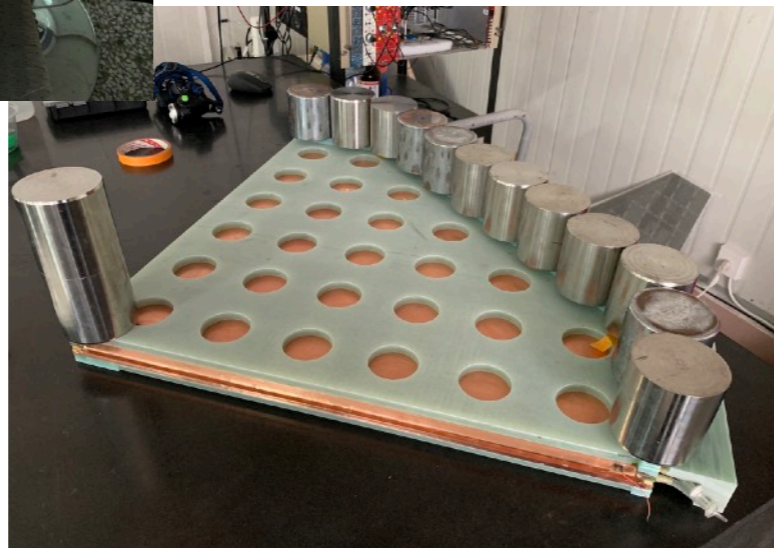


Station production status

- Station production
 - Two dedicated table — One station per-day for assembly
 - Additional soldering and supporting frame installation need two days for each station
 - 20 station are required — 13 are done
 - 15 station will be assembled before May



Soldering
connector and
capacitance



Assembly
supporting
frame



station

CO₂ flow

Production overall status

	Overall Status													
Date	3/20	3/23	3/24	3/25	3/26	3/27	3/29	3/30	3/31	4/1	4/2	4/3	4/6	4/7
Half	12/80	16/80	18/80	20/80	22/80	24/80	26/80	28/80	30/80	32/80	34/80	36/80	38/80	40/80
Chamber	0/40	3/40	4/40	4/40	6/40	8/40	8/40	9/40	11/40	11/40	11/40	11/40	11/40	11/40
Station	0/20	0/20	0/20	0/20	0/20	0/20	0/20	1/20	1/20	2/20	2/20	3/20	4/20	4/20
Date	4/8	4/9	4/10	4/12	4/13	4/14	4/15	4/16	4/17	4/19	4/20	4/21	4/22	4/23
