



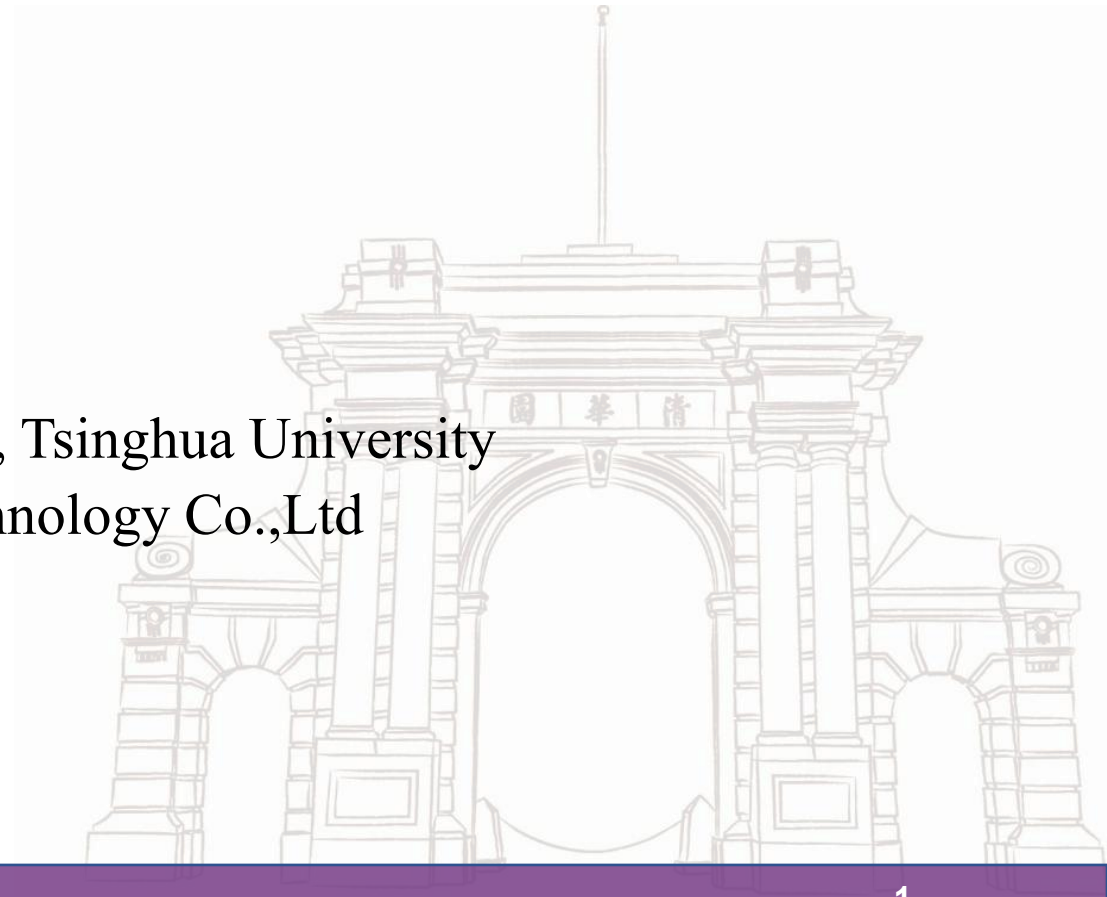
Introduction of RPC production workshop of Guanyu Co, Ltd

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Guanyu Muon (Yichang) Technology Co.,Ltd

2025.10.9

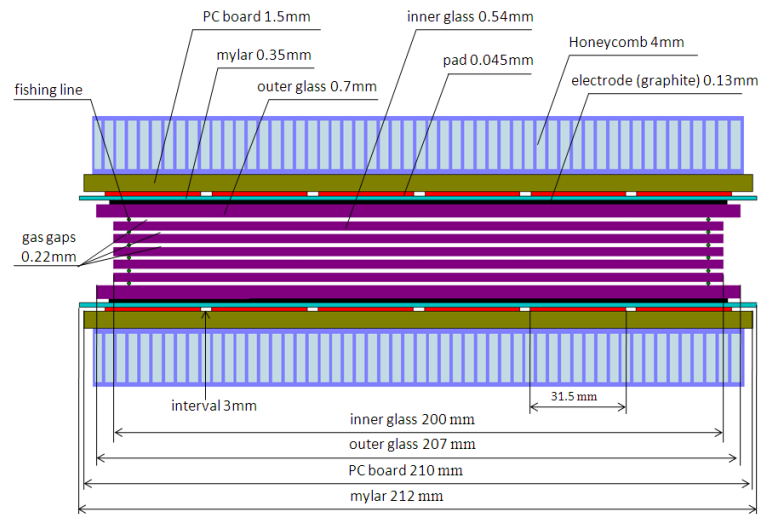
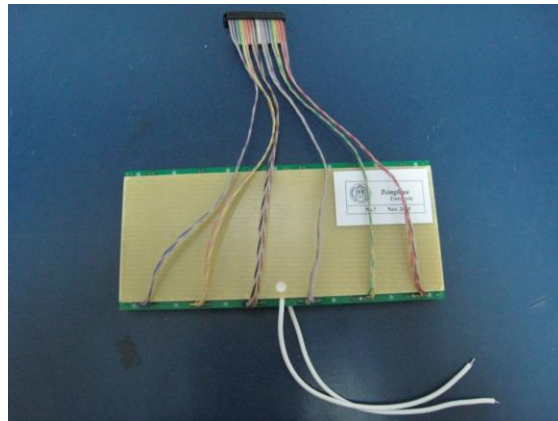
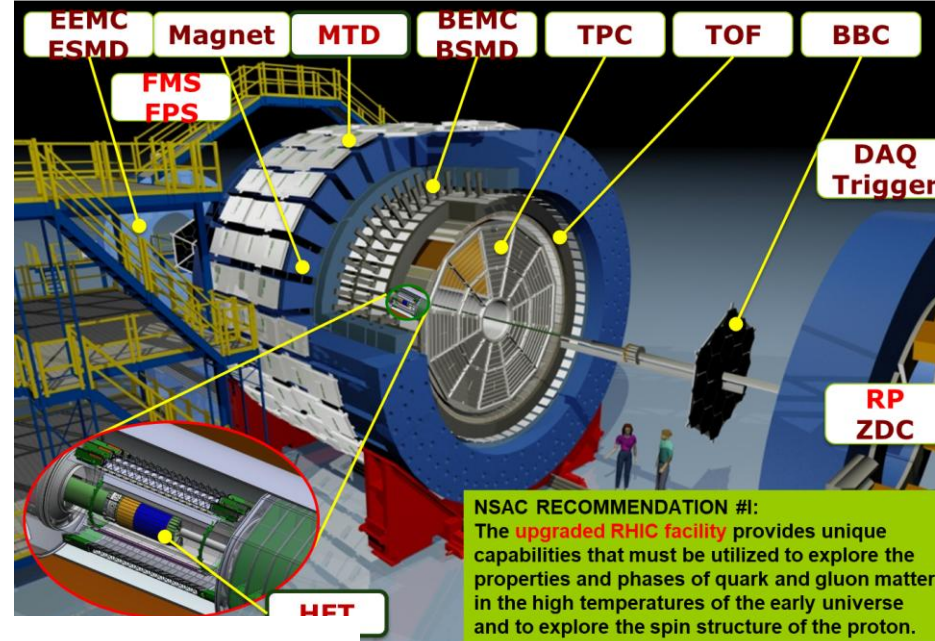


