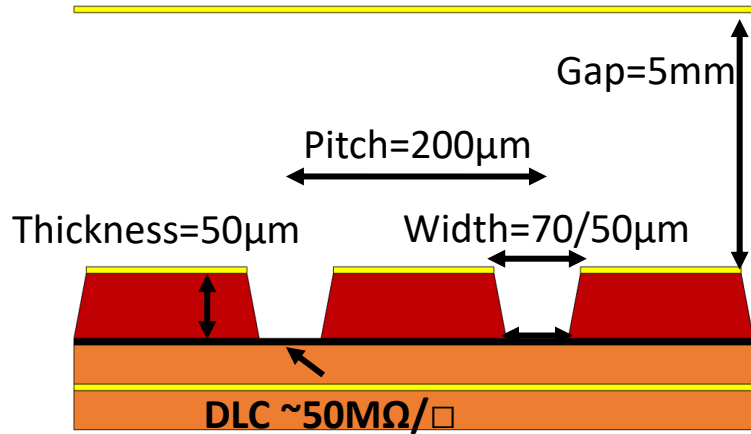


USTC April Beam Results

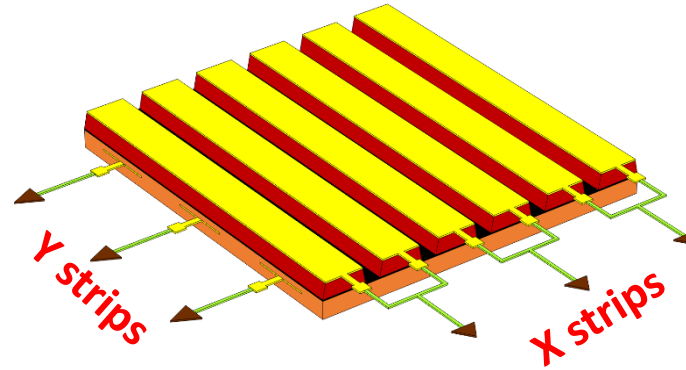
Siqi He

DRD1 Collaboration Meeting , 21-06-2024

