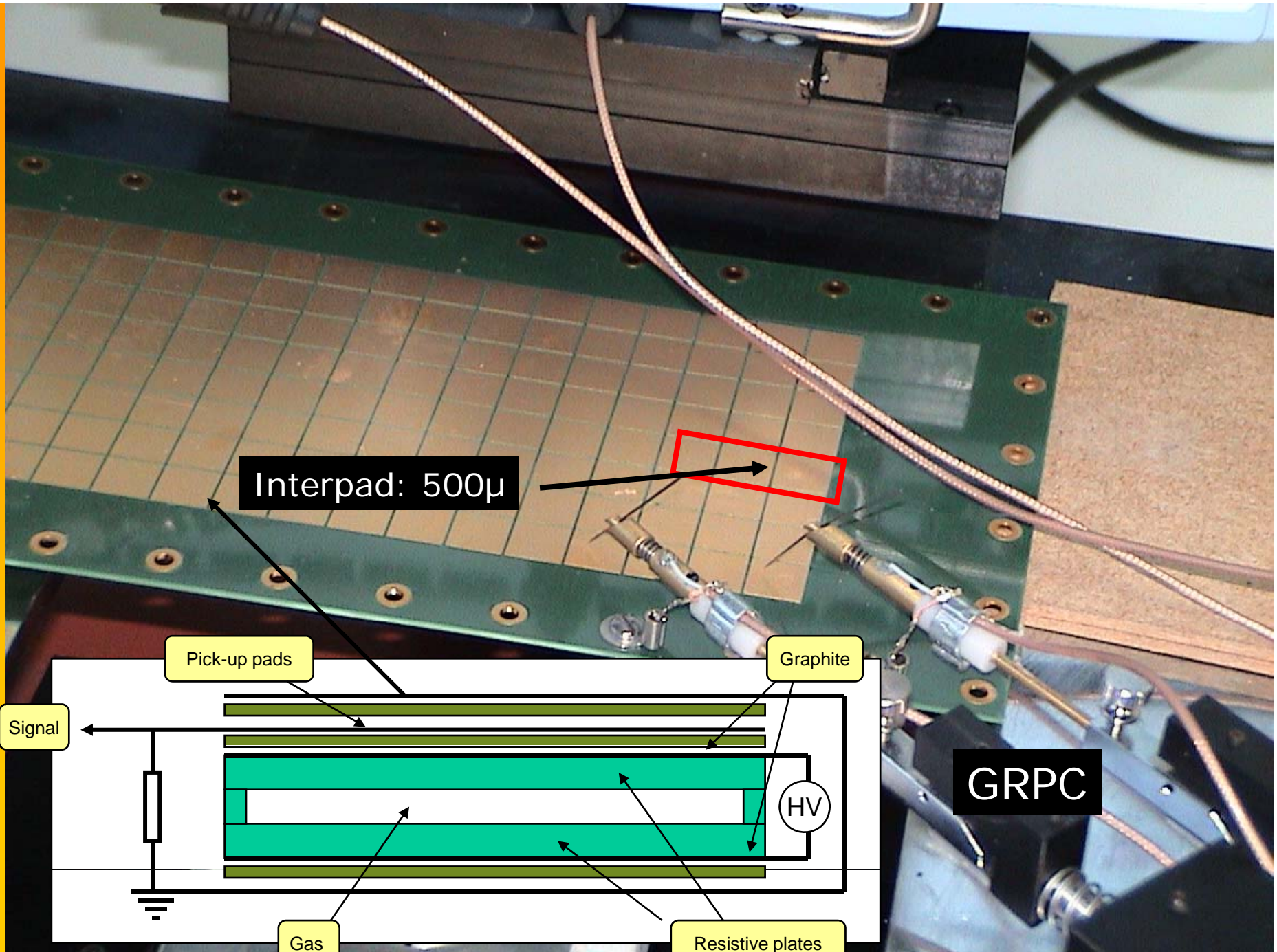# DHCAL+EuDet@CERN

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IPNL/IN2P3/UCBL

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.**

Interpad: 500μ

Pick-up pads

Graphite

Signal

GRPC

HV

Gas

Resistive plates

PS Operation   Period 3 2008 Jul 10 to Aug 14

Schedule issue date: 2-September-2008   Version 1.8

(colour code: purple (dark) = scheduling meeting , light green (light) = weekend or holiday)

		Thu 10 Jul	Fri 11 Jul	Sat 12 Jul	Sun 13 Jul	Mon 14 Jul Wk29	Tue 15 Jul	Wed 16 Jul	Thu 17 Jul	Fri 18 Jul	Sat 19 Jul	Sun 20 Jul	Mon 21 Jul	Tue 22 Jul	Wed 23 Jul Wk30	Thu 24 Jul	Fri 25 Jul	Sat 26 Jul	Sun 27 Jul	Mon 28 Jul	Tue 29 Jul	Wed 30 Jul	Thu 31 Jul Wk31	Fri 1 Aug	Sat 2 Aug	Sun 3 Aug	Mon 4 Aug	Tue 5 Aug	Wed 6 Aug Wk32	Thu 7 Aug	Fri 8 Aug	Sat 9 Aug	Sun 10 Aug	Mon 11 Aug	Tue 12 Aug	Wed 13 Aug Wk33	Thu 14 Aug