Half	42/80	44/80	46/80	48/80	50/80	52/80	54/80	56/80	58/80	60/80	62/80	64/80	66/80	68/80
Chamber	11/40	13/40	15/40	15/40	17/40	19/40	21/40	22/40	23/40	23/40	23/40	25/40	27/40	29/40
Station	5/20	5/20	5/20	5/20	5/20	5/20	5/20	6/20	7/20	8/20	9/20	10/20	11/20	11/20
Date	4/25	4/26	4/27	4/28	4/29	4/30								
Half	70/80	72/80	74/80											
Chamber	31/40	33/40	35/40											
Station	11/20	12/20	13/20											

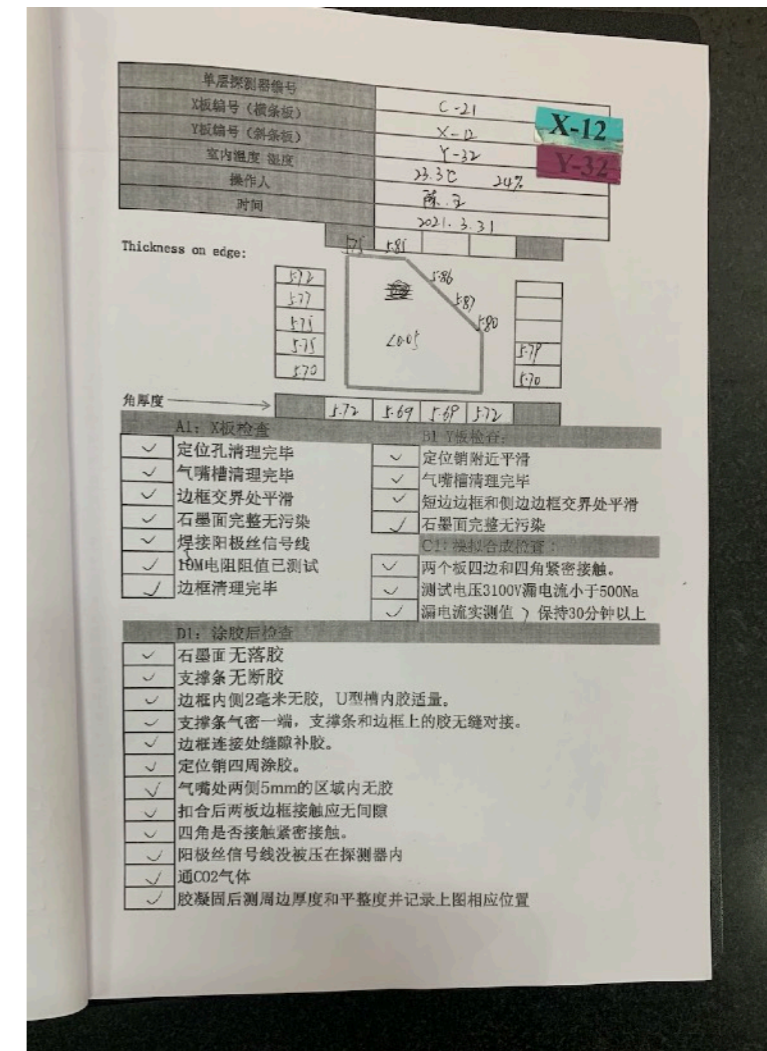
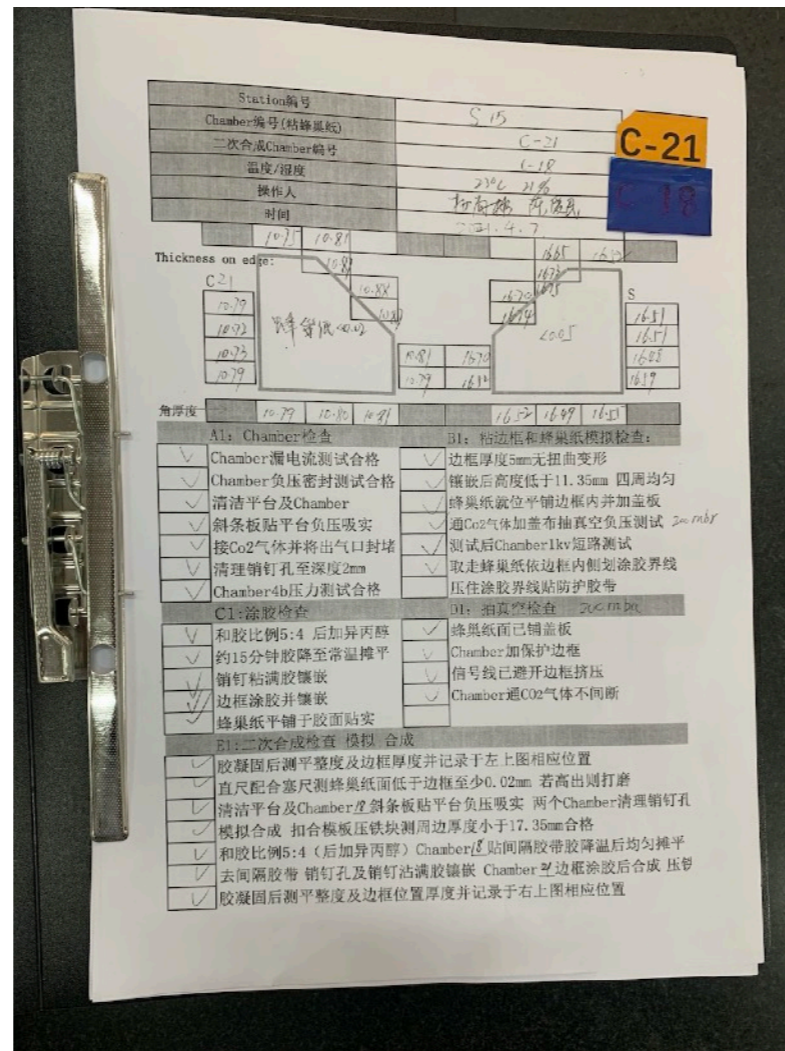
- 4 full time technicians and one faculty members work 6 days a week on this project
- 9 station were produced within a month (3/20 - 4/20)
- 74 out 80 half-chamber have been assembled, other 6 will be produced before May
- 35 out of 40 chamber have been produced, other 5 will be produced before May
- 13 out of 20 station have been assembled, other 7 station assembly will be done at mid-May