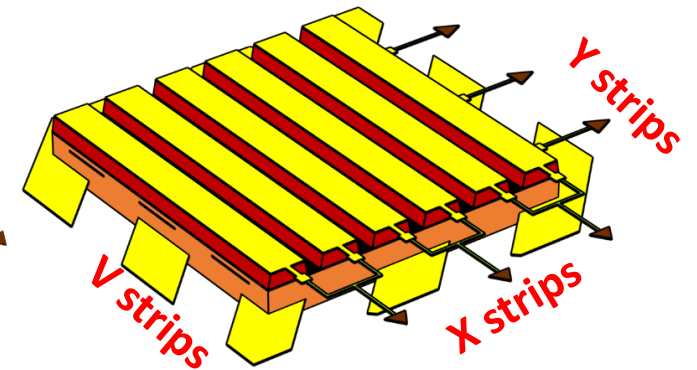
10cm × 10cm μ RGroove prototypes



2D-readout (XY) μ RGroove

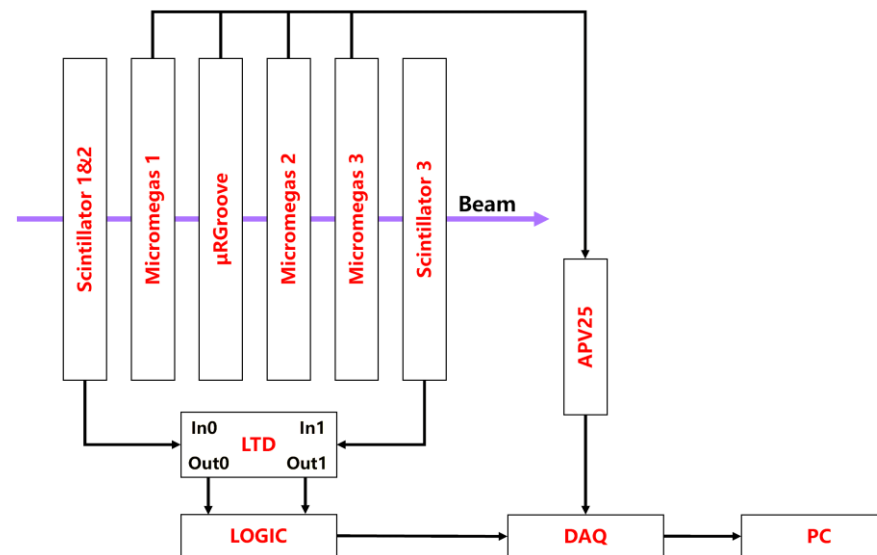
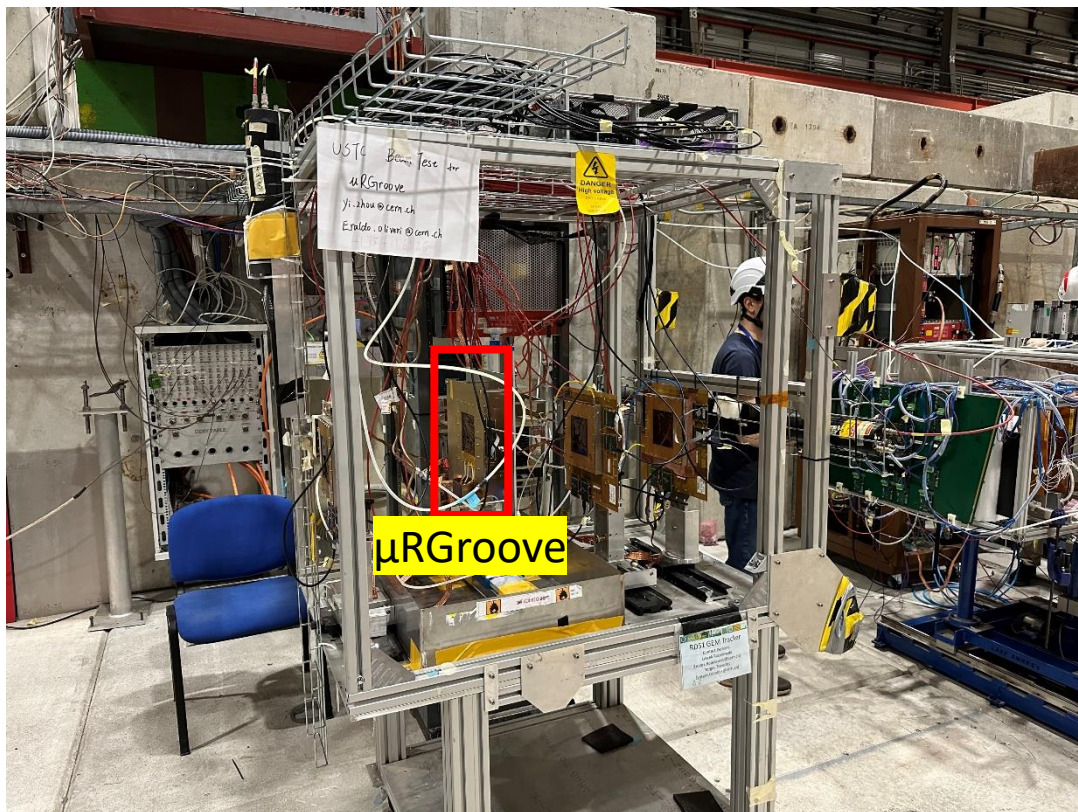


