

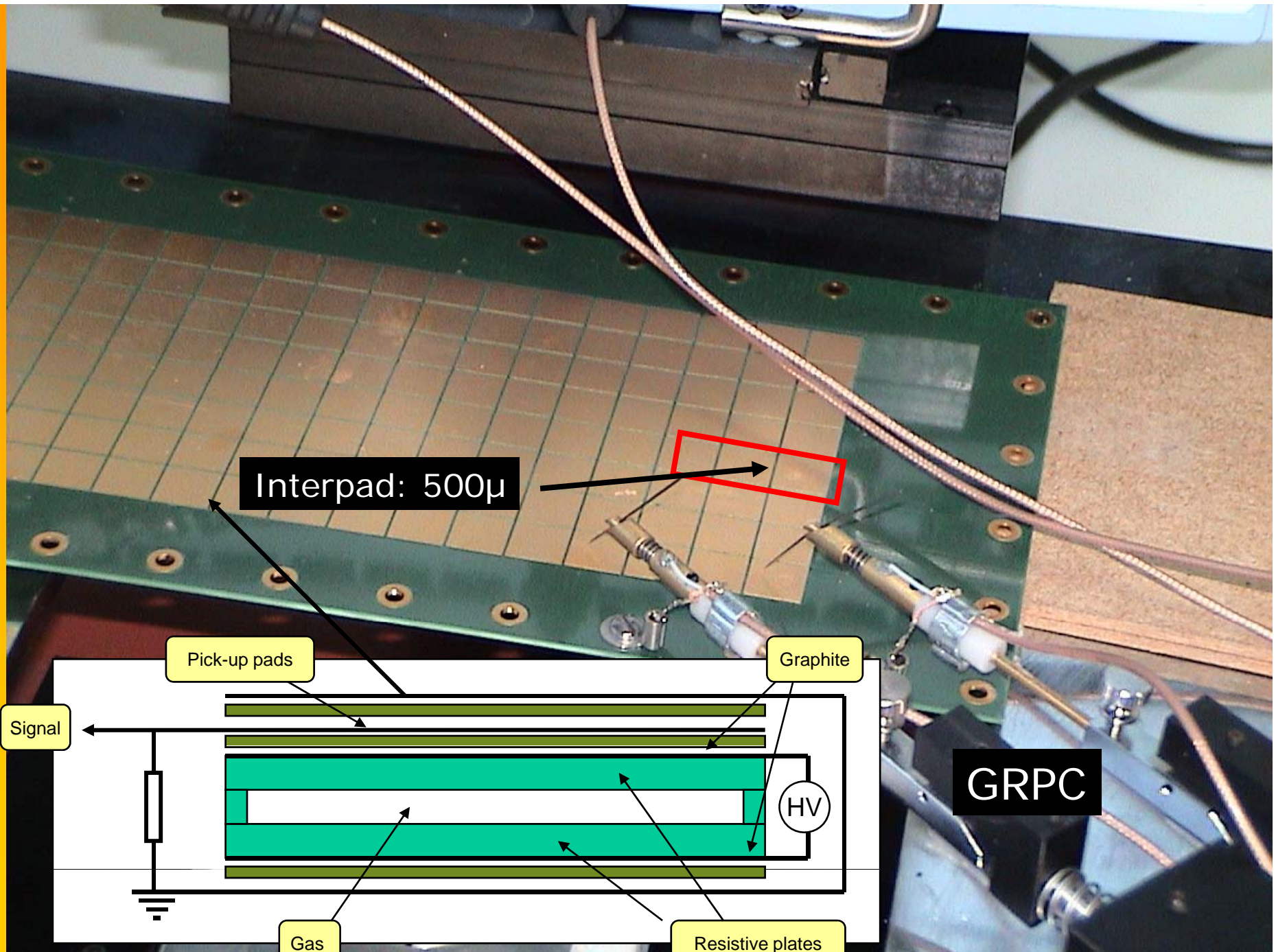


Beam-Test@CERN

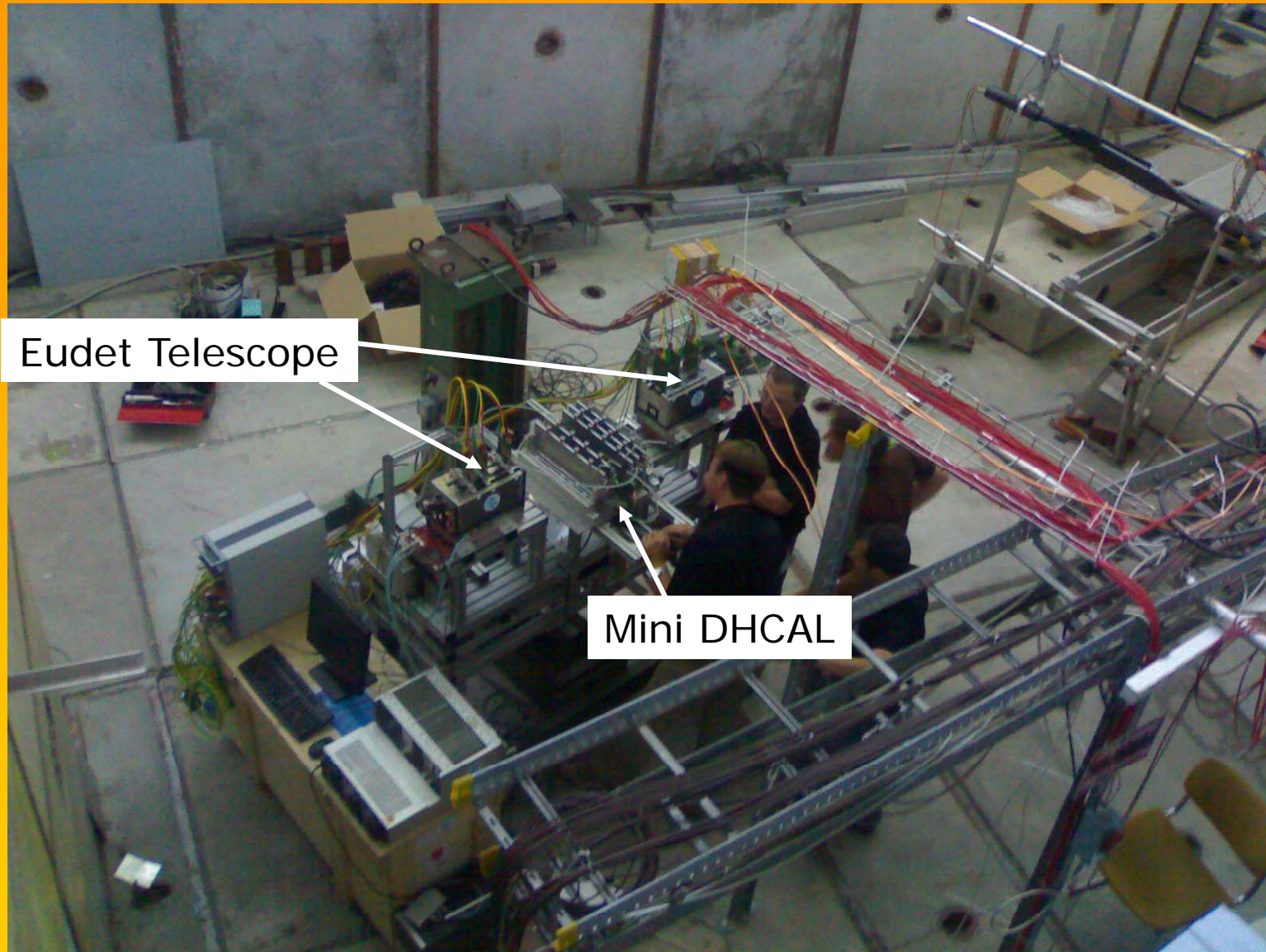
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Aims

- Test a mini DHCAL with new generation embedded electronics readout in beam conditions for the first time
- Use the high precision provided by EuDet telescope to study the inefficiency of GRPC **due to inter-pads and edge effects.**