Machine   BIG MD   MTE&HI CNGS   BIG MD

EAST HALL

T7	8h M Glaser, N... Irradiation	8h	FREE	8h M Glaser Irradiation
T8	8h L Nemenov		DIRAC	
T9	8h M Prest CHIC	8h CALICE	8h FREE
T10	8h I Laktineh CALICE	8h EUDET/DEPFET	
T11			

For further information contact the SPS/PS Coordinator   Status:

Remarks
SPS/PS-Coordinator: Emmanuelle Perez
E-mail: SPS.Coordinator@cern.ch
phone: 71915 (ext. +41 22 767 1915)
mobile: 165758 (ext. +41 76 487 5758)
- The indicated Machine Stops might not be up to date.
  Please consult http://ab-div.web.cern.ch/ab-div/Schedules/schedule2008.pdf

10 days with no beam because of ps magnet problem

Thanks to E.PEREZ (sps coordinator) and EUDET/DEPFET colleagues our beam test was extended up to 24 July
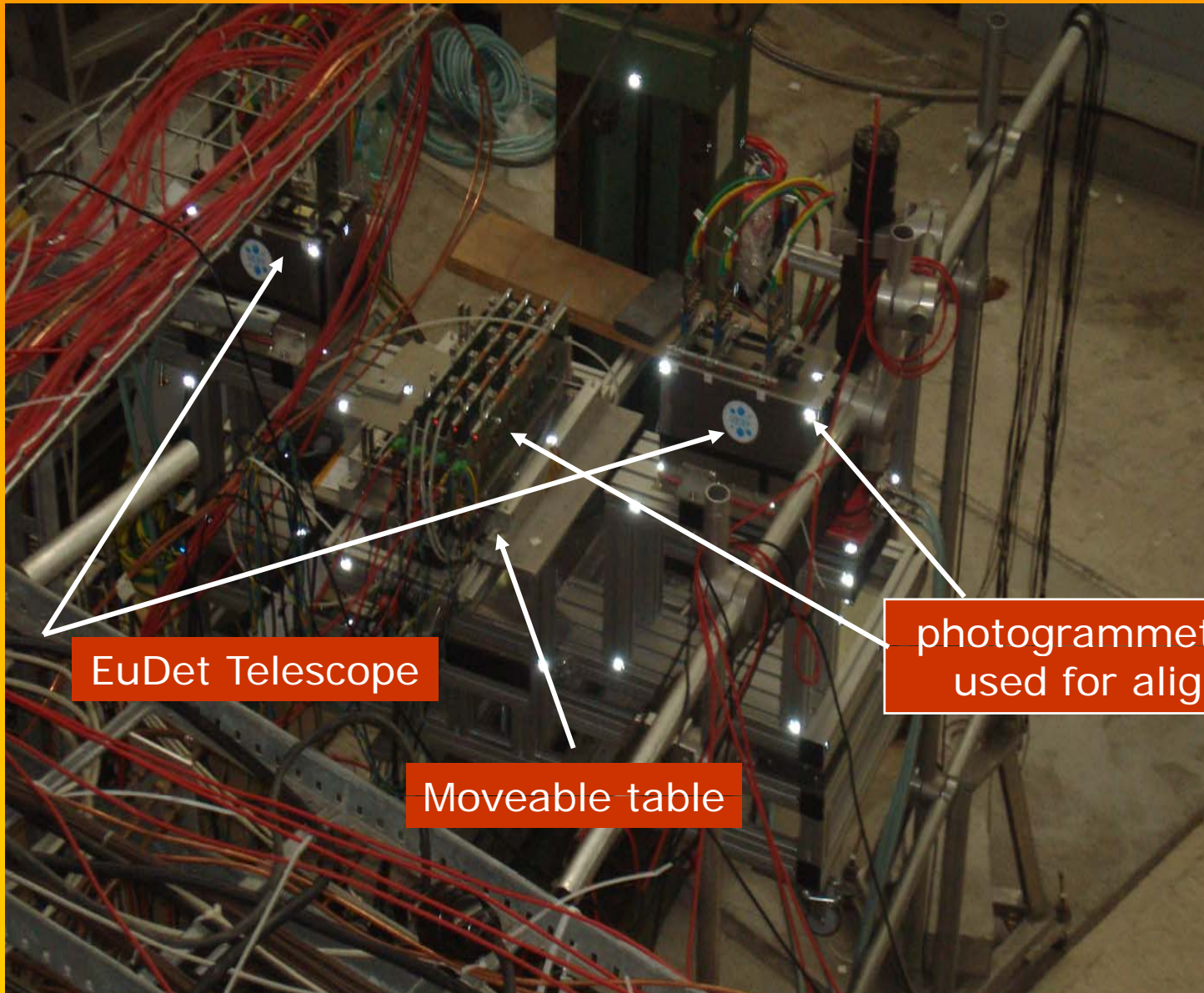
Test @ps-T10
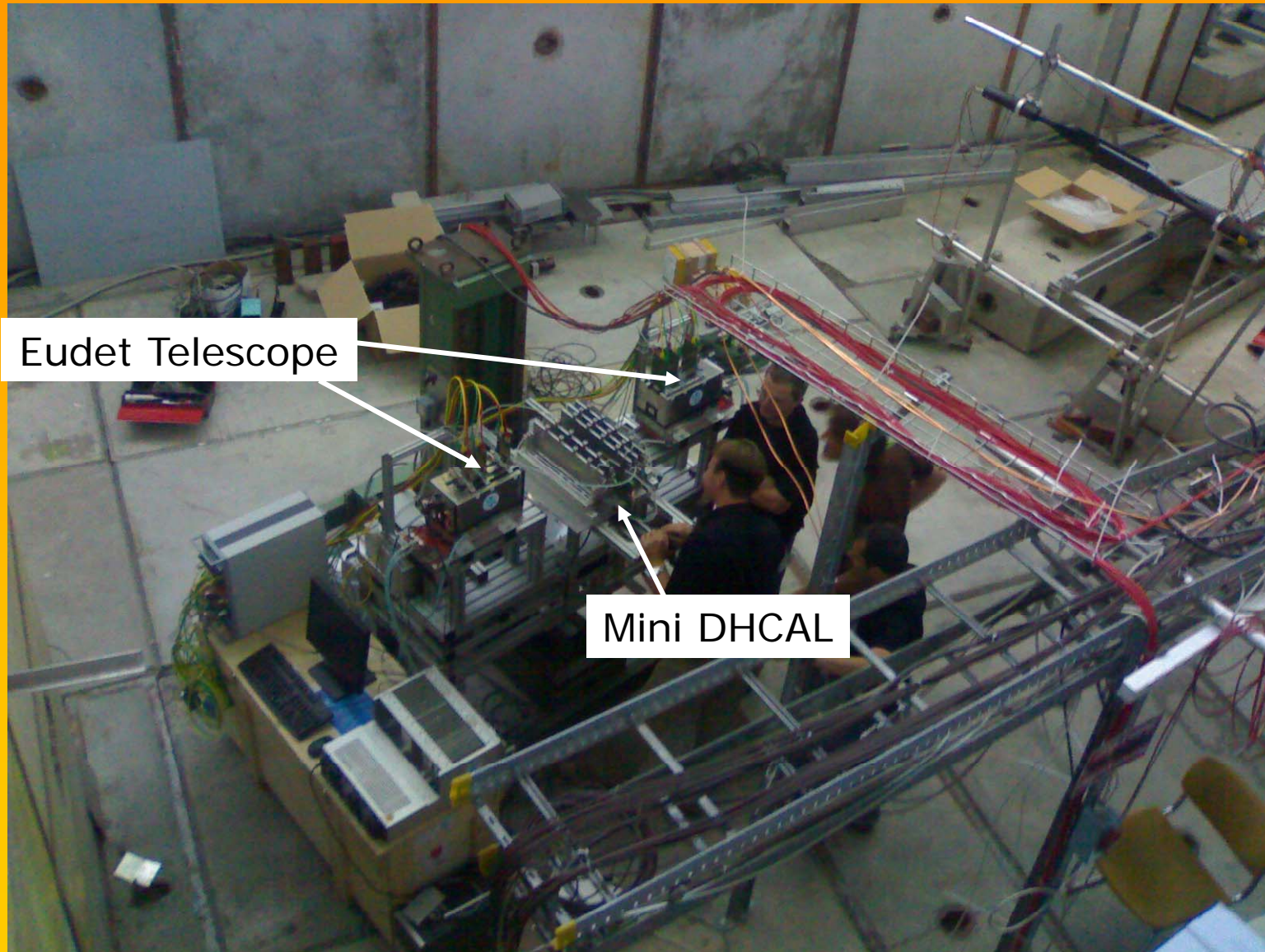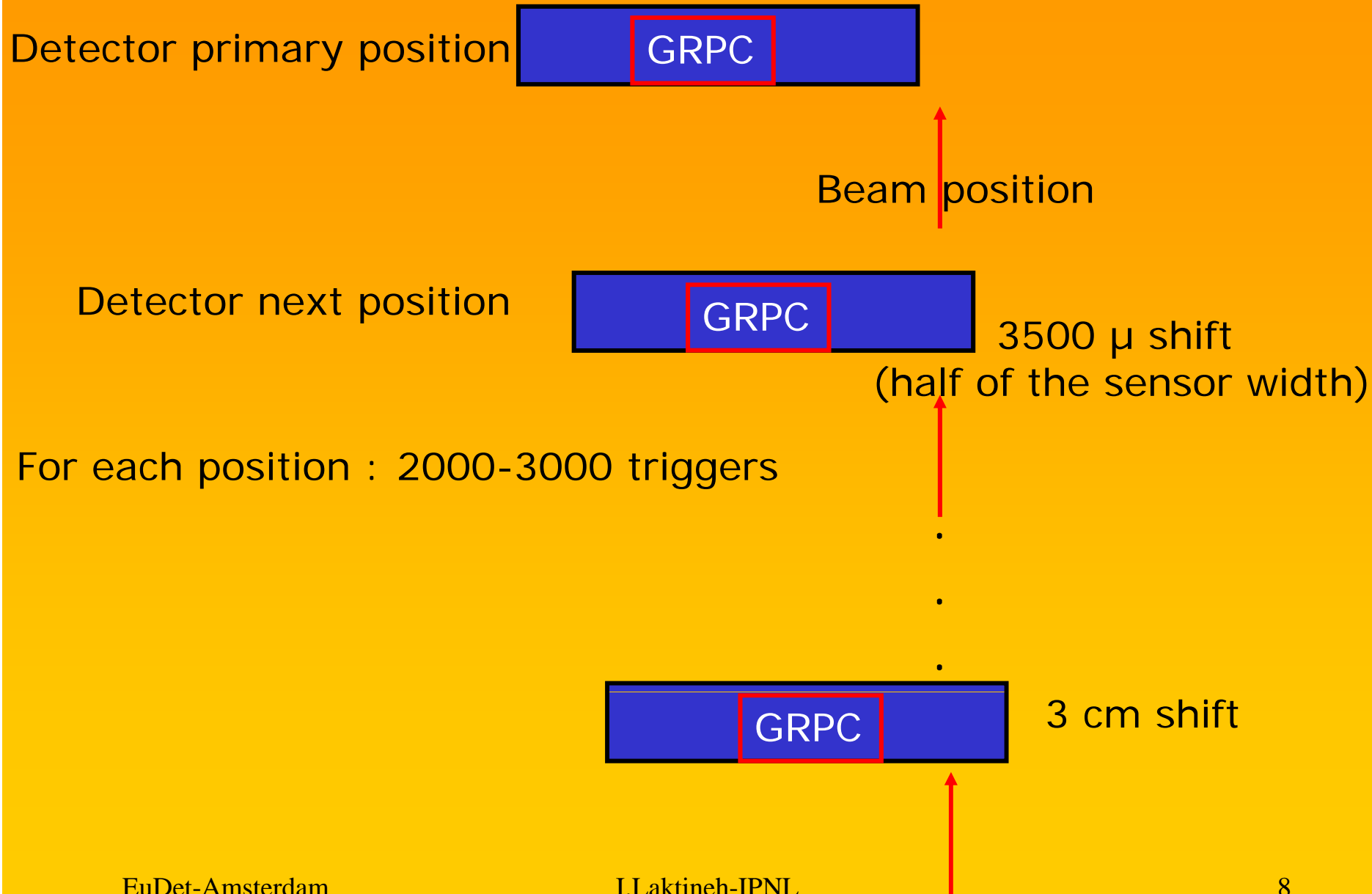