Contents

- **MRPC R&D at Tsinghua University**
- **Introduction of Guanyu Muon Co.Ltd**
- **Main product of Guanyu Muon Co.Ltd**
- **MRPC production at Beijing base**
- **Conclusions**

MRPC R&D

Collaboration with RHIC-STAR



STAR MRPC specifications:

Electrodes: 0.5mm float glass

Gas gap: $6 \times 0.22 \text{ mm}$

Working gas: 95% F134a+5% iso-butane

HV: $\pm 7 \text{ KV}$

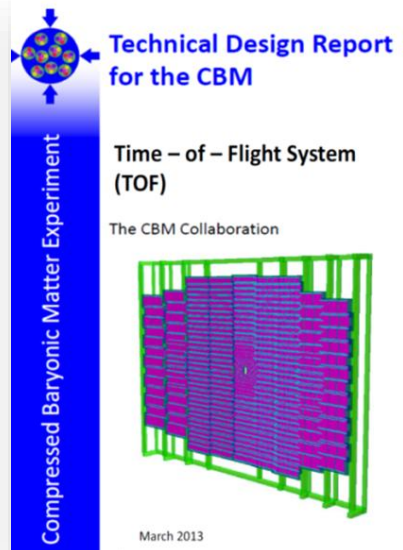
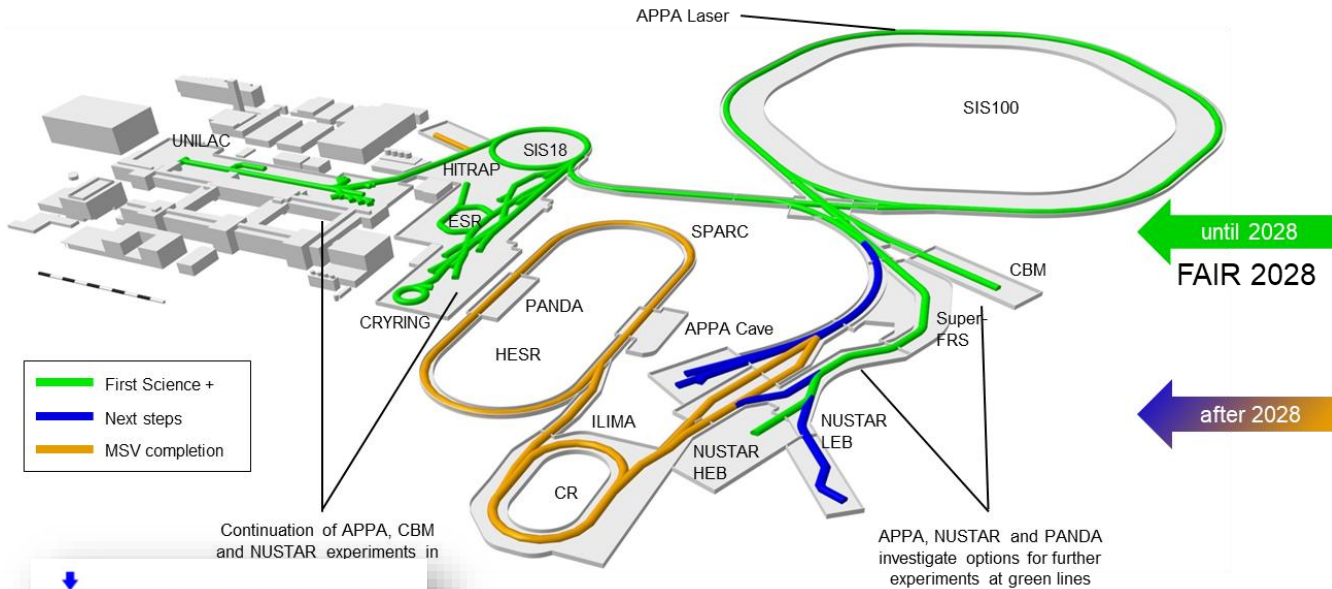
Time resolution: 60ps

