First results of Atlas RPC cosmic rays test

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Outline

✓ RPC cosmic rays test in Naples.

✓ Definitions.

✓ Test results.

➤ Gap currents and single rates
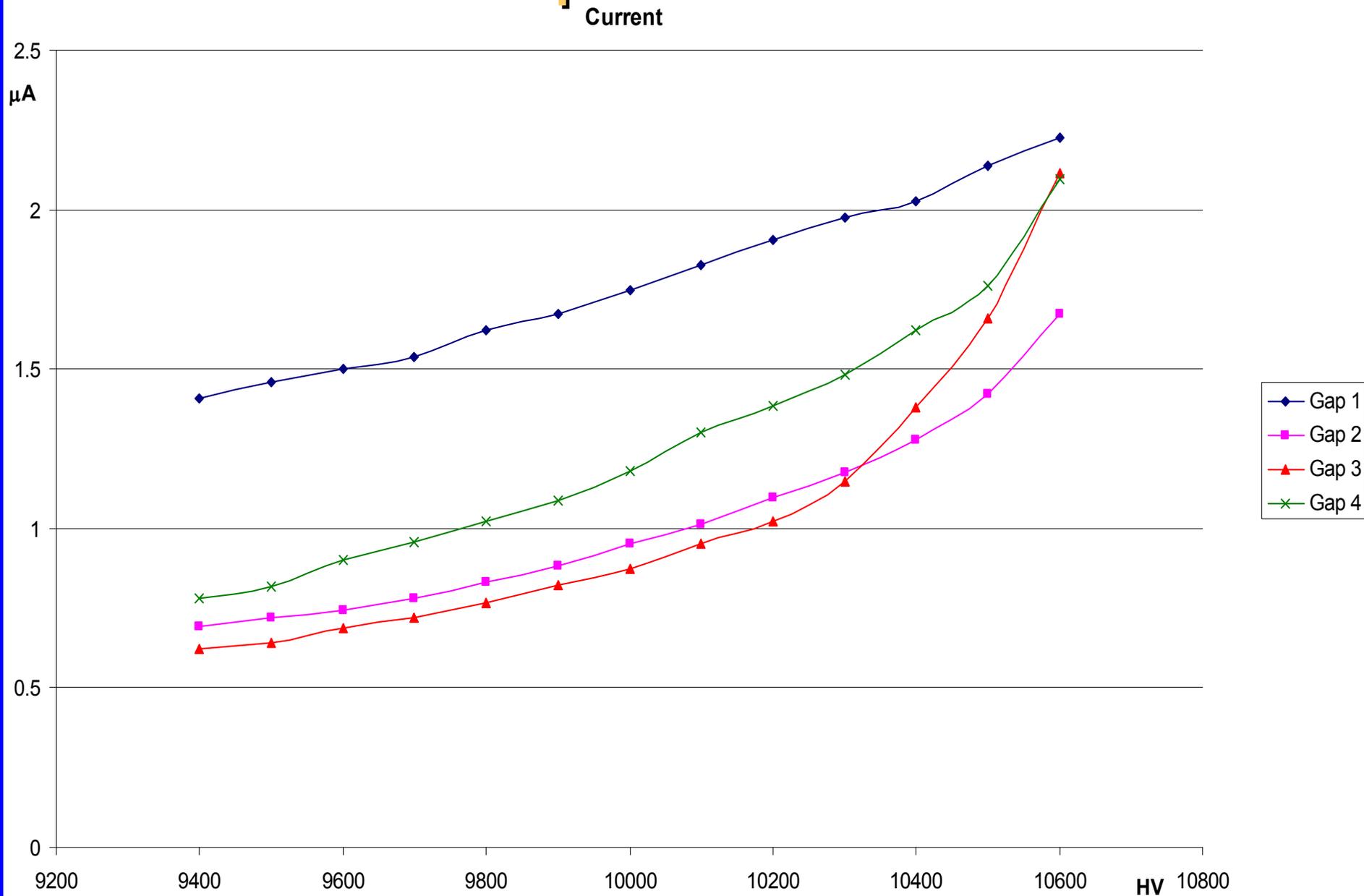
➤ Full Plateau curves

➤ Cluster size

✓ Conclusions.