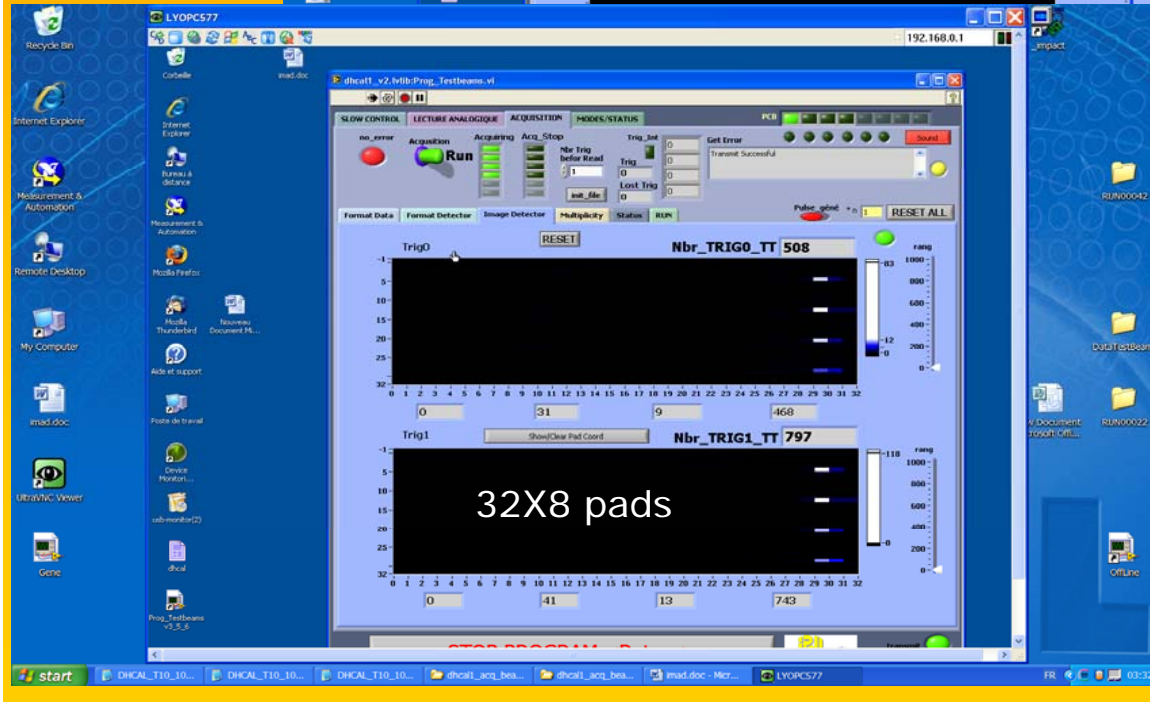Eudet Telescope

Mini DHCAL

Photogrammetry measurement

EuDet Telescope

Moveable table

photogrammetric spots used for alignment

Detector primary position [GRPC]

Beam position

Detector next position [GRPC]   3500 μ shift
                                 (half of the sensor width)

For each position : 2000-3000 triggers

.
.
.