QC documents

QC document for stations



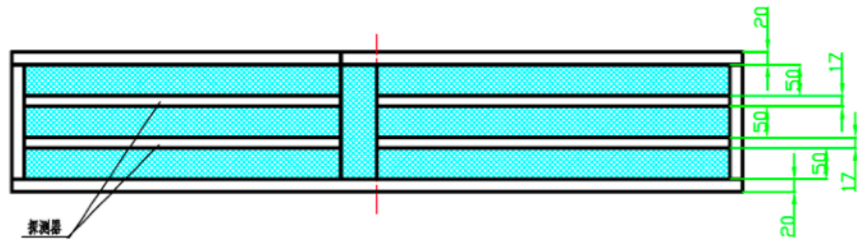
station assembly checklist Chamber assembly checklist



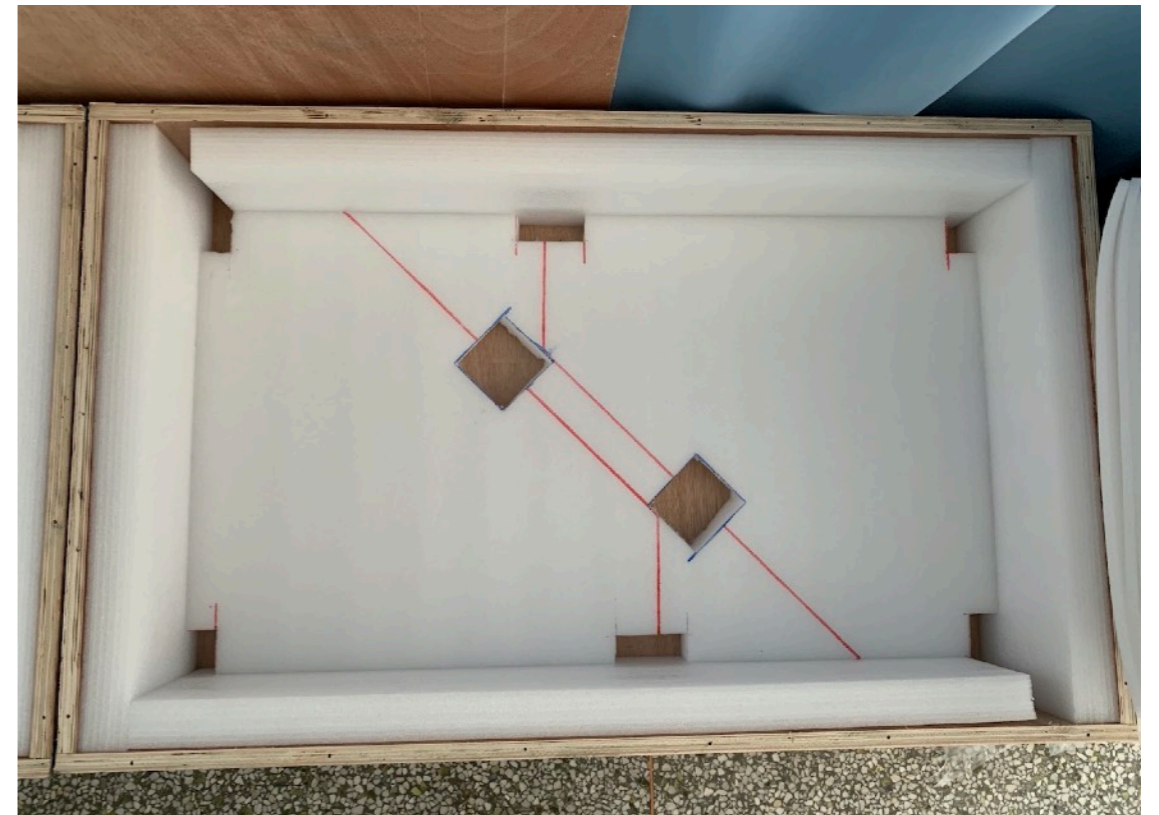
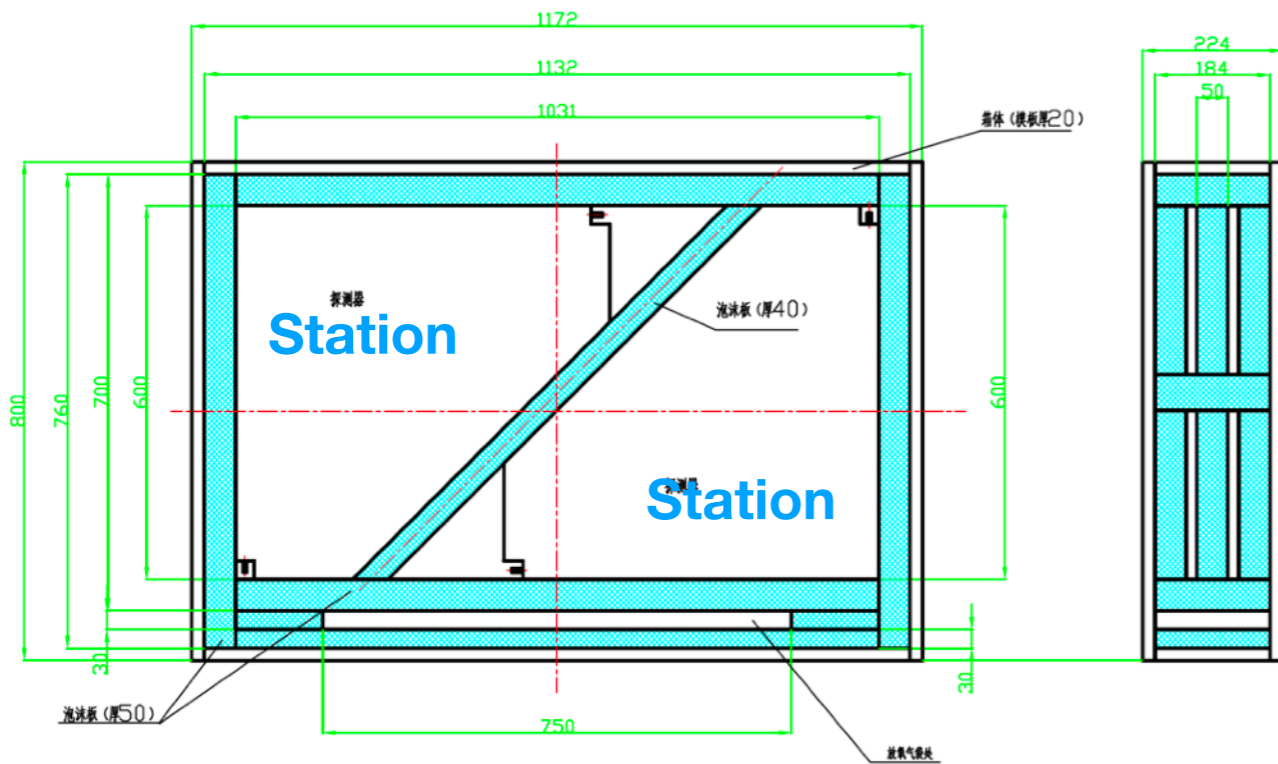
- Checklist of Each step have been filed (PCB board checklist, chamber assembly checklist, station assembly checklist et. al)
- Documents will be updated to Drupal soon