Test @ps-T10



Eudet Telescope

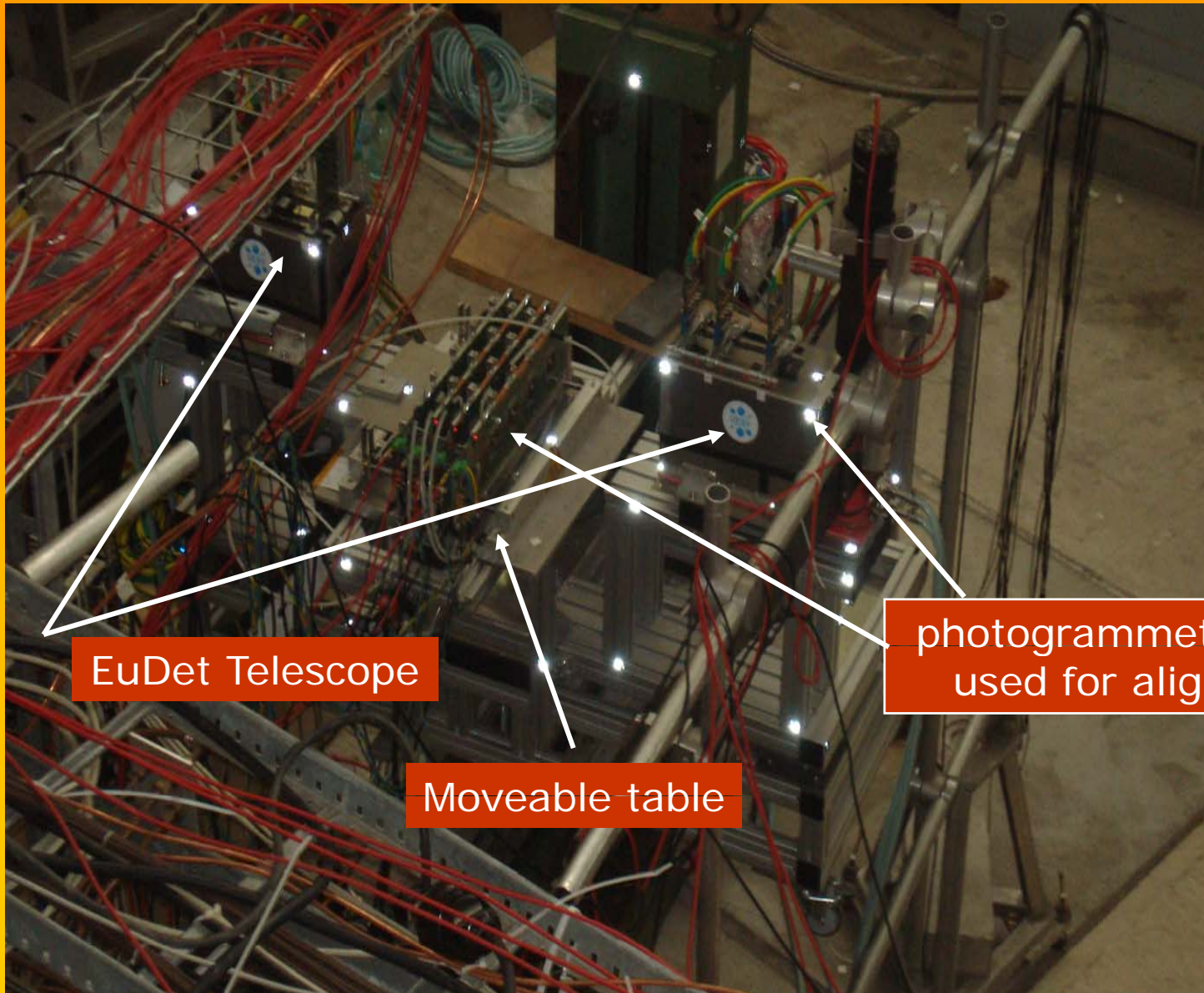
Mini DHCAL

Test @ps-T10