[GRPC]   3 cm shift

Second threshold

First threshold

32X8 pads
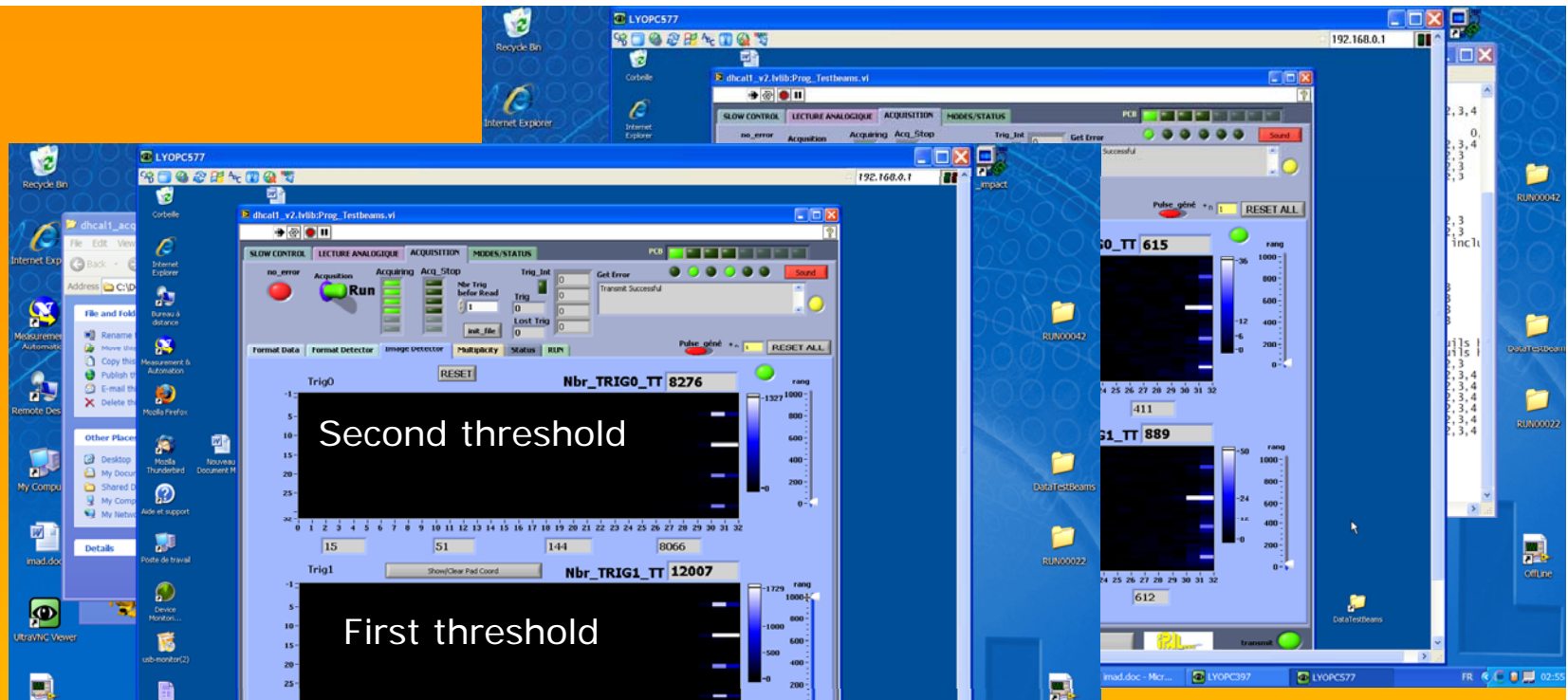
The touched pads in the 4 GRPC for successive positions