Shipping box

side-view

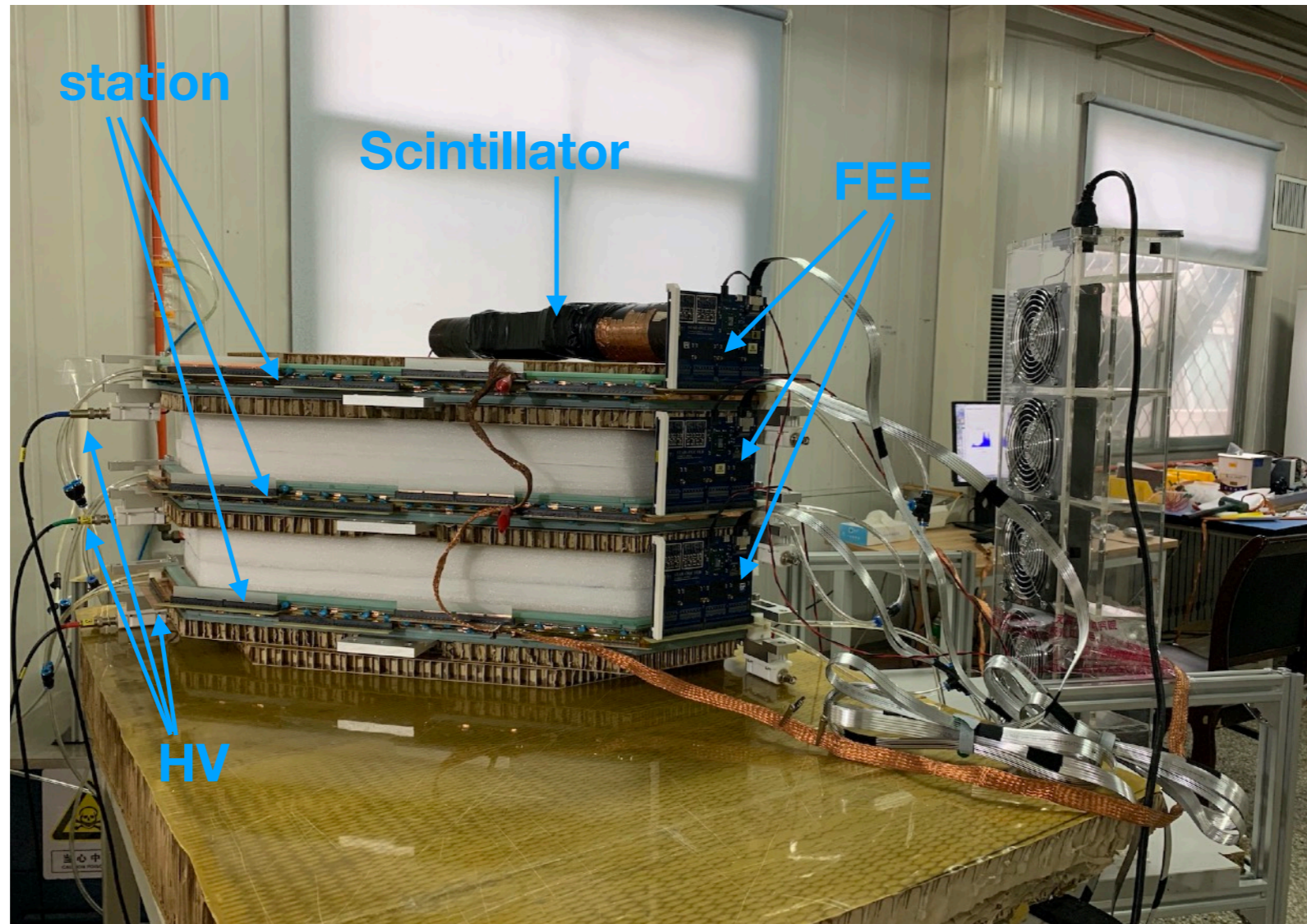


Top-view

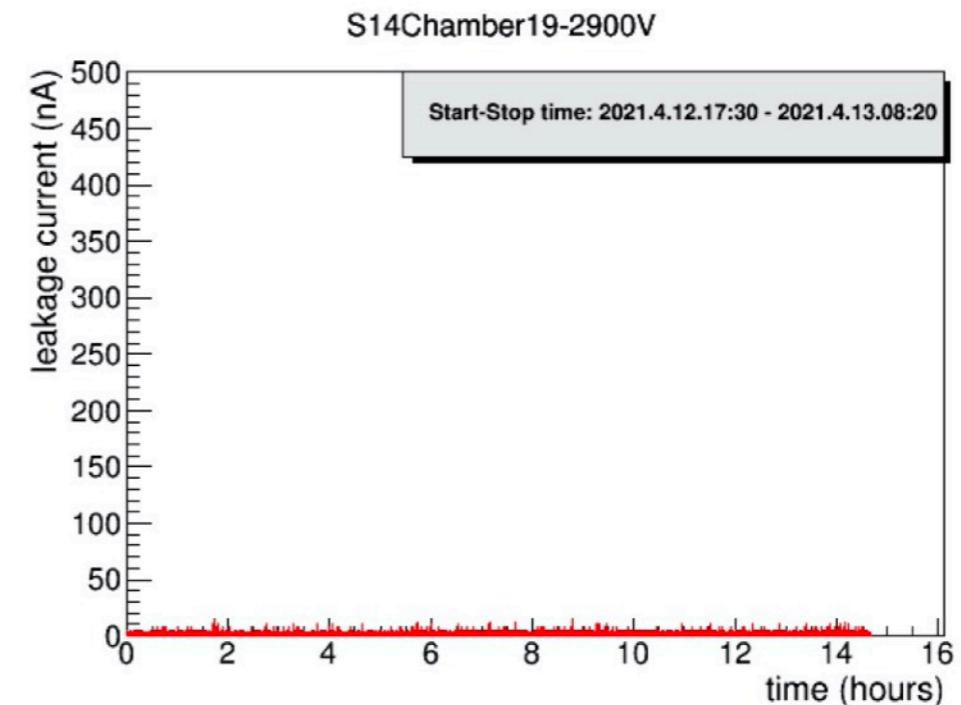