Efficiency: 97%

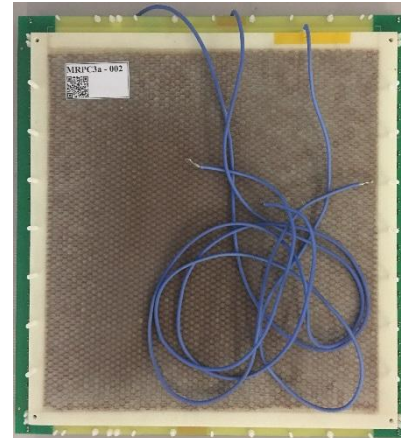
Number: 3840

MRPC R&D

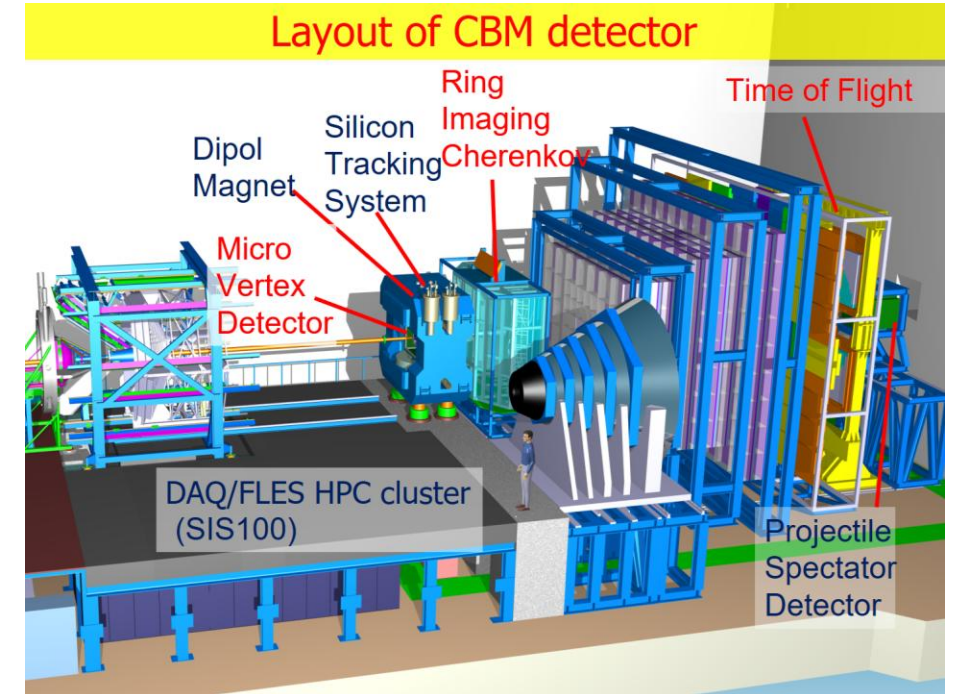
Collaboration with Fair-CBM



Low resistive glass



CBM MRPC

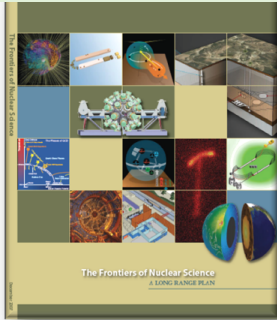


CBM MRPC specifications:

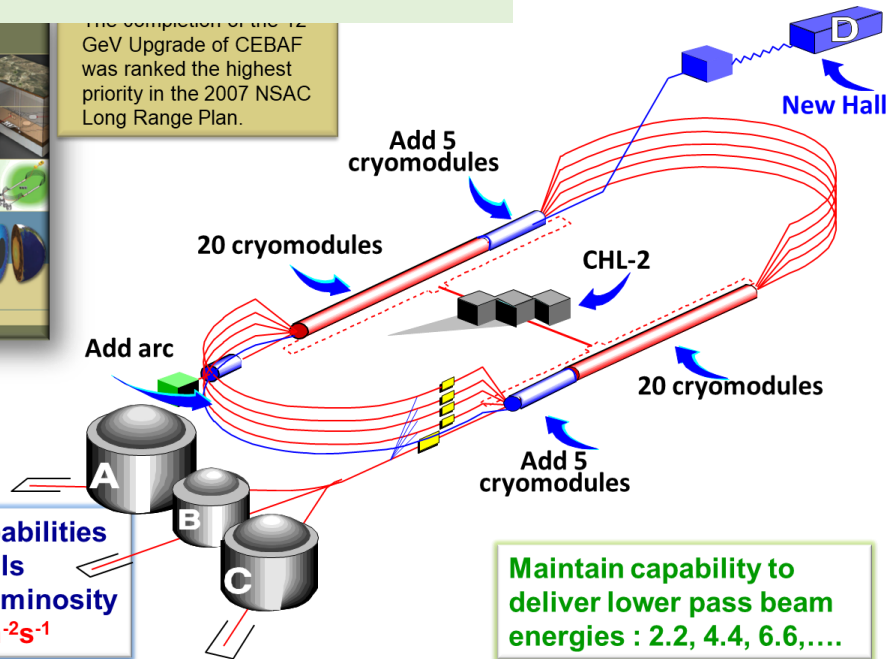
Electrodes: 0.7mm low resistive glass
 Gas gap: 4×0.25mm, two stacks
 Working gas: Standard gas
 HV: ± 5.2 KV
 Time resolution: 60ps
 Rate: $> 30 \text{ kHz/cm}^2$
 Number: 580