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
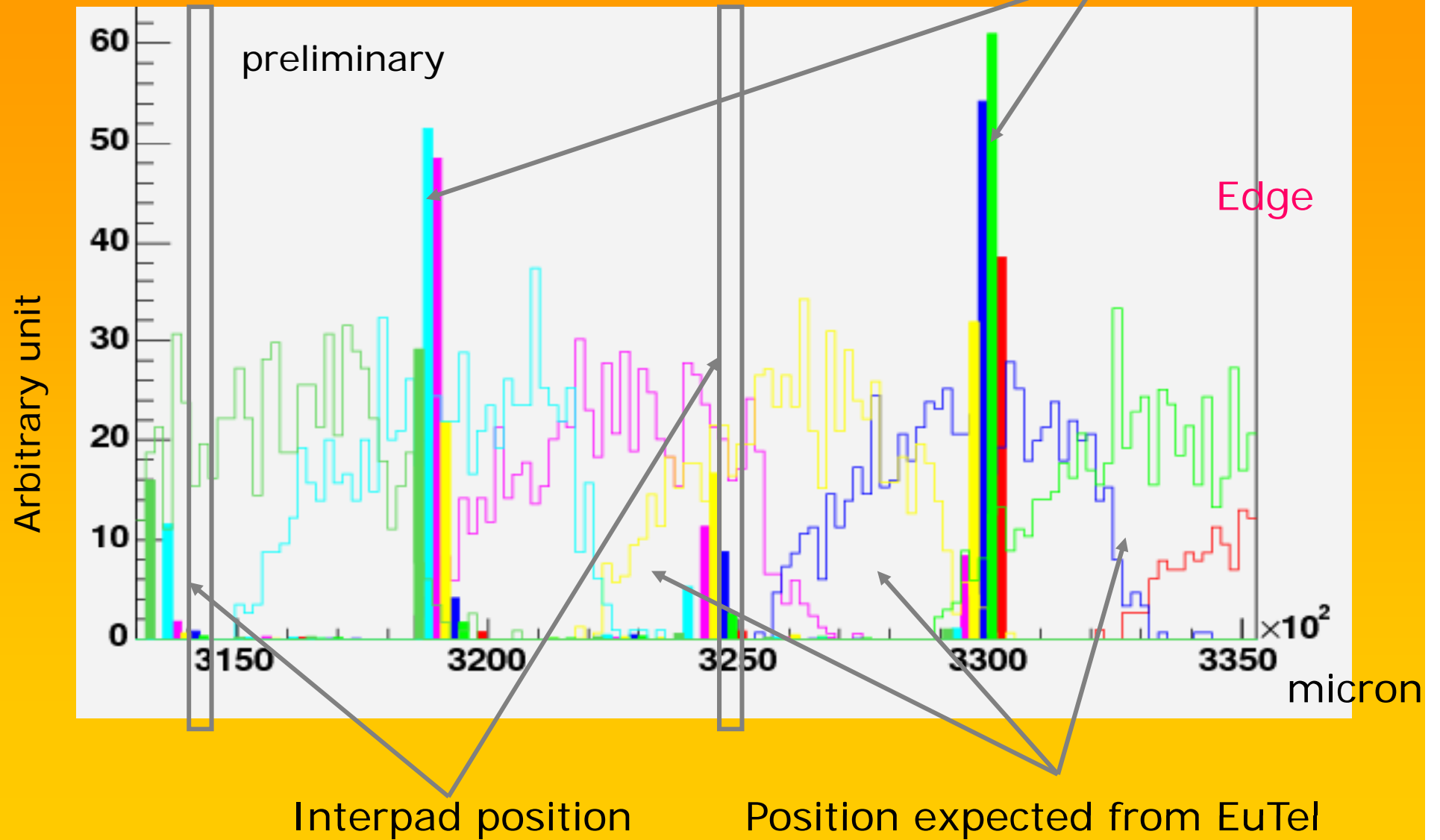Pads having two thresholds   :   weight = 2

Tracking :
Clusters belonging to different detectors
were gathered into tracks if compatible with straight line
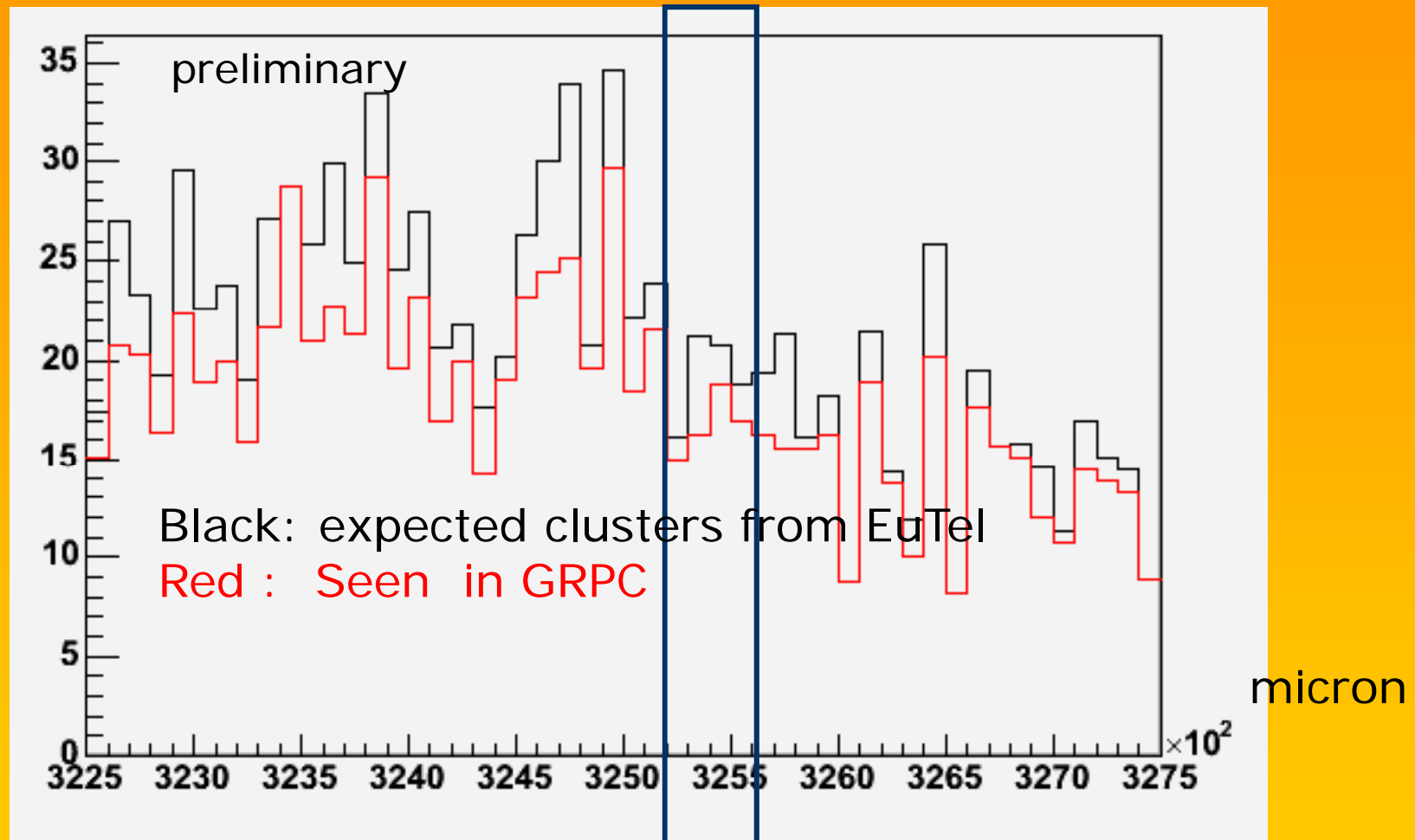
Inefficiency Study using EuDet Telescope