Photogrammetry measurement

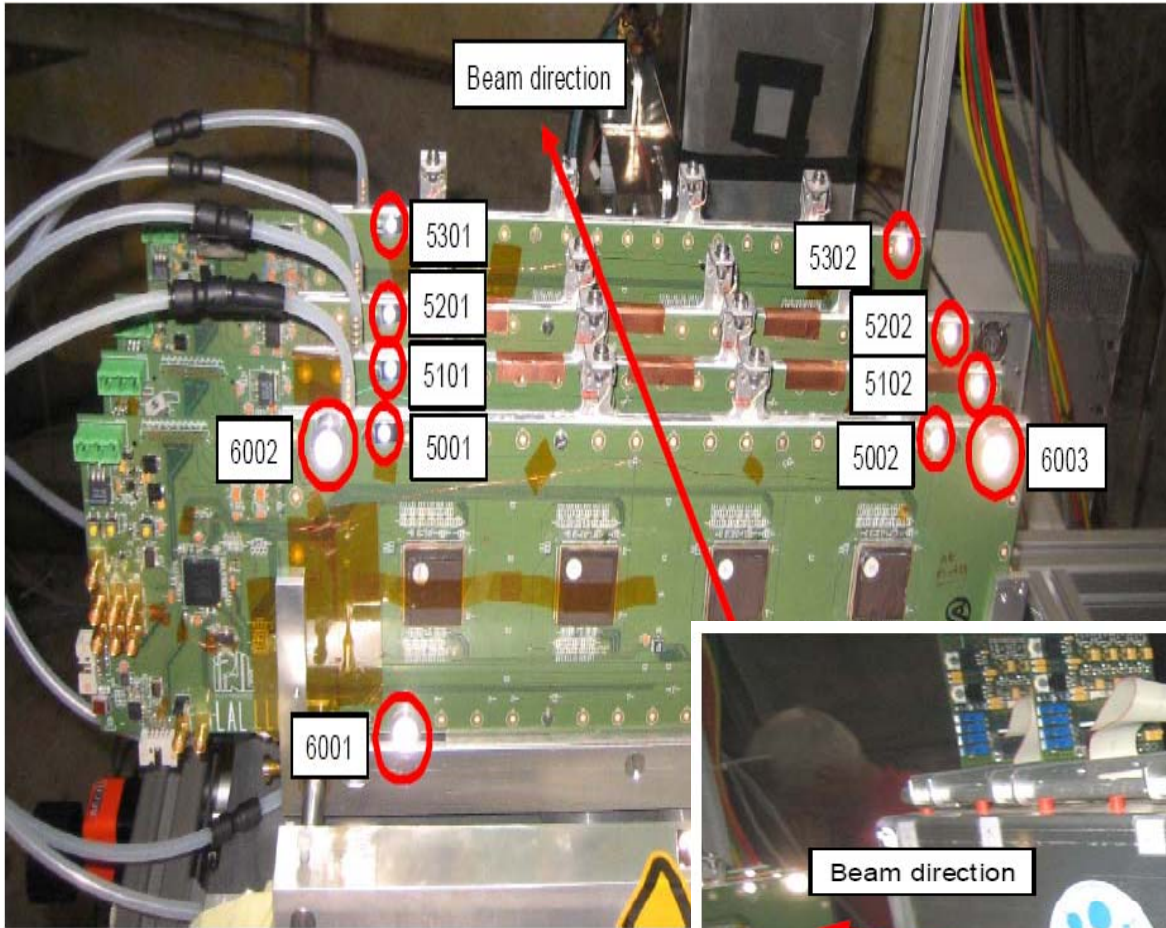
Test @ps-T10



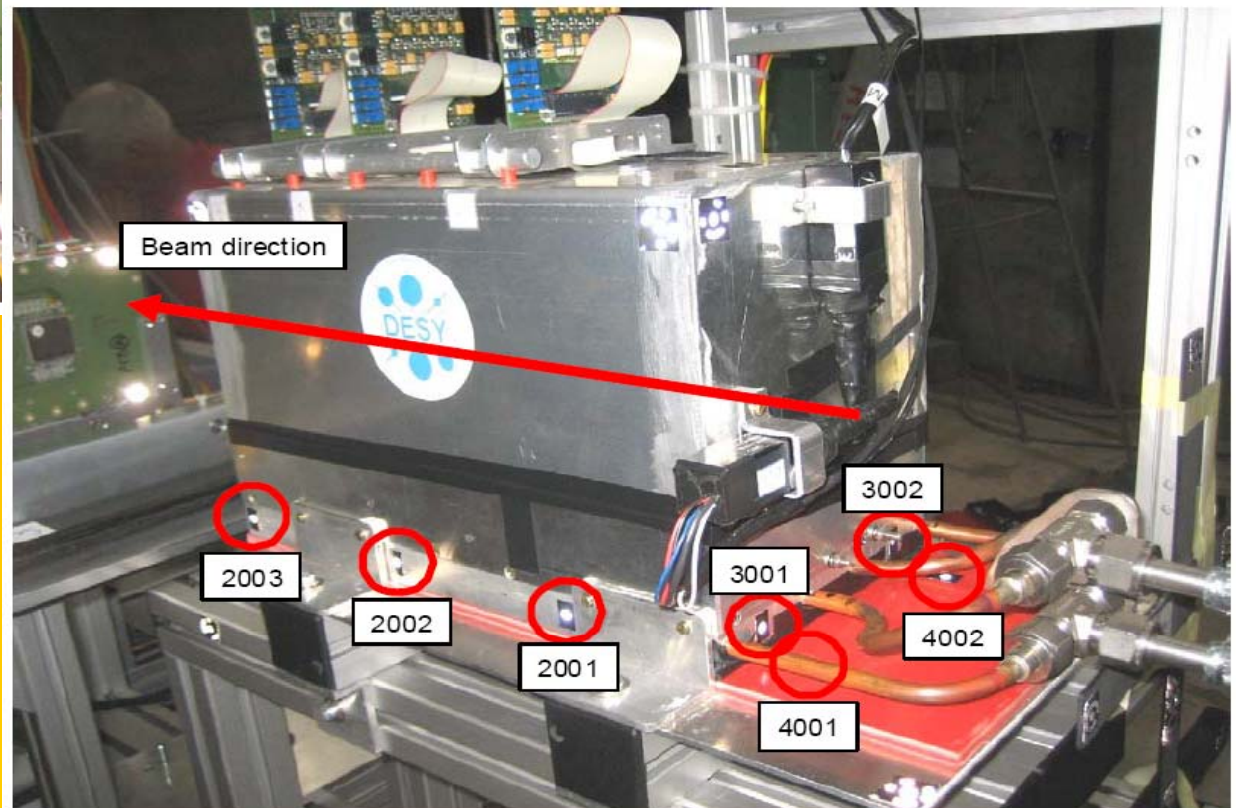