3D-readout (XYV) μ RGroove



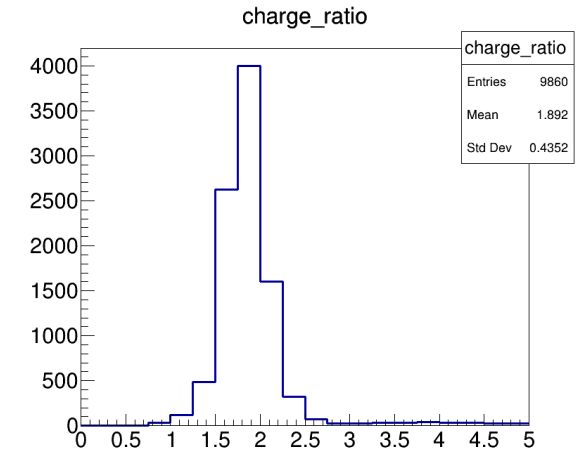
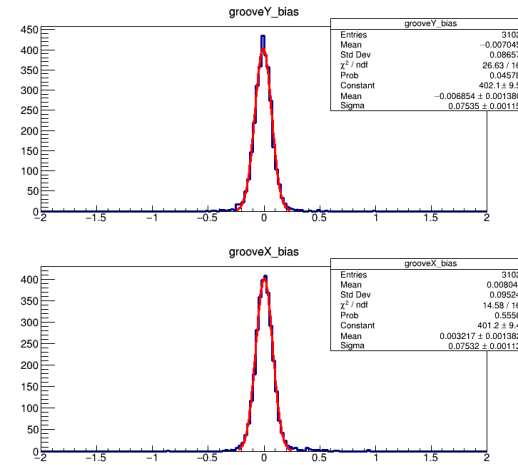
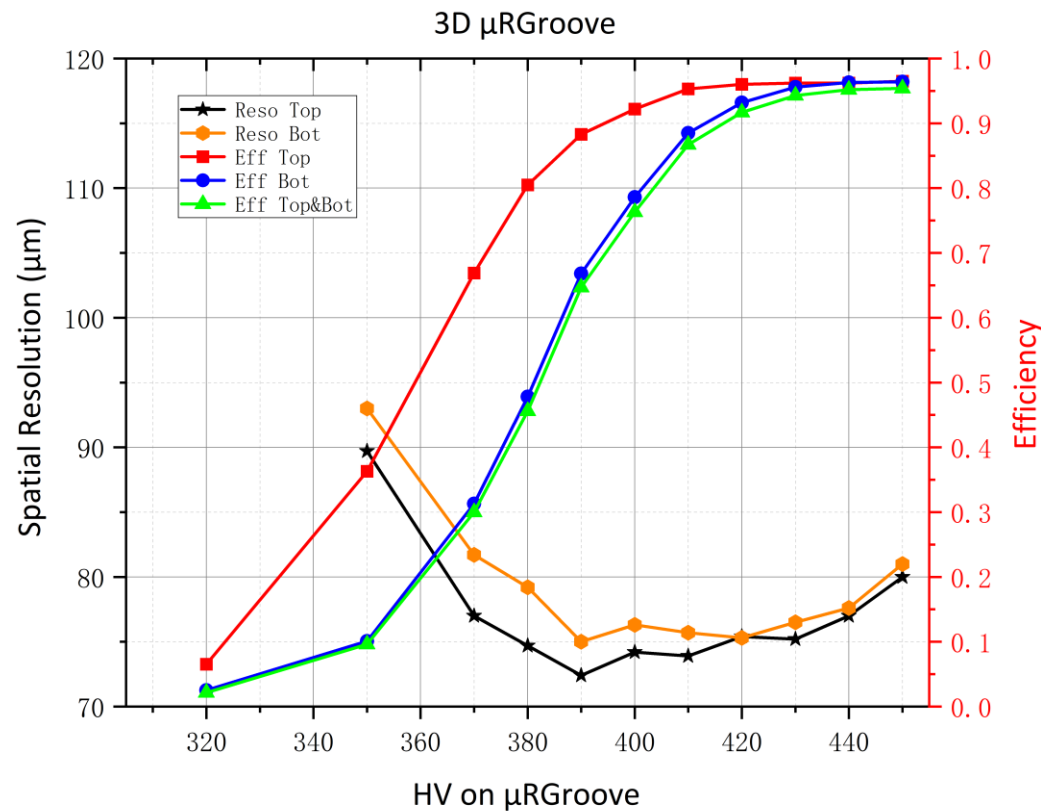
- Two version prototypes of 10cm × 10cm
- Groove pitch: 200 μ m, 2 grooves are connected as 1 X strip
- For 2D-version, Y pitch: 400 μ m, Y width: 260 μ m
- For 3D-version, Y/V pitch: 400 μ m, Y/V width: 60 μ m/350 μ m angle of YV: 45°

