75 µm thick µRWELL: Preliminary results

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CLAS12 High luminosity upgrade bi-weekly

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Parameters of new μRWELL prototype

- Rui @ CERN got a 75 μm Cu-clad Kapton raw foil from his vendor
- Standard μRWELL prototype with this thicker foil

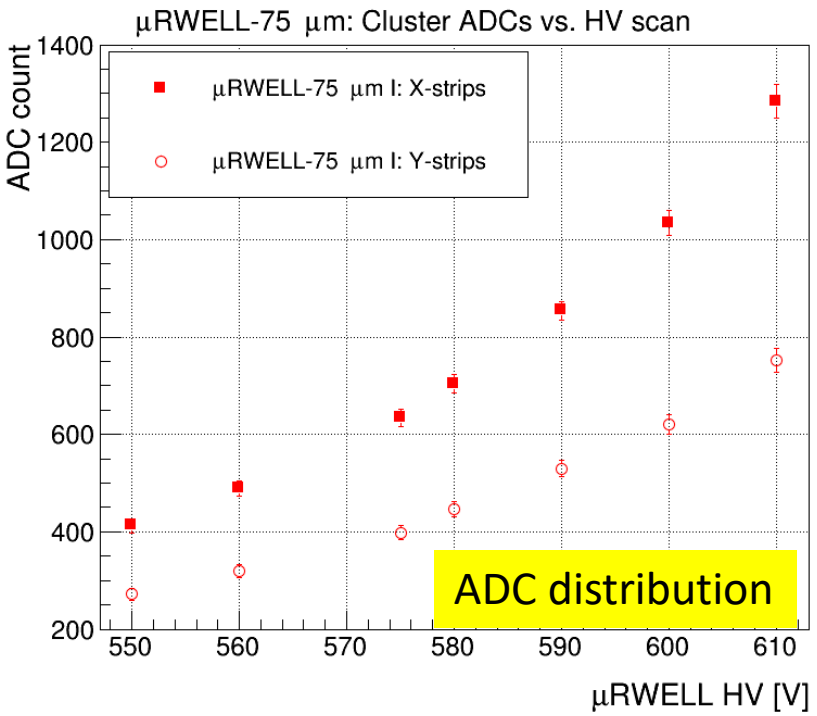
	Standard 50 μm μRWELL	New 75 μm μRWELL
pitch	140 μm	120 μm
Outer diameter	70 μm	80 μm
Inner diameter	50 μm	20 - 30 μm (not perfectly round