- 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 was used to reconstruct tracks

- Using the alignment result from the photogrammetry results, tracks reconstructed in the first arm were projected to the GRPC's

- The efficiency of tracks reconstruction in Eudet is between 50 and 60%.
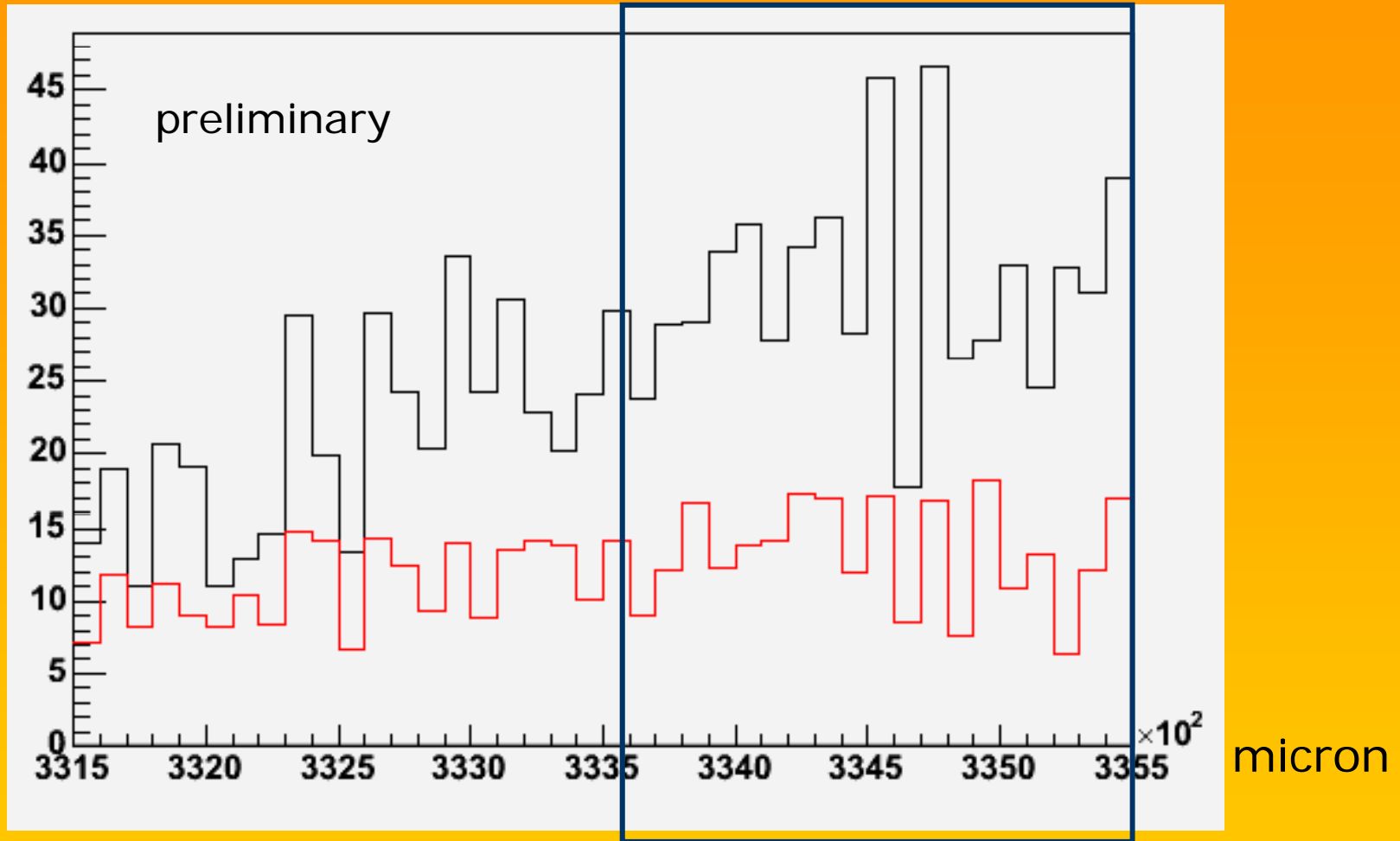
Correlation : expected position%seen