MRPC R&D

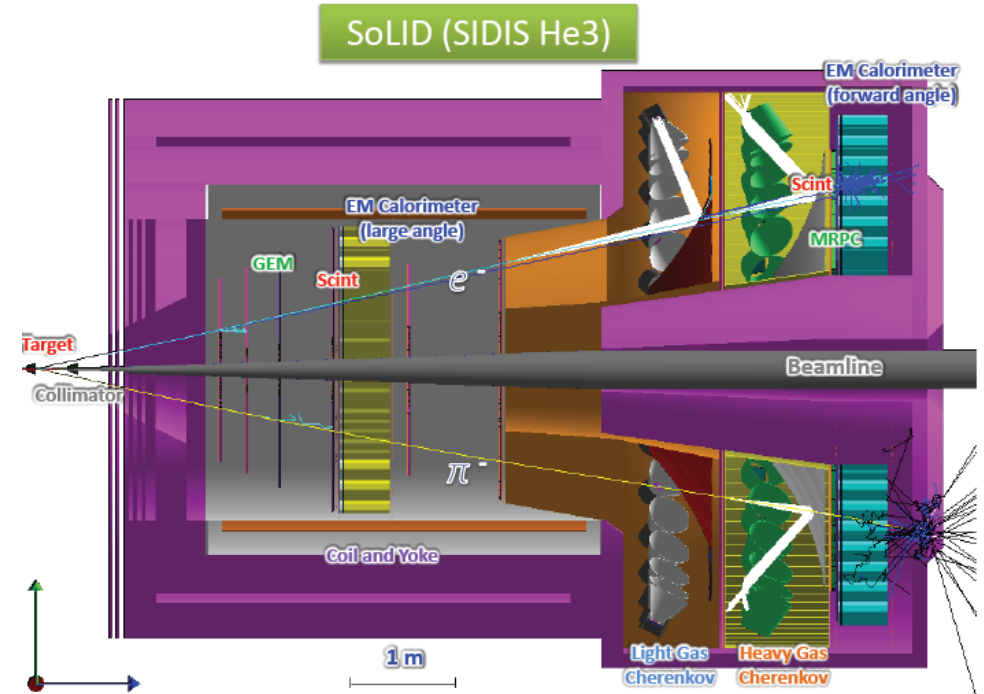
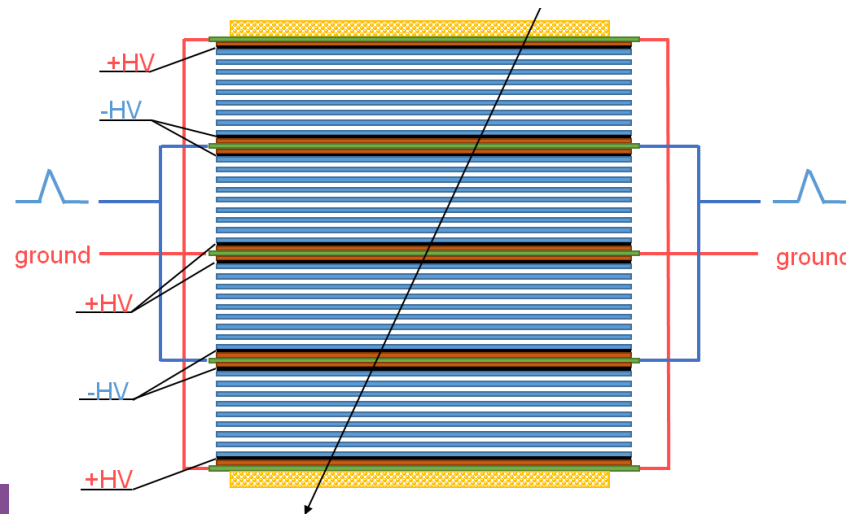
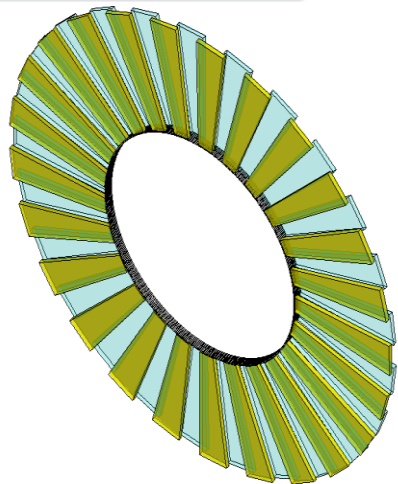
Collaboration with JLab-SoLID



The completion of the 12 GeV Upgrade of CEBAF was ranked the highest priority in the 2007 NSAC Long Range Plan.



- Enhanced capabilities in existing Halls
- Increase of Luminosity $10^{35} - \sim 10^{39} \text{ cm}^{-2}\text{s}^{-1}$