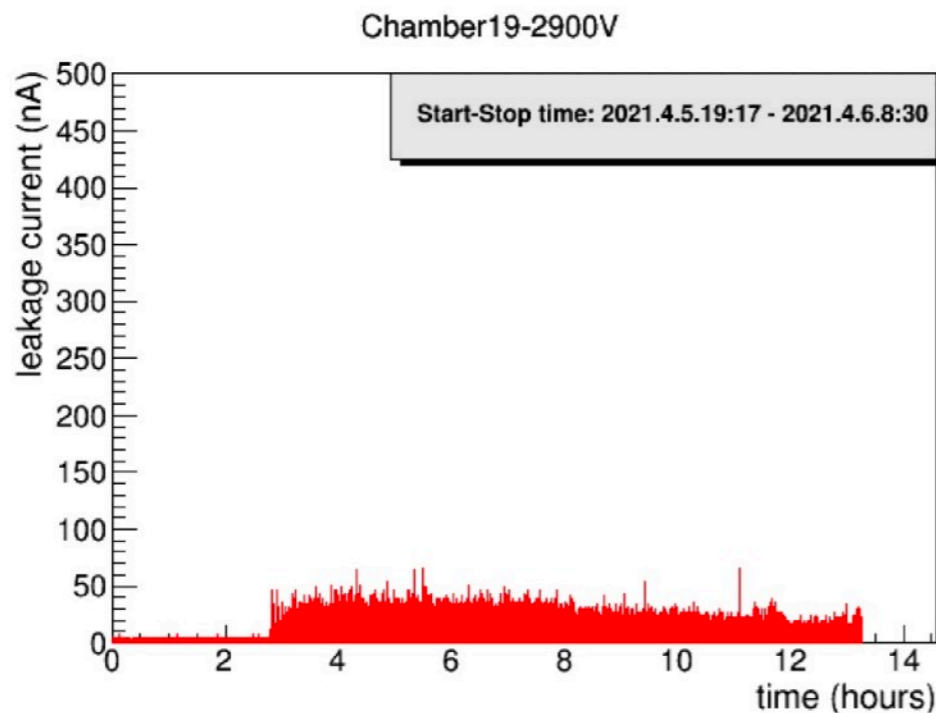
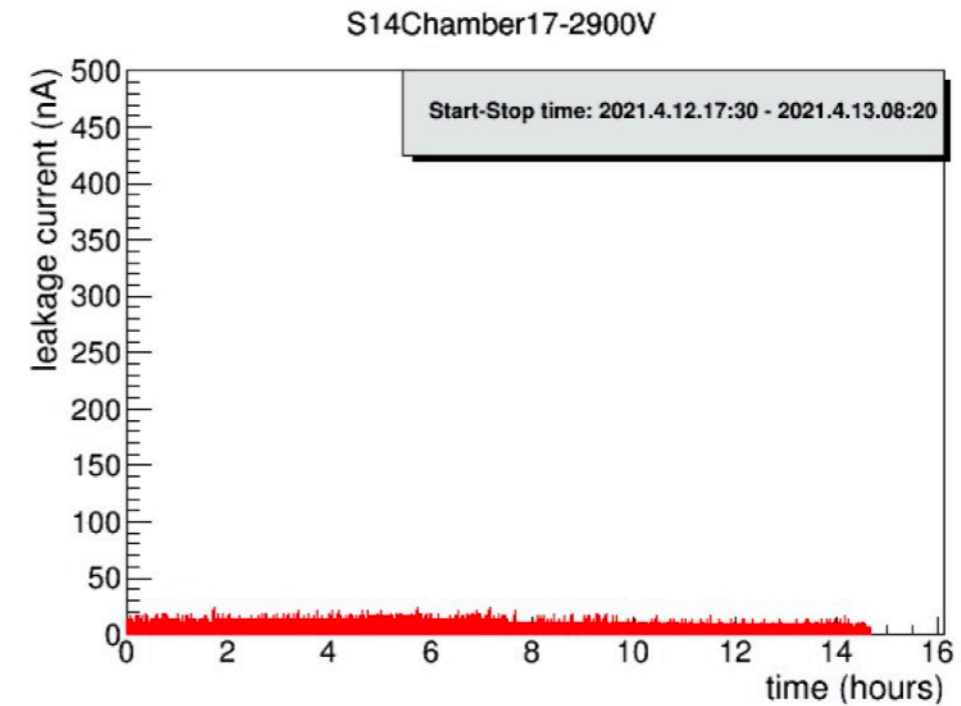
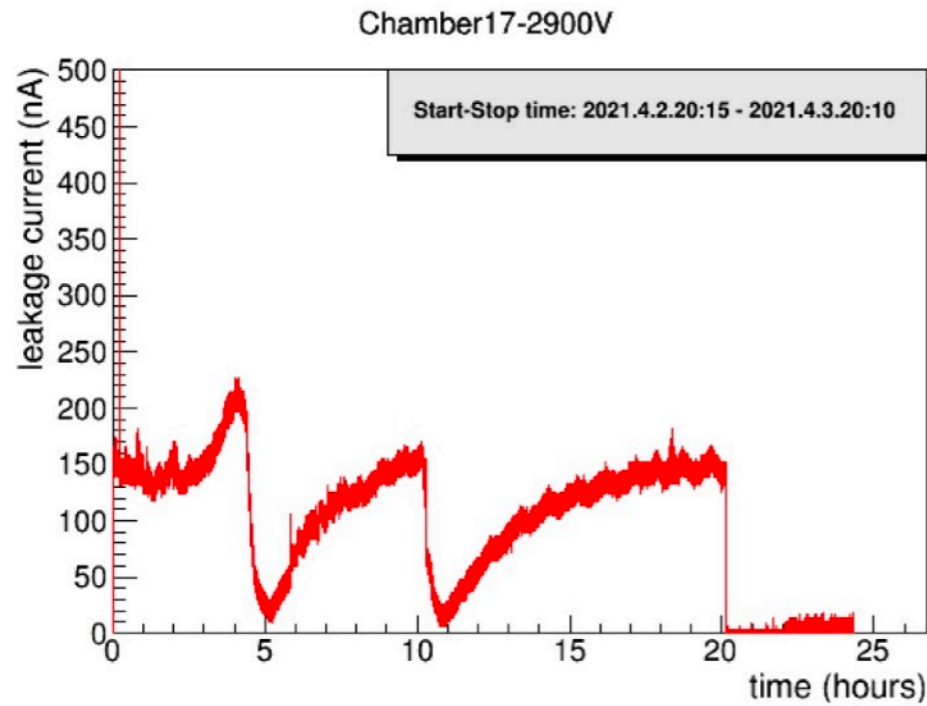