EuDet Telescope

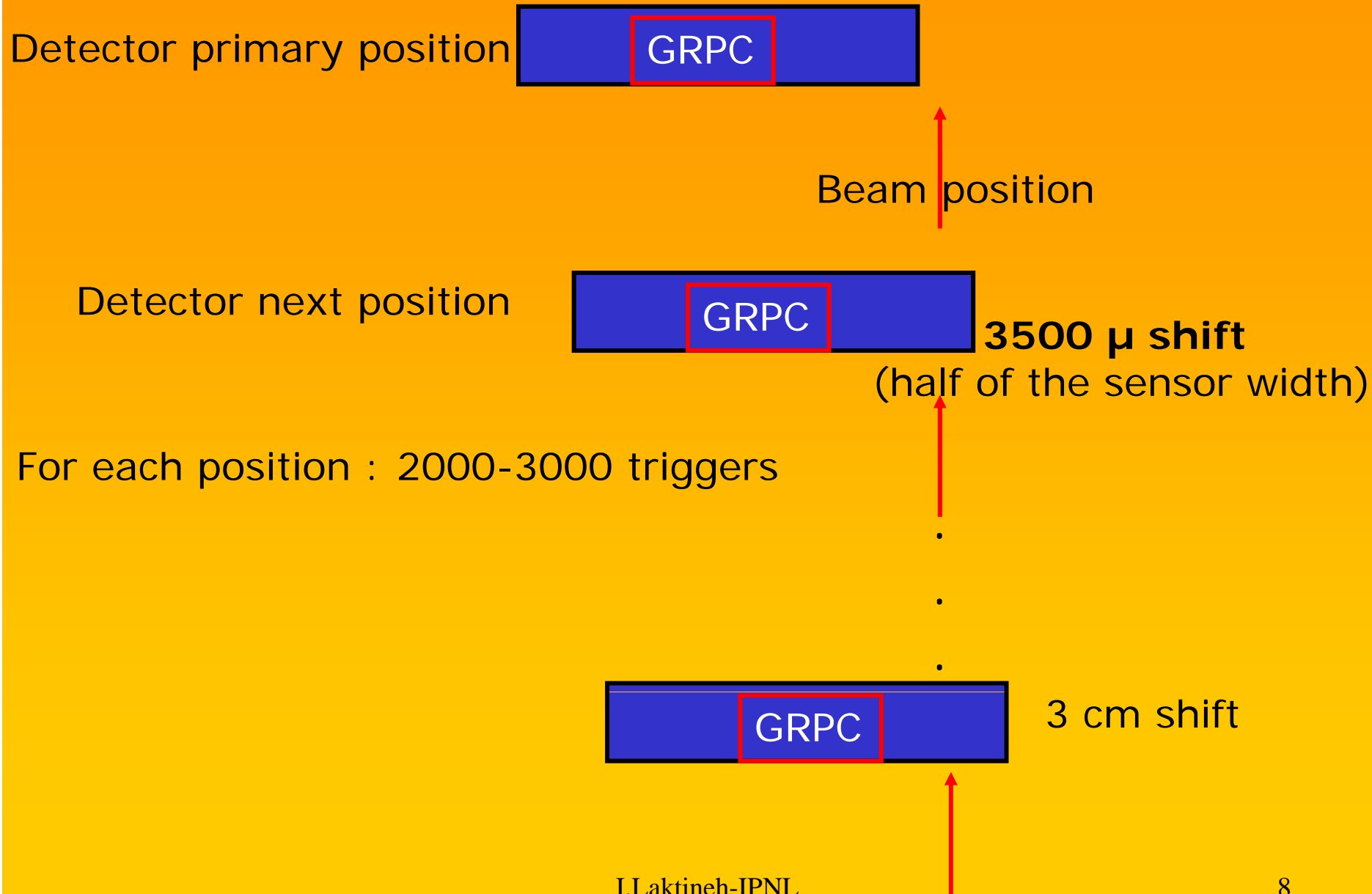
Moveable table