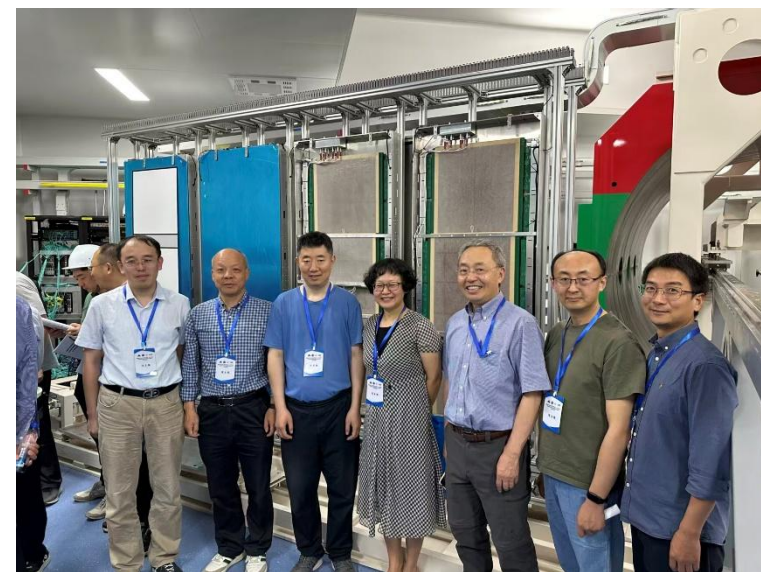
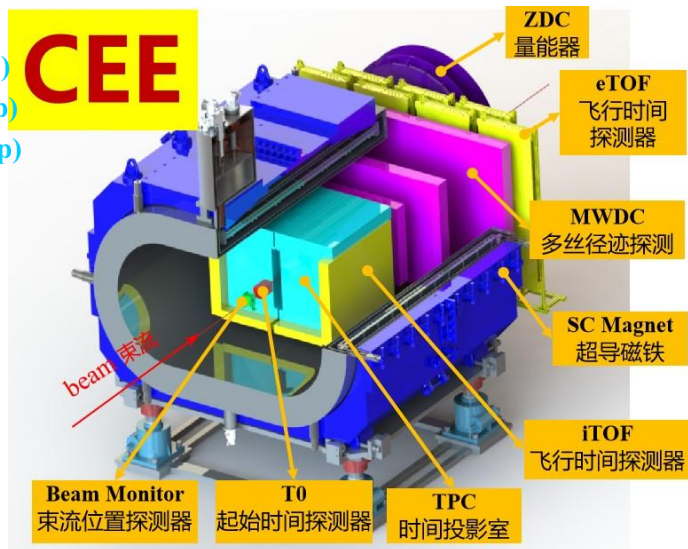
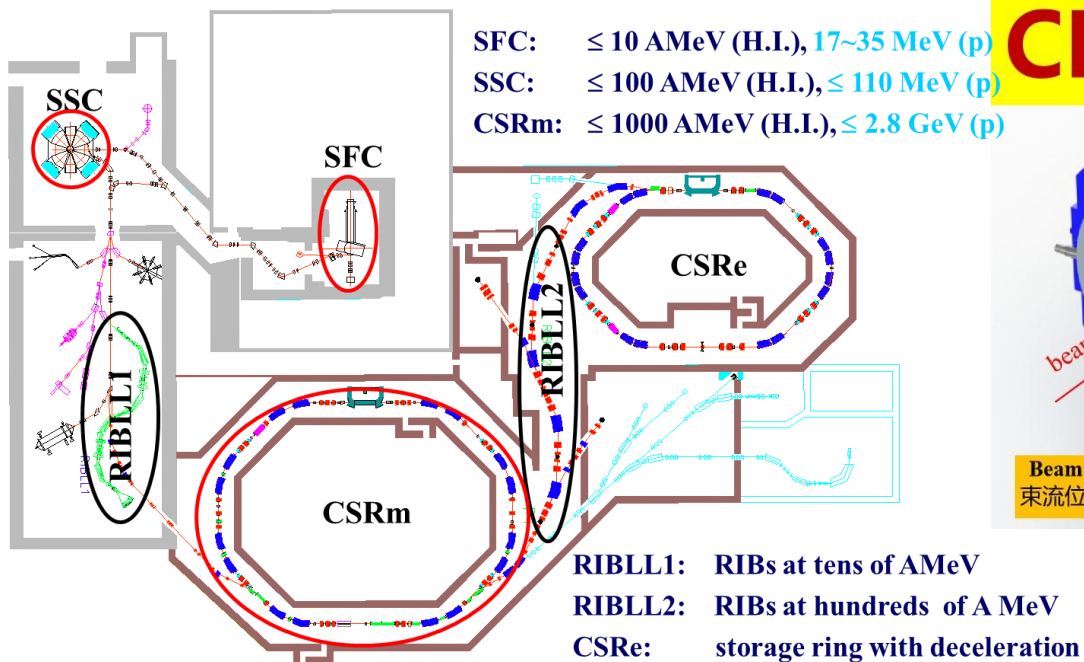


SoLID MRPC specifications:

Electrodes: 0.7mm low resistive glass
 Gas gap: $8 \times 0.128\text{mm}$, four stacks
 Working gas: Standard gas
 HV: $\pm 6.7 \text{ KV}$
 Time resolution: 20ps
 Rate: $> 20\text{kHz/cm}^2$
 Number: 150

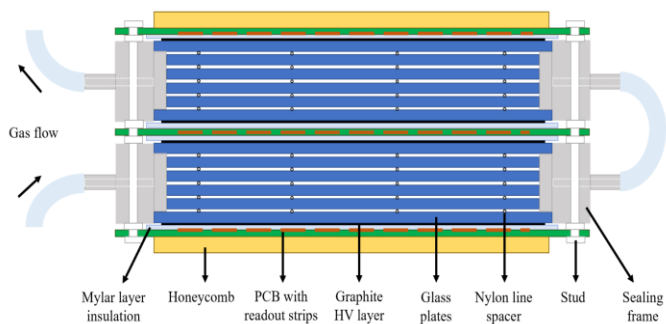
MRPC R&D

Collaboration with CSR-CEE

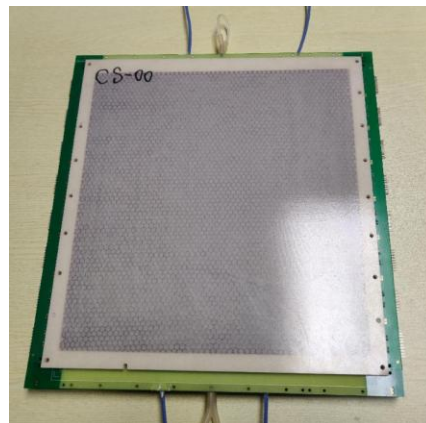


CEE-eTOF MRPC specifications:

Electrodes: float glass
Gas gap: 5×0.25 mm, two stacks
Working gas: Standard gas
HV: ± 6.7 kV
Time resolution: 60 ps
Gas consuming: < 20 Sccm/m²
Number: 24



Sealed MRPC for CEE-eTOF



Guanyu Moun (Yichang) Technology Co.Ltd

- Guanyu Muon Co.Ltd is founded at Yichang (Hubei province, my home town) on February, 2025
- It is specialized on **Muography** application on nuclear material detection, mine safety, subway, ship container, et al.
- It's manufacture center is at Yichang (2600m²), There is also 1000m² R&D base at Miyun (Beijing)
- It also specialized on the **manufacture** of **gas detector** and other detectors