GRPC clusters position

preliminary

Edge

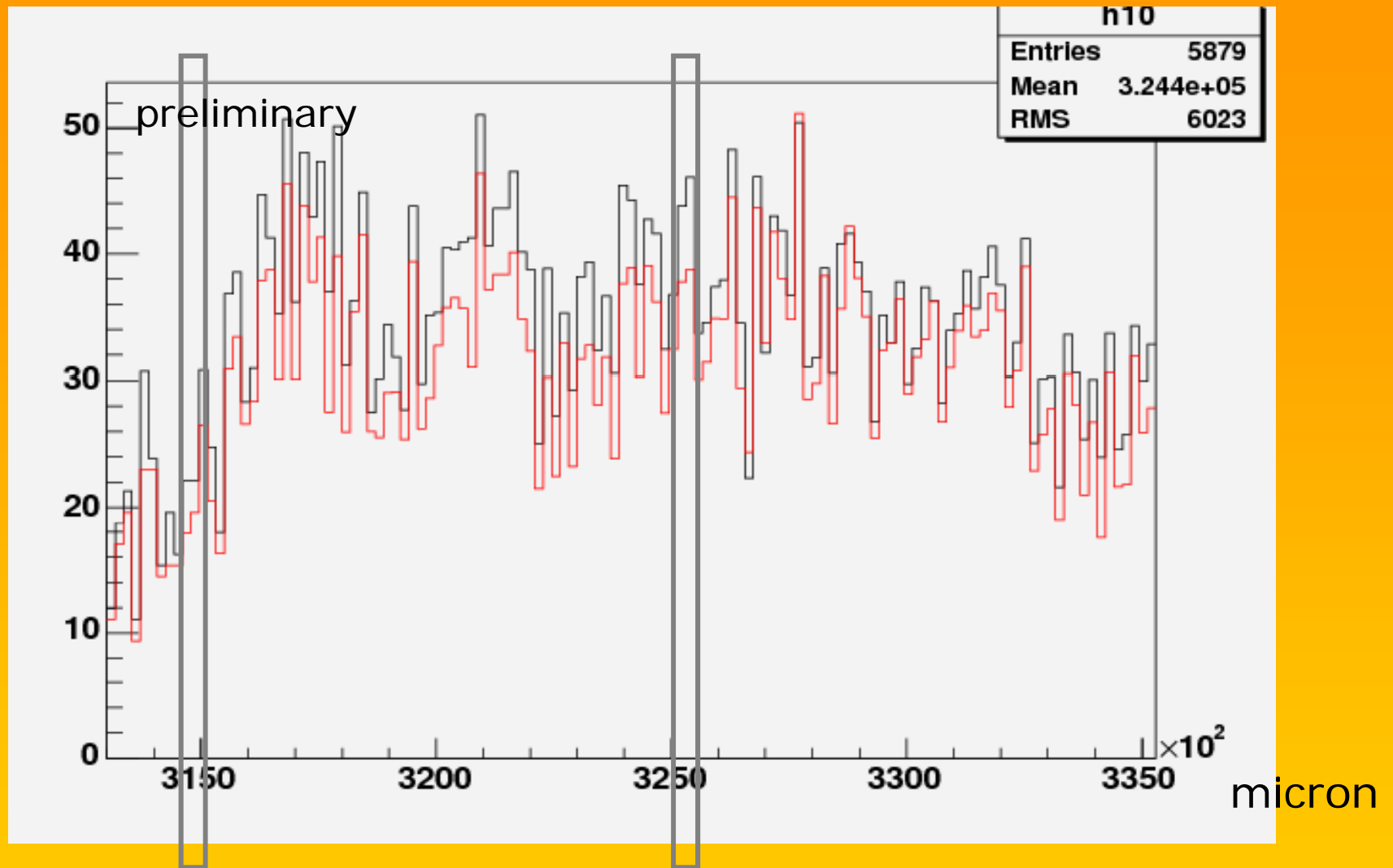Arbitrary unit

$\times 10^2$

micron

Interpad position   Position expected from EuTel

Interpad position

preliminary

Black: expected clusters from EuTel
Red : Seen in GRPC

micron

No evidence of the Interpad effect

preliminary

micron

GRPC edge

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
- Collaboration with our colleagues from DPNC and DESY was excellent
- First results show an edge effect but no inter-pad effect in the GRPC (within the available statistics). New version of GRPC with improved frame should reduce this effect.
- Events with more than one track will be reanalyzed using the new reconstruction code (thanks to Joerg)
- The use of TLU was very helpful
- We would like to continue this collaboration in the near future to study the PFA application in the DHCAL