Setup of Beam test



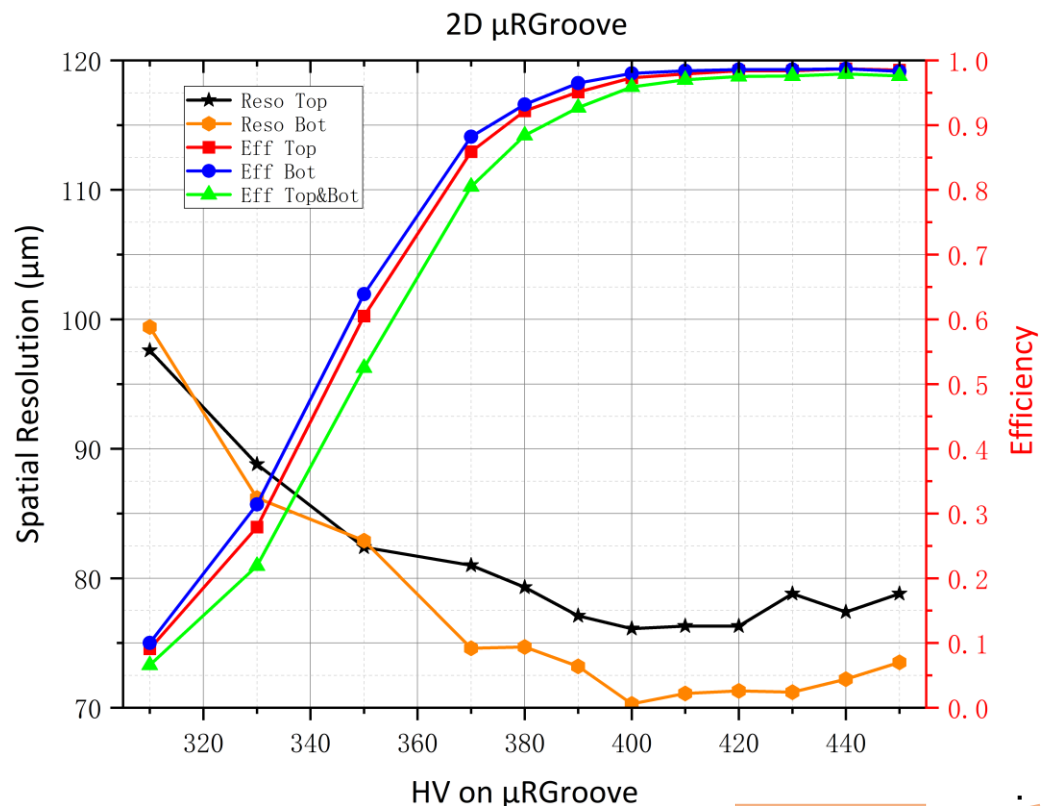
- Beam line: SPS - H4
- Particle: 150GeV/c Muon
- Electronics: SRS + APV25 + mmDAQ
- μ RGroove gas: Ar/ i C₄H₁₀ (90/10)
- Micromegas trackers gas: Ar/CO₂ (93/7)