Prof. Yi Wang, Chief Scientist



Dr. Xiaolong Chen, CEO

Workshop and Equipment

Yichang



Electrode production room



Clean room

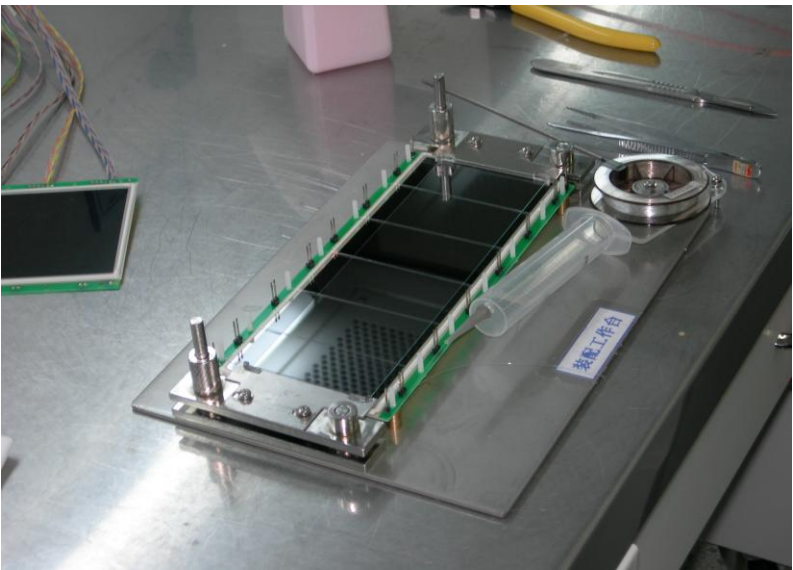
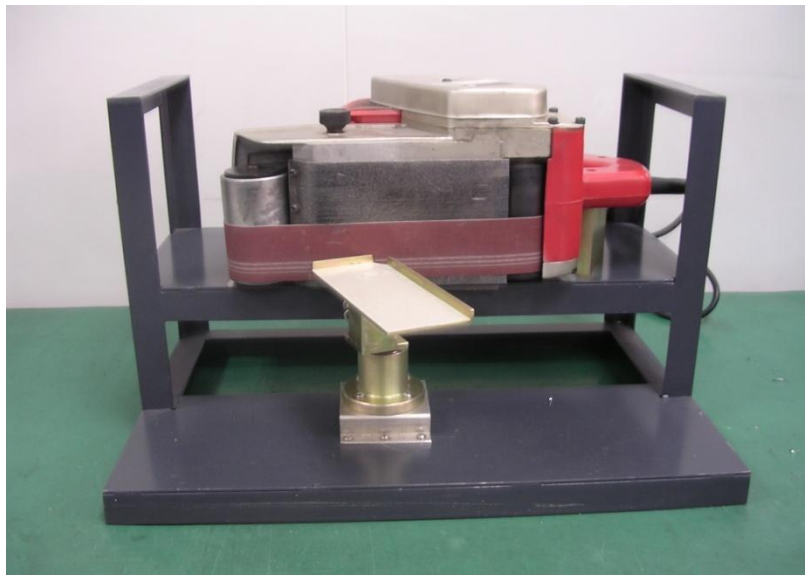
Beijing