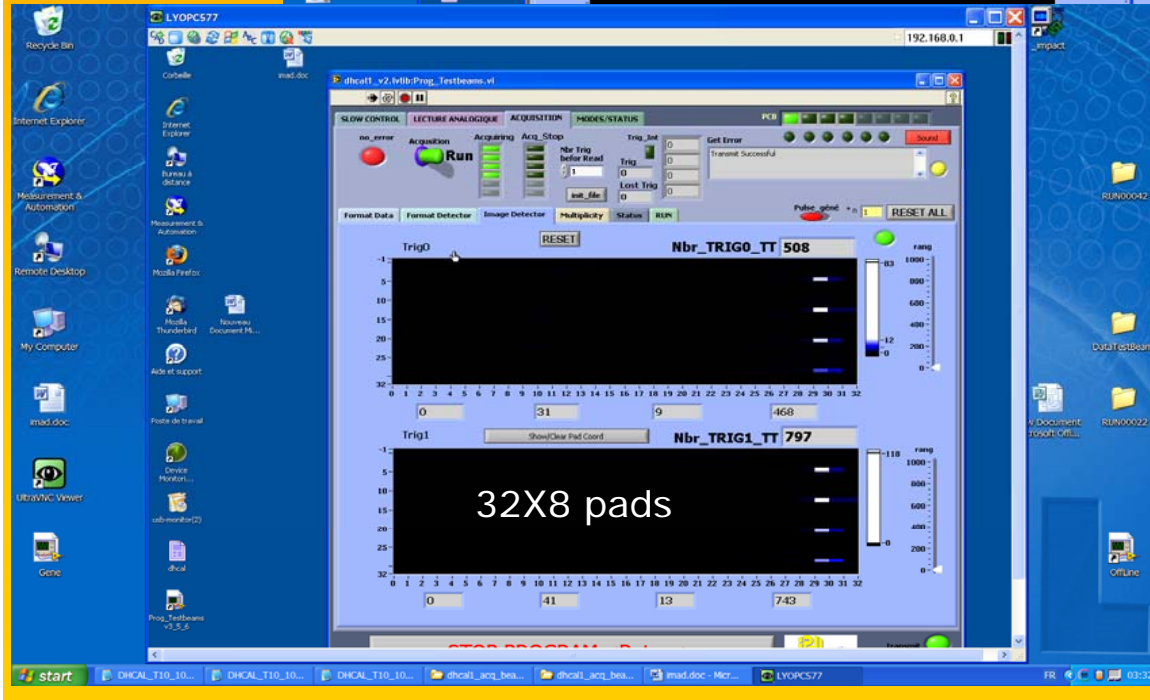
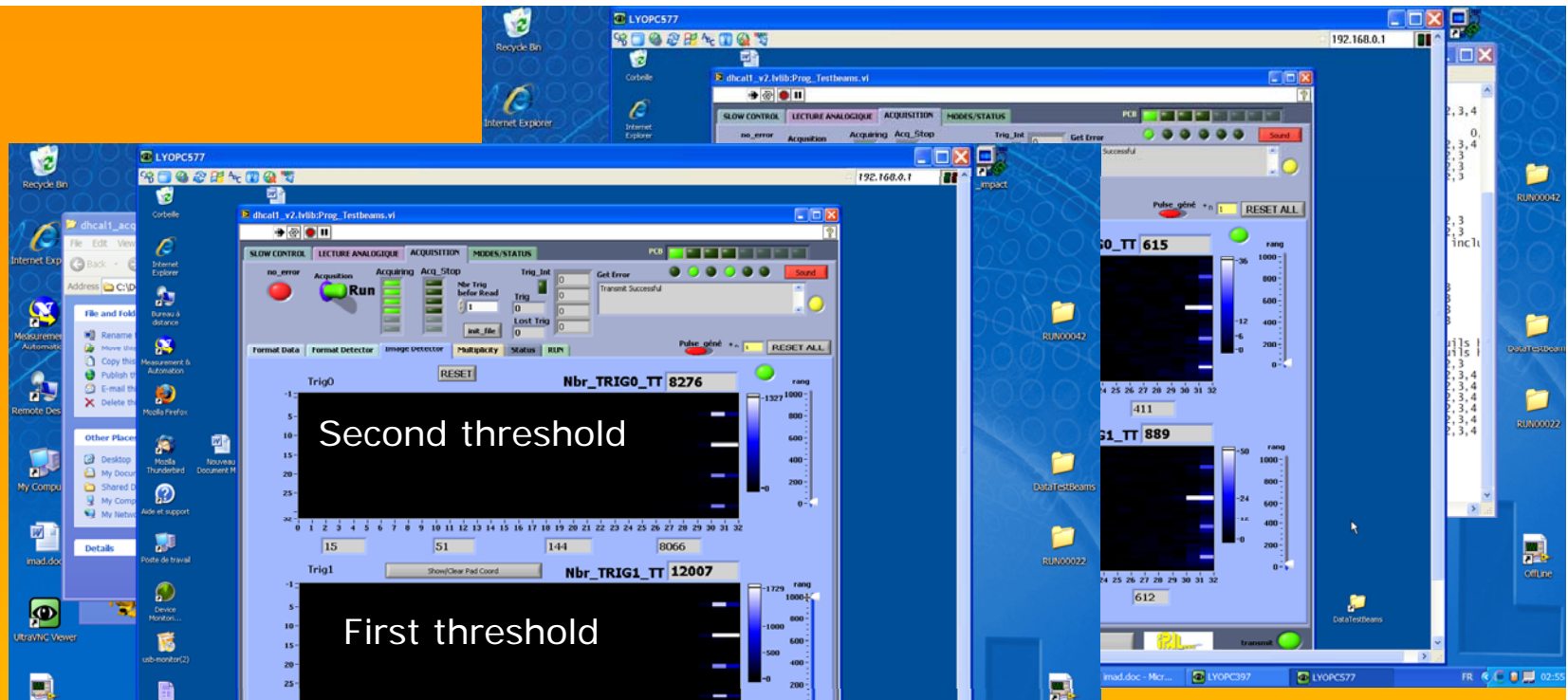
photogrammetric spots
used for alignment