Efficiency & Spatial resolution for 3D-version

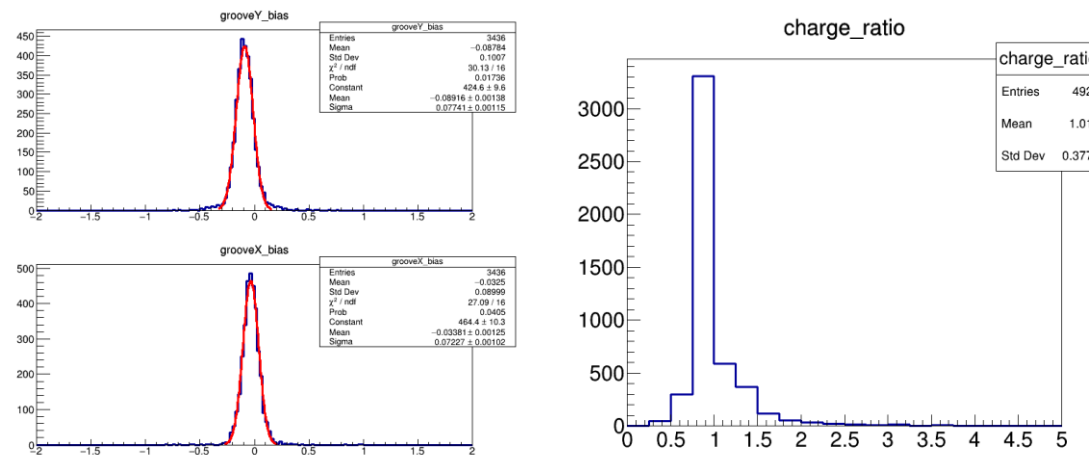


- Only X and Y readout is tested with V-strip float at first .
- Drift electric field is 2kV/cm with 5mm gas gap.
- ✓ The combined efficiency is about 95.6% and enter plateau at ~430V
- ✓ Spatial resolution is better than 80μm