Equipment

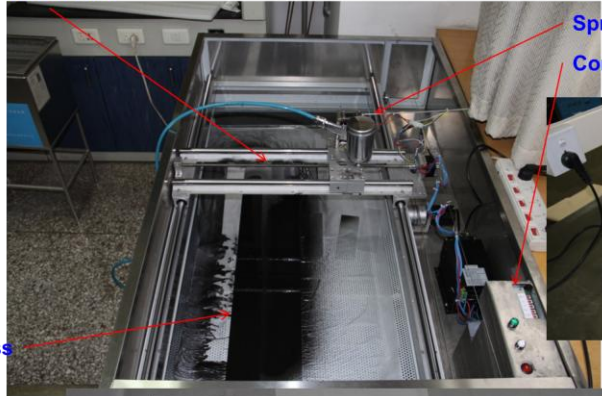


Machine for assembling Shashlyk Ecal tower





Transmission



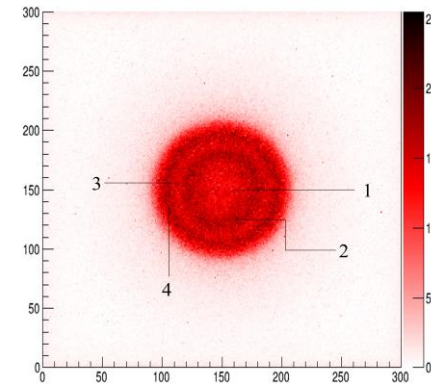
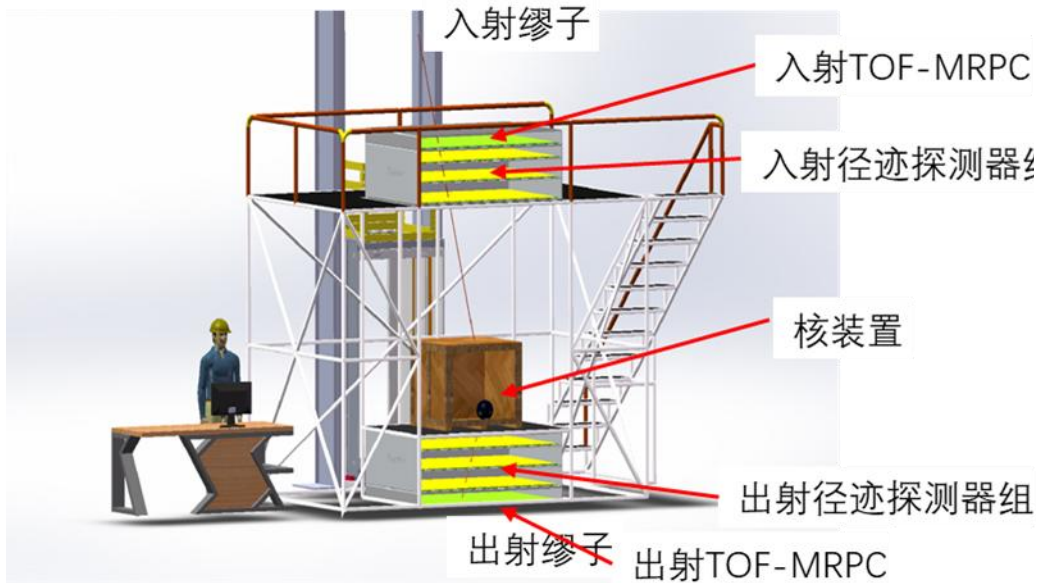
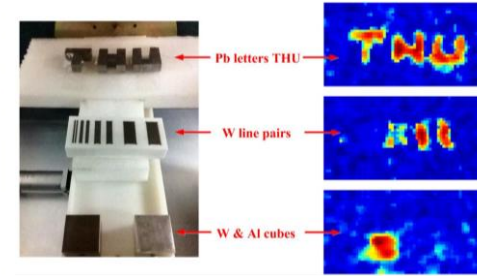
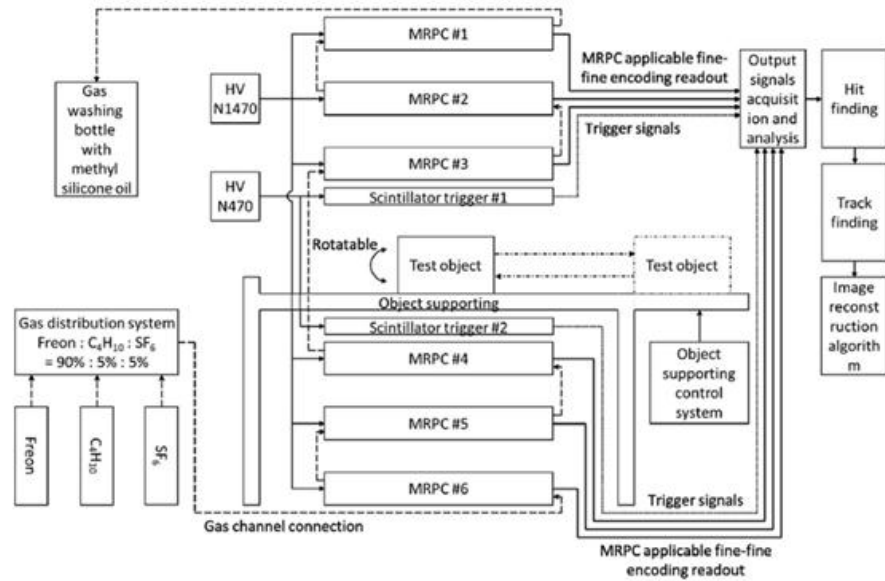
Spraying gun
Controller

glass

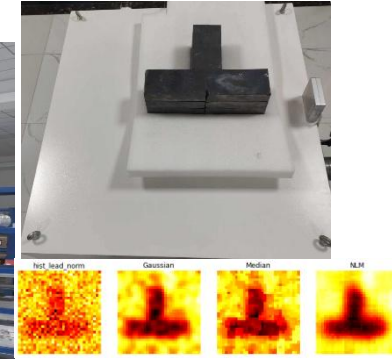
Colloidal graphit



Main Products



Three kinds of muon scattering system



New scintillator muon detector

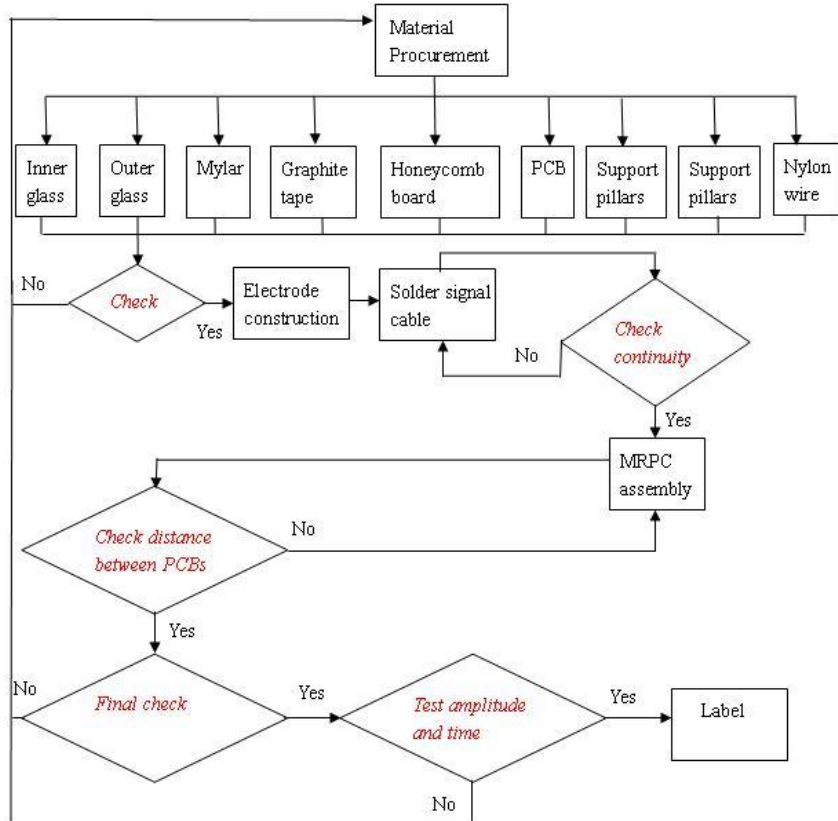
MRPC production for STAR-TOF

Plan (Finished)	2006						2007						2008			
	1/2	3/4	5/6	7/8	9/10	11/12	1/2	3/4	5/6	7/8	9/10	11/12	1/2	3/4	5/6	7/8
Prod Start		I														
132 MRPCs		→														
768 MRPCs		→														
1856 MRPCs		→														
2944 MRPCs		→														
4032 MRPCs		→														



MRPC production was finished until September of 2008.