- 4 station in two layer for each shipping box

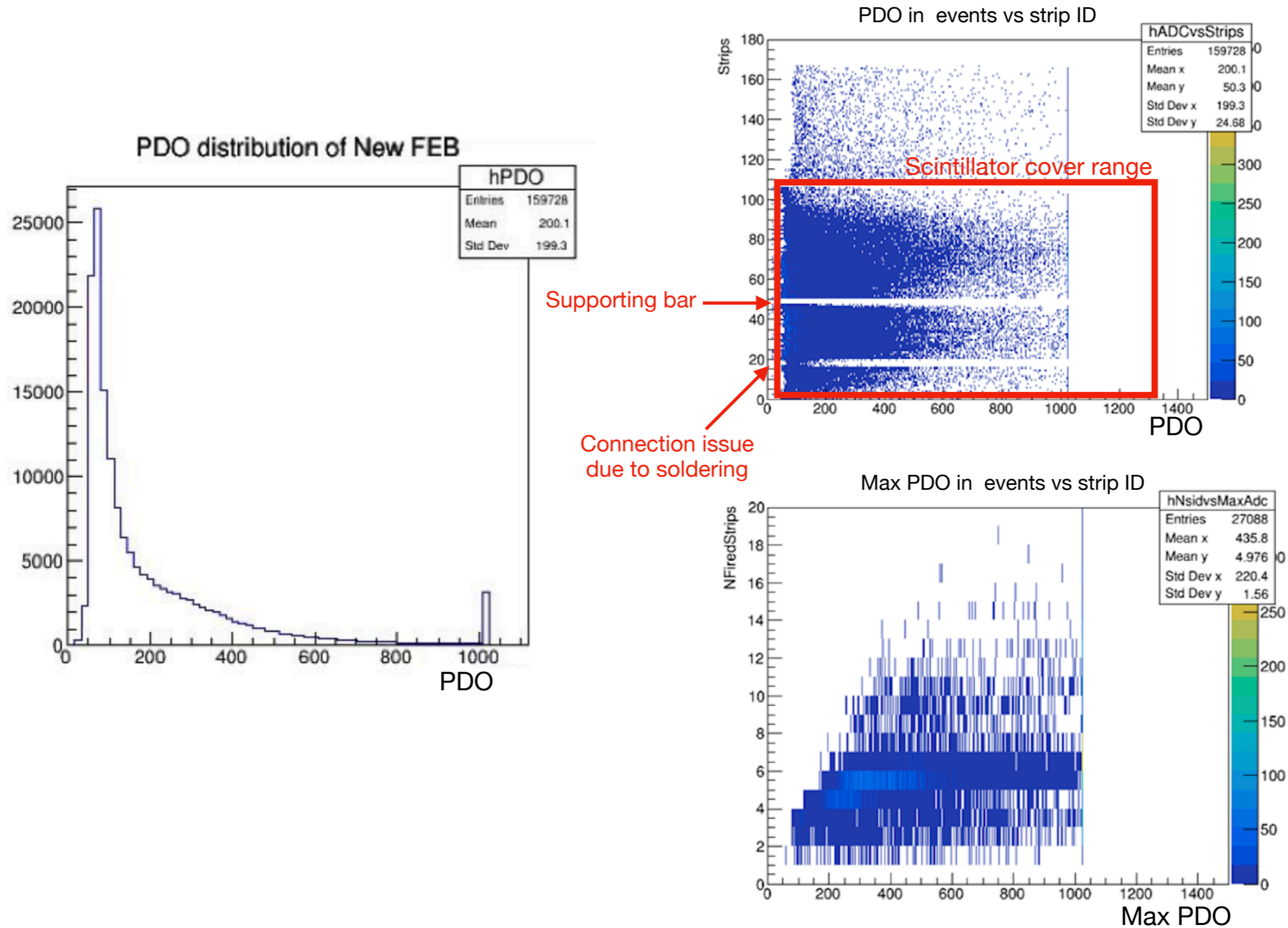
Station testing system



Station testing: leakage current

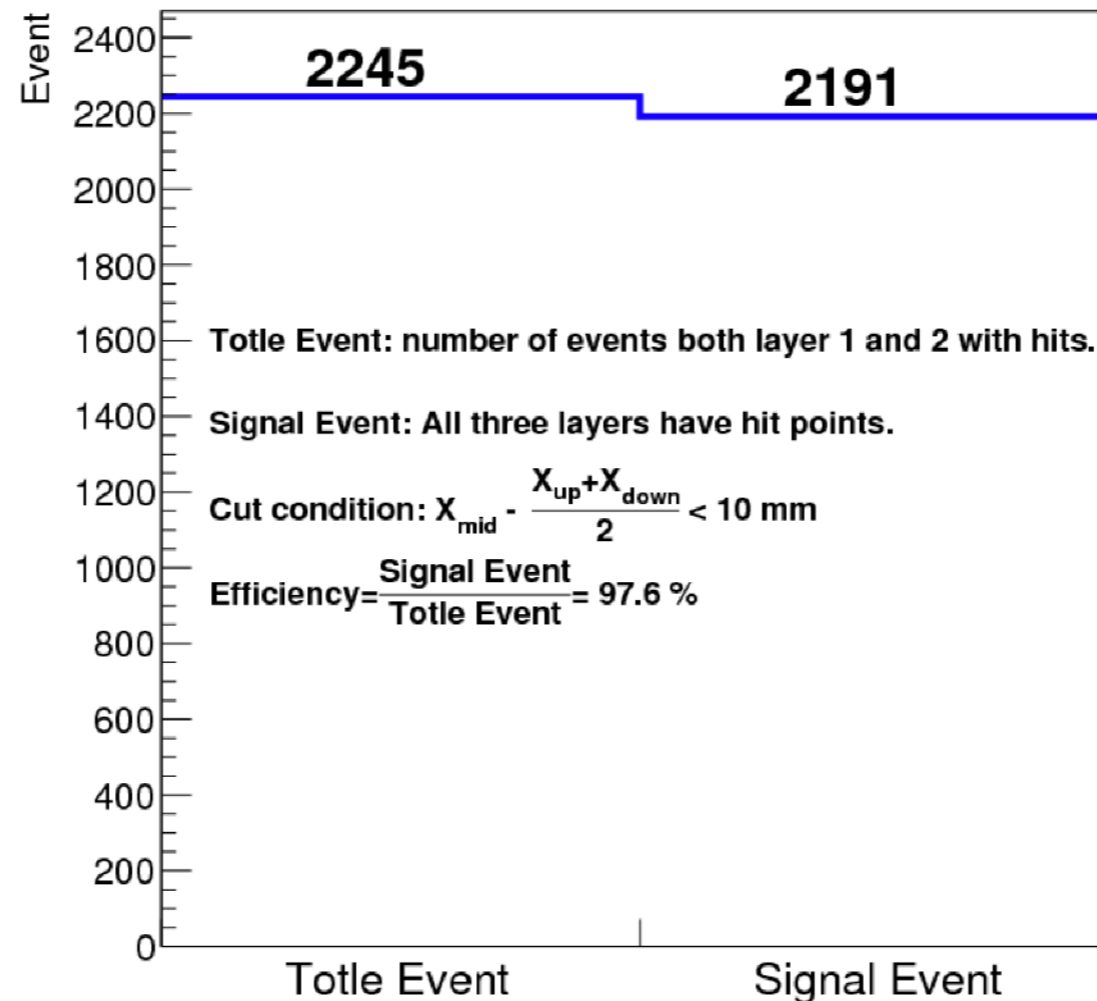


Station testing: QA (S14 C-19)