- ✓ Charge ratio of X/Y is about 1.89

Efficiency & Spatial resolution for 2D-version



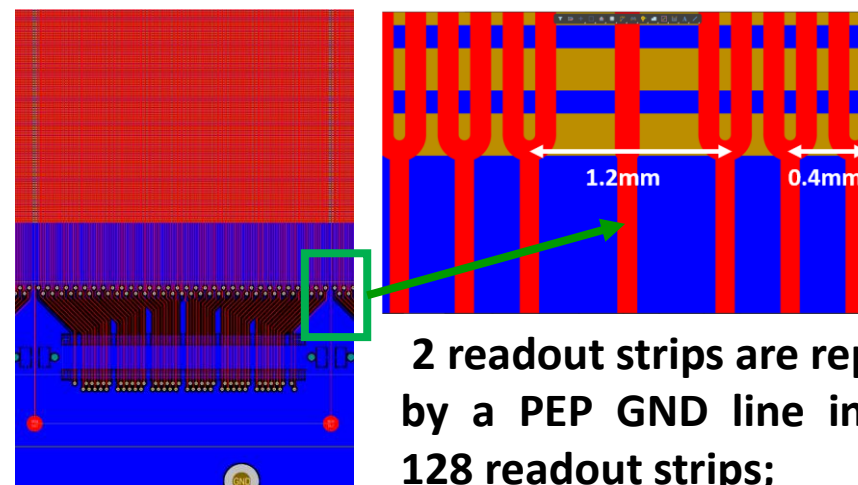
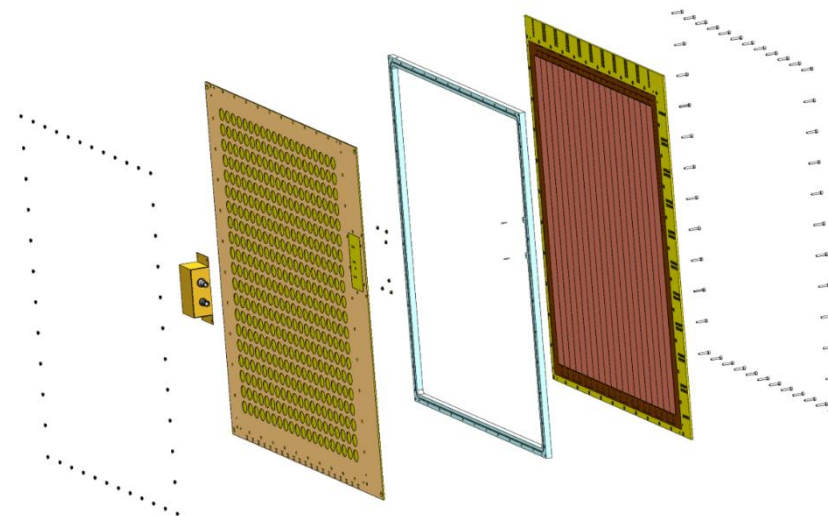
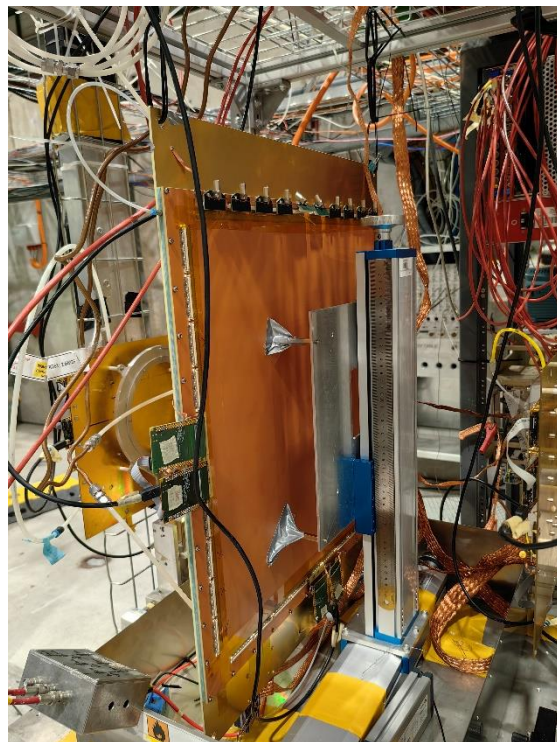
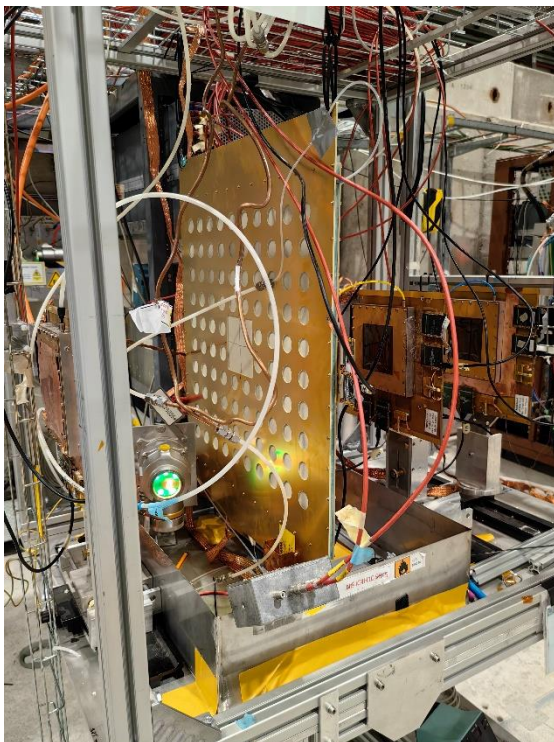
➤ Incomplete alignment results in slightly worse spatial resolution for X strips