Spots positioning
on both EuDet
telescope and
DHCAL Setup







The touched pads in the 4 GRPC for successive positions

Clusters and tracks reconstruction in mini DHCAL

A simple reconstruction algorithm was used to study the GRPC detectors

Clustering :

touched pads were gathered into clusters if relative distance is less than 2cm.

Pads having only one threshold: **weight = 1**

Pads having two thresholds : **weight = 2**

Tracking :

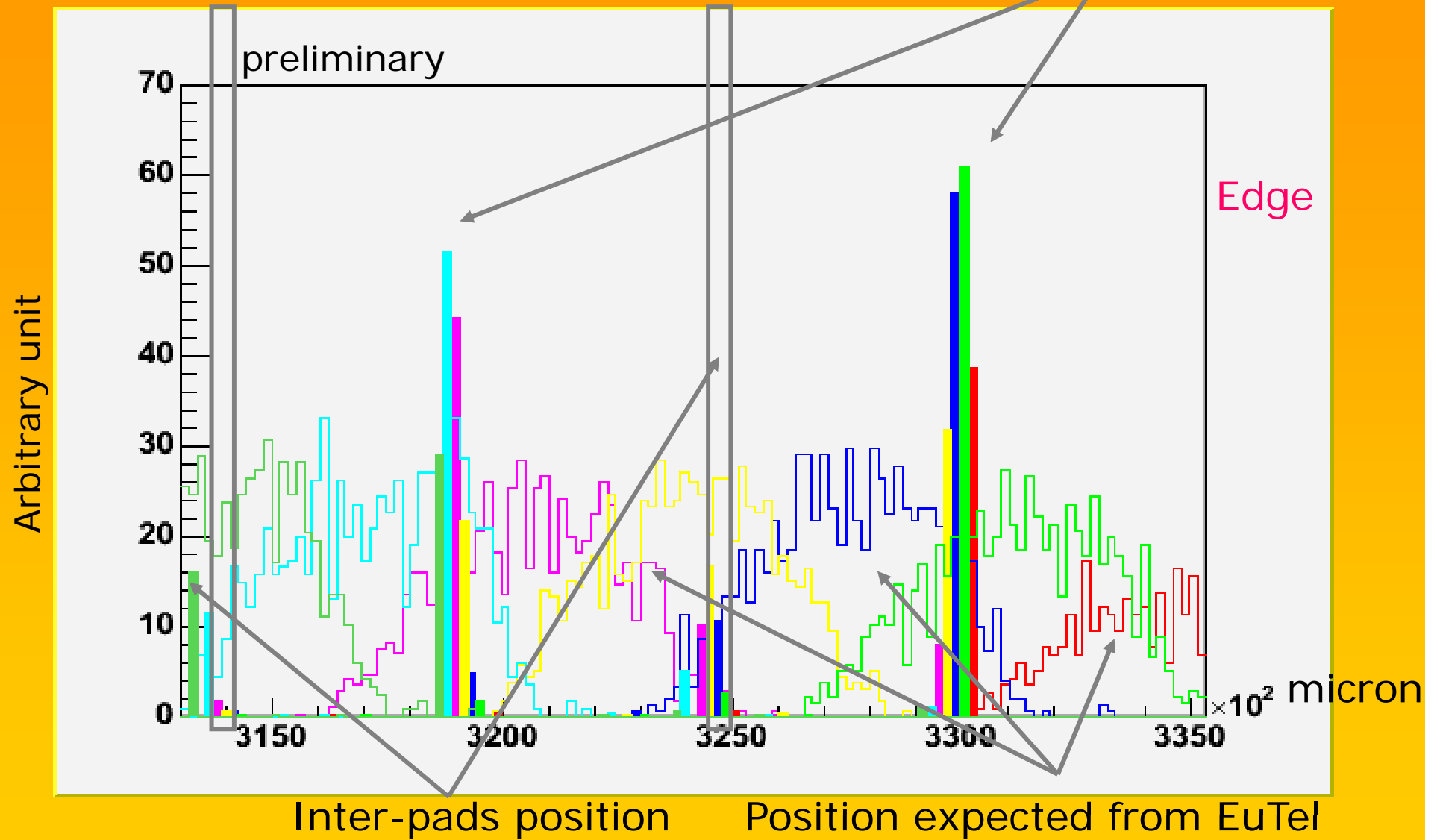
Clusters belonging to different detectors were gathered into tracks if compatible with **straight line**