Station testing: Detector efficiency

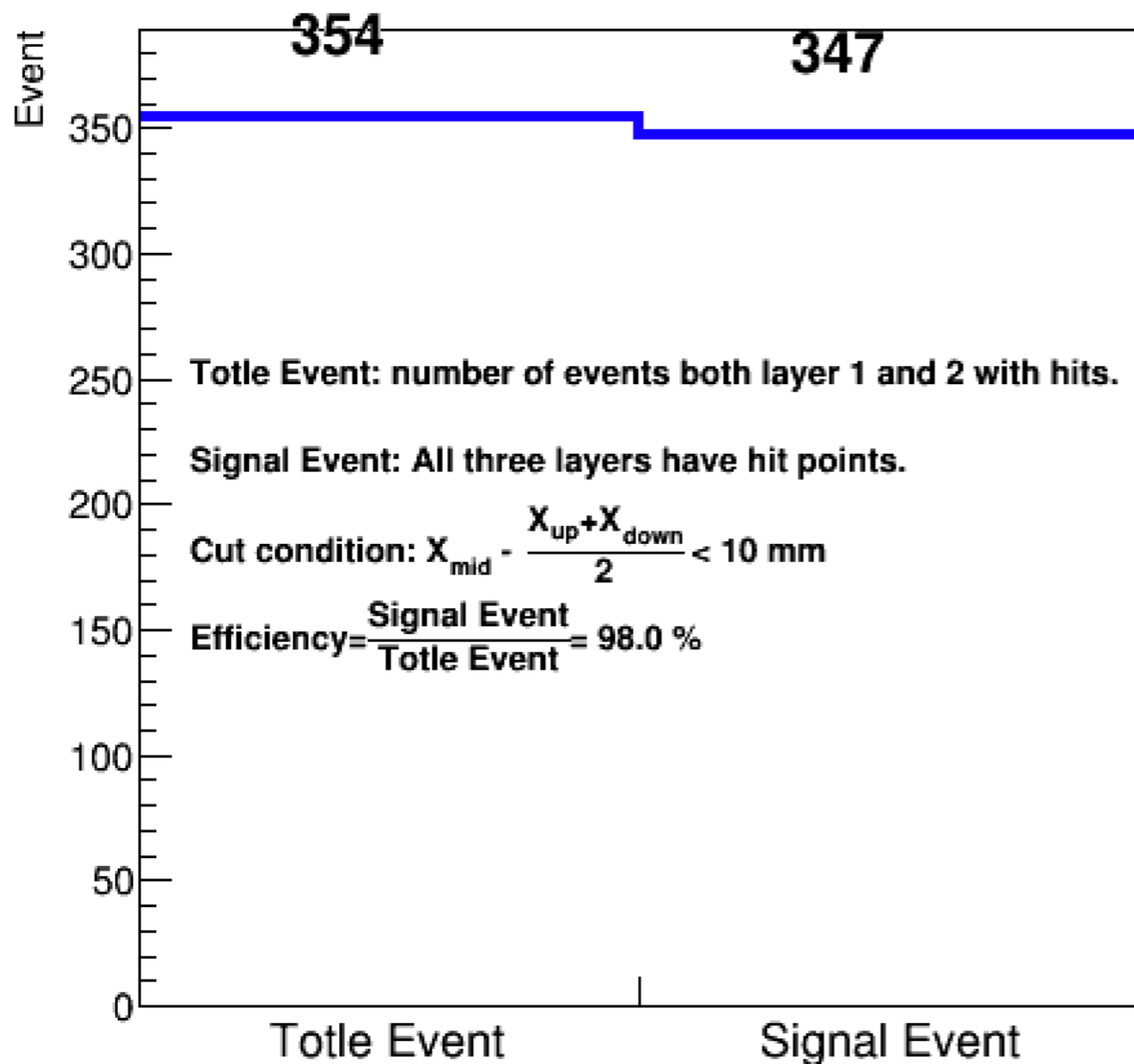
HV: 2900V
Gain: 3 mv/fc



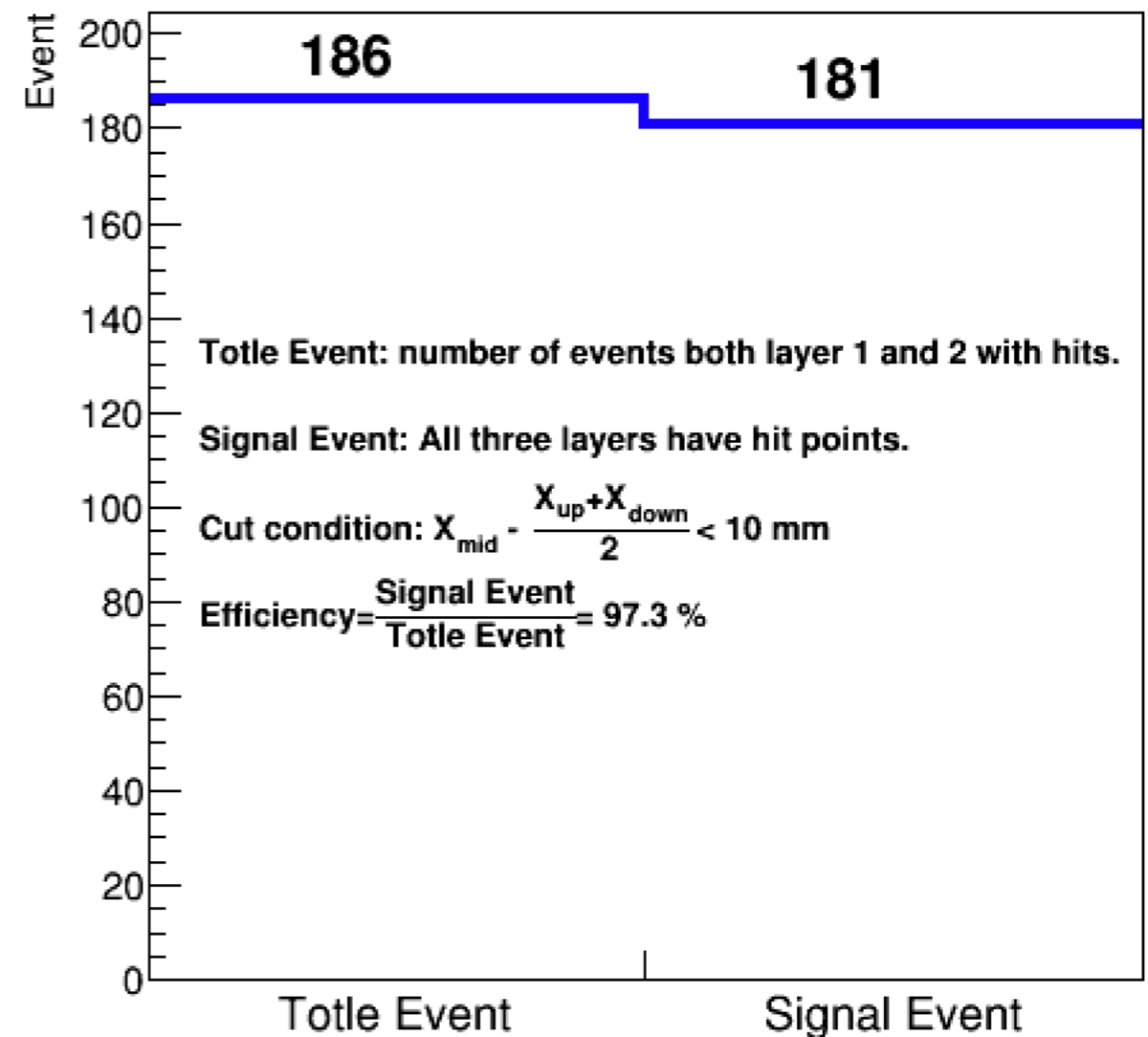
- The VMM gain setting is 3 mv/fc and detector is ramp up to 2900V
- Including only the active area in both three layer
- Alignment requirement: hit position differ less than 10 mm
- The detector efficiency is 97.6% for Chamber-19