➤ Drift electric field is 2kV/cm with 5mm gas gap.

- ✓ The combined efficiency is about 97.9% and enter plateau at ~410V
- ✓ Spatial resolution is ~76μm for X readout and 70μm for Y readout
- ✓ Charge ratio of X/Y is about 1.013

50cm × 50cm 2D- μ RGroove

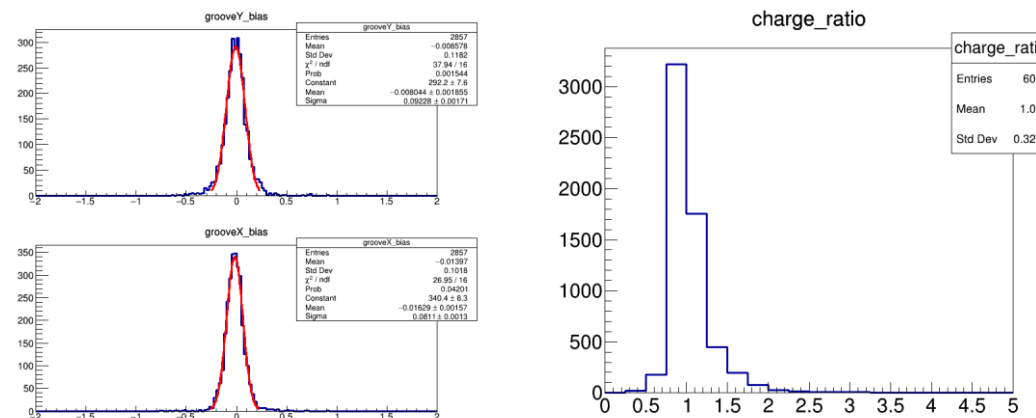
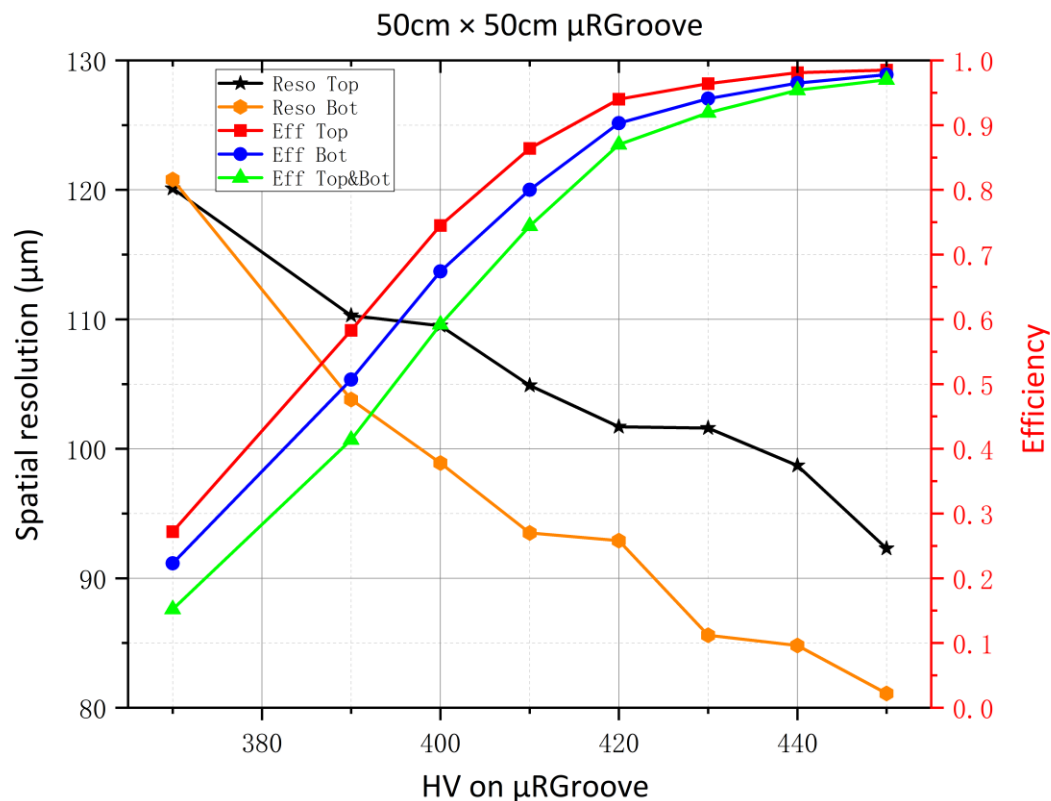


- The central 10cm×10cm area is connected to the electronic system for testing with the rest readout strips grounded
- Same setup of beam test

2 readout strips are replaced by a PEP GND line in each 128 readout strips;

Dead Area (TOP): $2/128=1.5625\%$

Results of 50cm × 50cm μ RGroove



➤ Drift electric field is 2kV/cm with 5mm gas gap.

- ✓ The combined efficiency is about 96.9% and enter plateau at \sim 450V
- ✓ Spatial resolution is \sim 93 μ m for X readout and \sim 81 μ m for Y readout
- ✓ Charge ratio of X/Y is about 1.049

- Much Larger capacitance causes smaller signal amplitude at the same working voltage and higher voltage entering plateau.
- **Incomplete alignment** results in worse spatial resolution for X strips

Summary & Outlook

- ✓ **10cm × 10cm μ RGroove prototype**
 - **Combined efficiency is about 95.6% for 3D-version and 97.9% for 2D-version**
 - **Spatial resolution is about 70~80 μ m for both versions.**
- ✓ **50cm × 50cm μ RGroove**
 - **Combined efficiency is about 96.9% and enter plateau at ~450V due to large capacitance**
 - **Spatial resolution is better than 100 μ m**
- **2 cylindrical μ RGroove detectors will be tested in June beam;**