Inefficiency Study using EuDet Telescope

- The available beam at T10 is made of 1-6 GeV pions. **6 GeV** pions were used for this study
- SciPM+TLU system was used as trigger for both EuDet telescope and the DHCAL so events in both detectors were associated.
- Due to **multiple scattering** in the 4 GRPC's of the mini DHCAL (even with no absorber) only the **first arm (3 sensors)** was used to reconstruct tracks
- Using the alignment result from the photogrammetry measurement, tracks reconstructed in the first arm were projected to the GRPC's. The clusters associated to those tracks are recorded.
- *The efficiency of tracks reconstruction in Eudet is between **50 and 60%*** I.Laktineh-IPNL

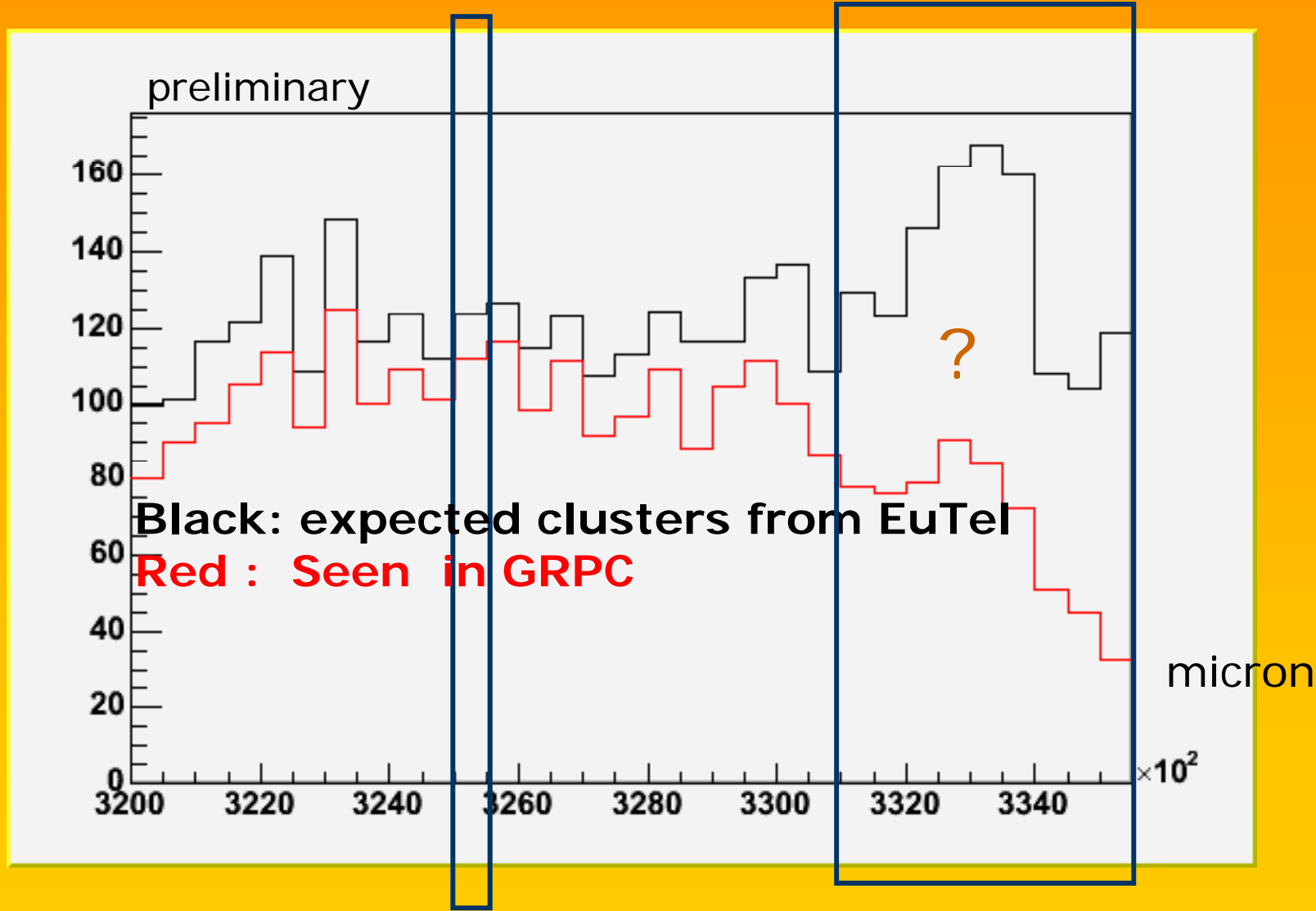
expected position%seen for found clusters