3100 MRPC have been produced;
2951 Modules passed QA ;
2824 modules shipped to UT Austin .



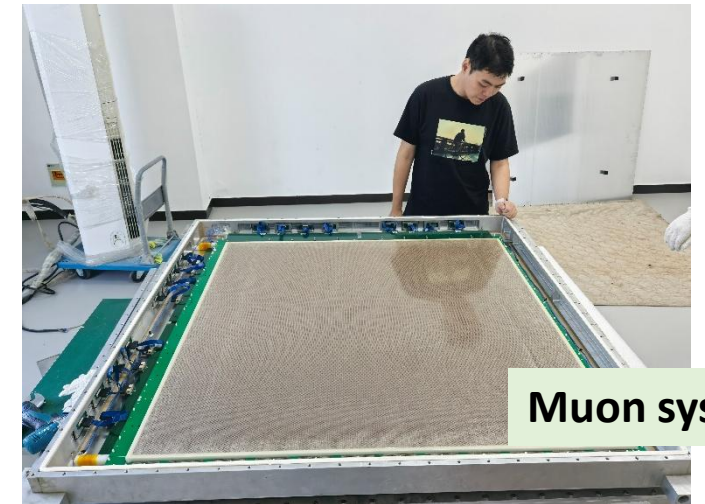
DC for production



STAR-MTD



CBM and CEE



Muon system

Sealed MRPC – A Paradigm-Shifting Gas Detector for Precision Measurement

Introduction

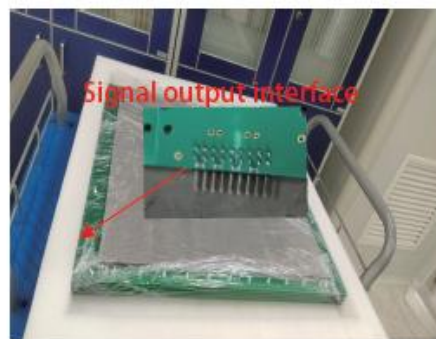
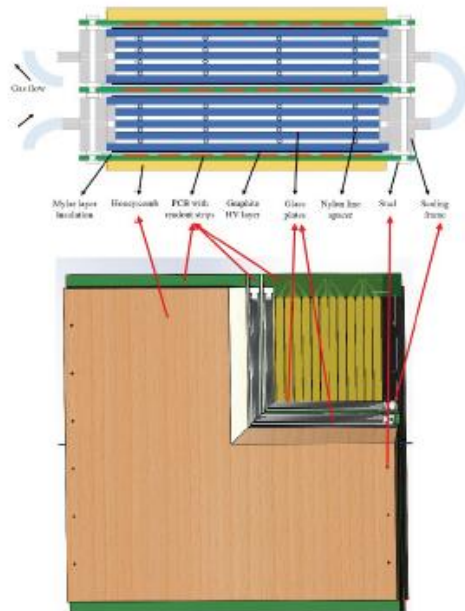
The Sealed MRPC redefines gas detector design through its innovative hermetic structure—integrating precision-engineered electrode glass plates with ultra-fine 3D-printed sealing frames—to transform the detector into a self-contained gas chamber. This breakthrough eliminates the need for bulky external metal gas containment systems typical of conventional MRPCs, delivering transformative advantages: **>95% reduction in operating gas flow rate**; **>80% shorter gas-purge duration for immediate system readiness**; **radically simplified architecture with integrated gas containment**. While maintaining the core performance benchmarks of standard MRPC technology—including exceptional time resolution (**20 ps**), outstanding spatial precision (**300 μm**), and **high cost efficiency**—the sealed MRPC overcomes critical limitations: extended stabilization periods, auxiliary system complexity, and environmental contamination hazards.

The sealed MRPC is engineered for scientific research and industrial applications demanding high-precision detection, minimal integration complexity, low operational costs, and sustainable operation.

Key Indicators of Sealed MRPC

- applications: Time Resolution or Position Resolution
- Performance indicators:
 - Time Resolution : 20ps ; 50ps ; 100ps or others
 - Position Resolution : 300 μm ; 700 μm or others
- Size: 100mm*100mm to 500mm*500mm. Position resolution can larger
- Structure: single stack ; double stacks ; 4 stacks
- Spacer Type: Fishing line ; Pad
- Signal output interface: Male header, 2 $\times$ N position, 0.1" (2.54mm) spacing
- Others: Time resolution with low resistive glass can be High rate **>70kHz/cm²**

Production Display



Double Stack Sealed MRPC for Time Resolution



Specifications of low resistive glass

Maximal dimension	32cm $\times$ 30cm
Bulk resistivity	$10^{10} \Omega\text{cm}$
Standard thickness	0.7, 1.1mm
Thickness uniformity	20 μm
Surface roughness	< 10nm
Dielectric constant	7.5 - 9.5
DC measurement	Ohmic behavior stable up to 1 C/cm ²

Low resistive glass for **high rate time resolution**

Conclusions

- The group of Prof. Yi Wang has been worked on RPC related detectors for more than 25 years-rich experience
- Guanyu Muon Co.Ltd can not only develop muon detection system, but also develop and produce various detectors, especially for **MRPC**
- We can provide Sealed-MRPC system:

Timing: 20-60ps
Rate: $>70\text{kHz/cm}^2$
Dimension: tens of cm to 100cm
Amplifier: Ninos or Padi11
TDC: Pico-TDC

Thanks !