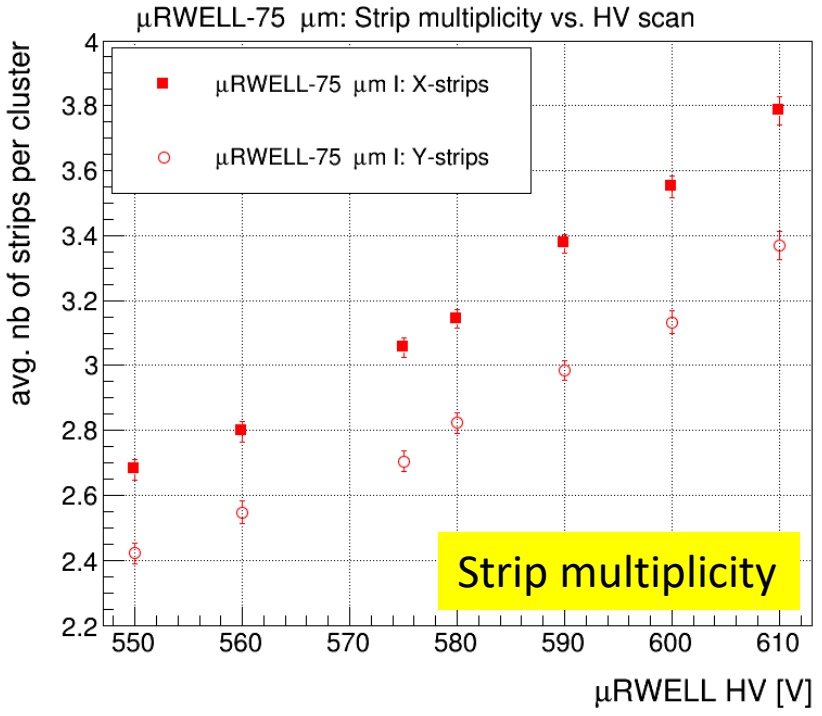
HV test in N2 of 75 µm µRWELL prototype

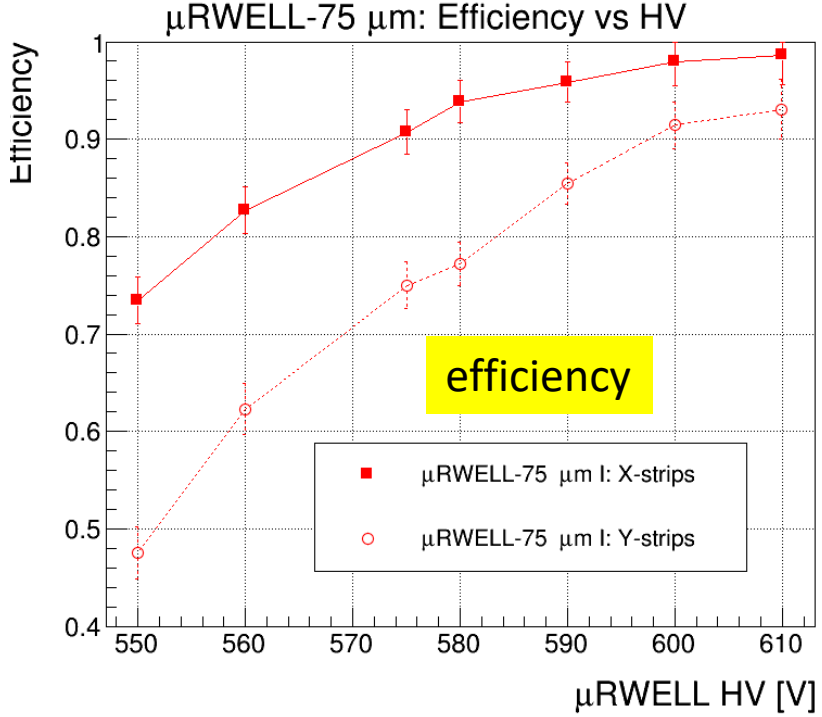
- The prototype tested in dry air @ CERN up to 840 V ➔ instabilities above 850 V
- Test in N2 at JLab ➔ max stable HV = 775 V
  - Should be able to go as high as 840 V as tested at CERN
  - Suspect issue with N2 purity ➔ we use industrial grade gas instead of research grade
  - Will repeat the HV test in N2 with new N2 cylinder certified high purity

Preliminary results with cosmic of 75 µm µRWELL prototype

- Gas Ar / CO2 - 75 / 25
- HV scan from 550 V to 610 V
- Analysis require with minimum 2 strip / cluster
- 600 V on 75 µm µRWELL ➔ electric field 80 kV / cm
  - with standard µRWELL full efficiency @ 580 V ➔ 116 kV /cm







Preliminary results with cosmic of 75 µm µRWELL prototype

- This are very preliminary results but seems like with 75 µm µRWELL, we can reach full efficiency at an HV way lower than the max HV for stability
- The 75 um thickness is one of the main reason but Rui also mentioned that the ration OD / ID (80 µm / 20 µm) also help with the gain
    - Basically increasing the charging-up effect in the holes due to the more conical shape of the hoes compared to standard 70 µm / 50 µm
- I ask about availability of these foil for large detectors
    - 50 cm raw Kapton roll in hand ➔ 45 cm active area
    - Investigating larger roll (60 cm) ➔to go to 55 cm active area