Station testing: Detector efficiency

HV: 3000V
Gain: 1 mv/fc



HV: 2900V
Gain: 1 mv/fc



Traveler

SD-TRAVELER S-14

Performance Test 性能检测

Chamber No. C-17 and No. C-19

After answering each of the following questions please initial your name.
完成下列检查后请签名。

Gas leakage test 室气密性测试

Generating a -6mb pressure difference between chamber and atmospheric pressure by using injector and measuring the pressure difference again at least 5 minutes latter.

给探测器加-6mb的负压，五分钟后测试探测器的负压

Chamber No. C-17

- Are the pressure difference less than -5.8mb?
探测器室内负压是否低于-5.8mb? Yes , No
- Do you hear any noise from detector?
是否听到来自探测器的噪音? Yes , No

Chamber No. C-19

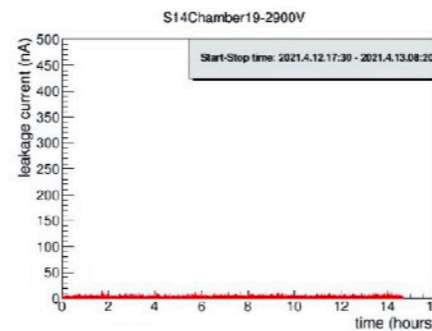
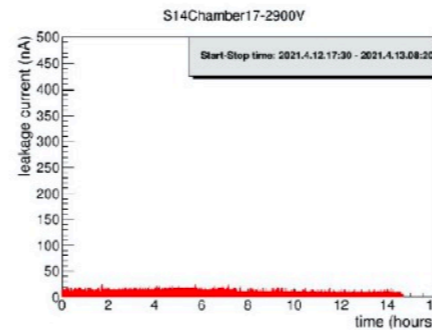
- Are the pressure difference less than -5.8mb?
探测器室内负压是否低于-5.8mb? Yes , No
- Do you hear any noise from detector?
是否听到来自探测器的噪音? Yes , No

HV leakage current test 高压漏电流测试

Flow working gas(55% CO₂ and 45% n-pentane) to the testing station for at least 24 hours and ramping the HV to 2900V for both chambers for the leakage current test. Monitoring the leakage current for 24 hours. The leakage current should less than 500 nA in each chamber

把探测器通入工作气体24小时，然后对两个室加2900V高压进行漏电流测试，监测探测器的24小时内漏电流情况，各室的漏电流应小于500 nA

1



Performance test 性能检测

After the working gas has been flowed for 24 hours, test the performance of the station under 2900V.

通工作气体24小时后，在2900V高压下测试探测器性能。

Detector efficiency for each chamber 探测器探测效率：

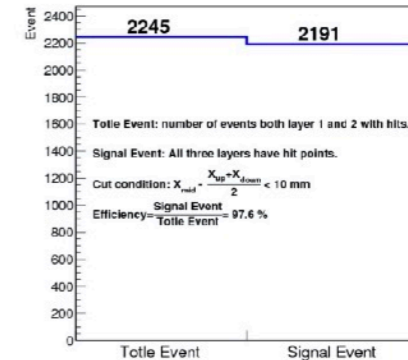
The detector efficiency are required to larger than 95%

每个室的探测效率应大于95%

Detector efficiency for C-19 : 97.6%

Detector efficiency for C_ : _____

2



Position resolution (in x and y)探测器位置分辨：

Note for this station 探测器备注

IF THE ANSWER TO ANY QUESTION ABOVE IS YES NOTIFY COGNIZANT ENGINEER

如果上述问题的答案任何一个为 YES，通知相关工程师。

IF THE PROBLEM CAN NOT BE REPAIRED TAG THE PART "REJECTED PERFORMANCE TEST"

如果问题很严重，且无法修复，标记“驳回-性能测试”

Engineer's signature

工程师签名 _____

Inspector's signature

检验员签名 _____

PASS通过 _____

Inspection date

检验日期: ___/___/___

Inspection date

检验日期: ___/___/___

REJECTED驳回 _____

3

Summary

- The mass production goes very smoothly, and will be finished in mid-May
- All QC documents are well filed
- The leakage current for sTGC stations are reasonable
- The detector efficiency is ~97% for sTGC with Gain 3 mv/fc setting
- The shipping boxes are ready
- All sTGC station will be delivered as schedule