GRPC clusters position



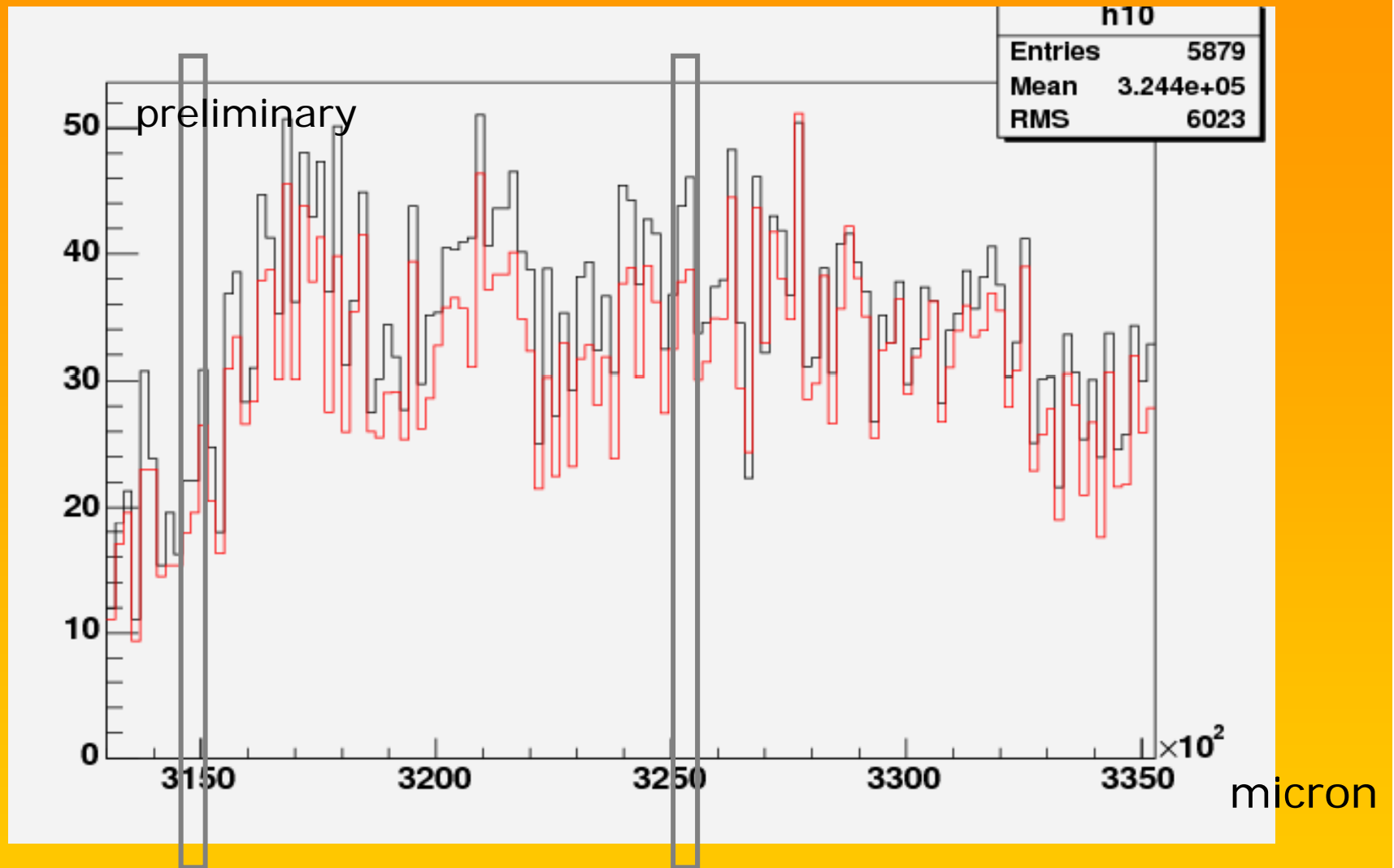
Interpad position

Edge position



No clear evidence of the Inter-pads effect

Important edge effect?



Black : Tracks associated to clusters with (1or2)threshold pads
 Red : Tracks associated to clusters with 2 threshold pads

Conclusion

- The beam test realized using EuDet telescope was very fruitful
- Preliminary results show an edge effect but this should be more investigated
- No inter-pad effect in the GRPC (within the available statistics). New version of GRPC with improved frame should reduce this effect.
- Apply the same study to the other three GRPC detectors.