RPC Test in Naples

✓ First chamber under test in Naples: BOS-B-004.

✓ 32 φ strips or 32 η strips were tested with cosmic rays using final receivers.

✓ A complete scan of RPC performances with respect to HV and threshold values has been done.
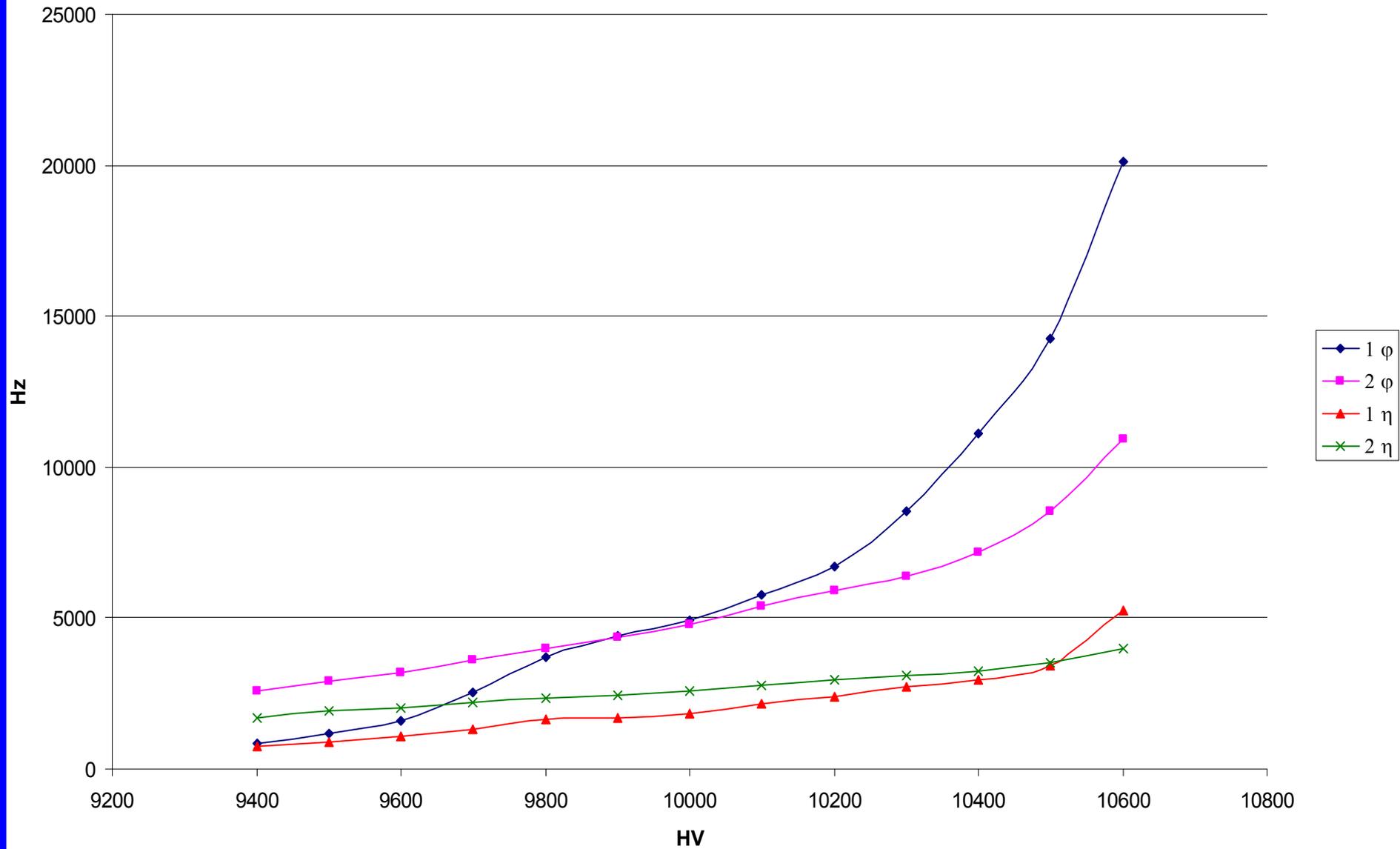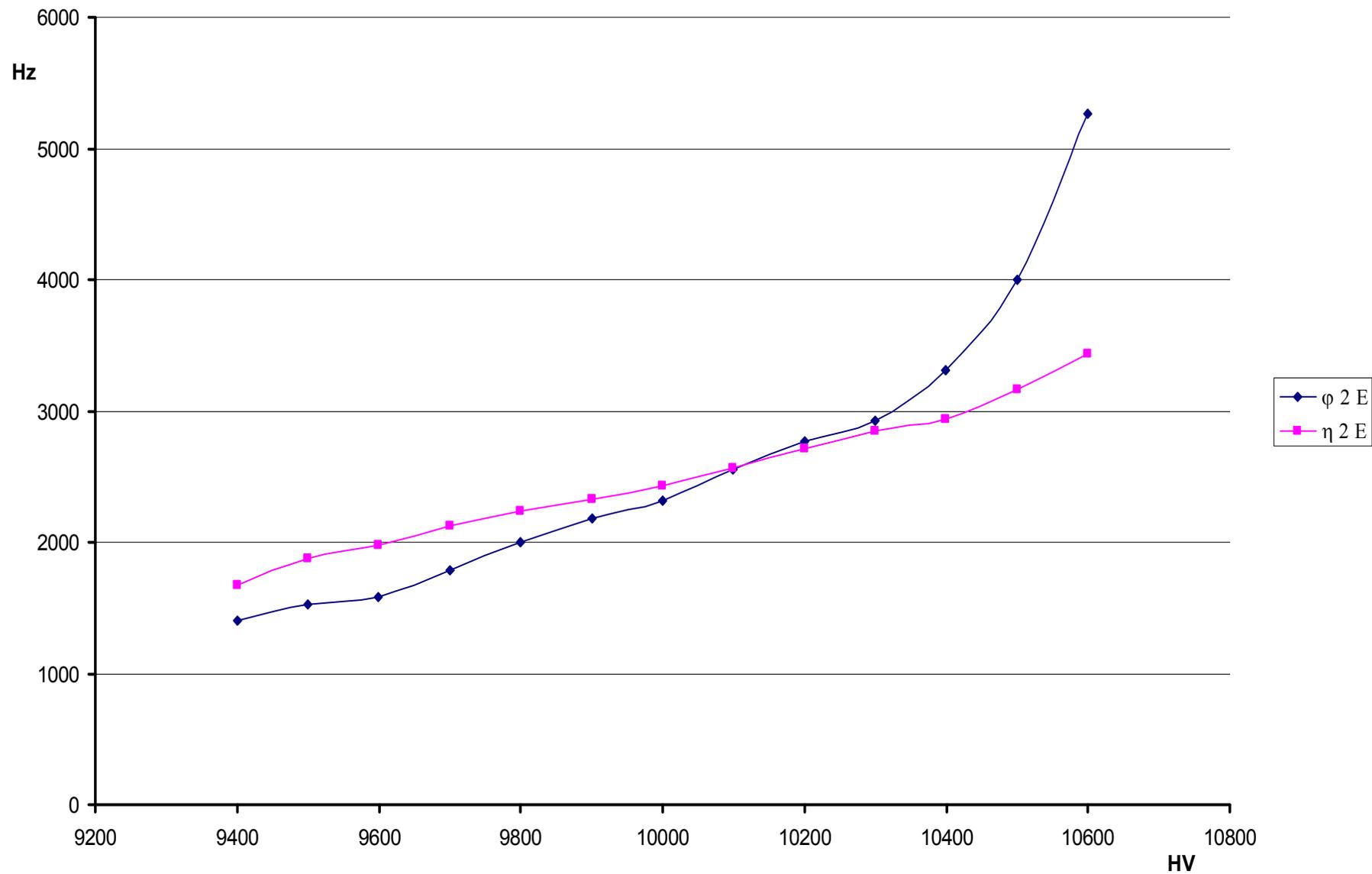
DAQ Setup
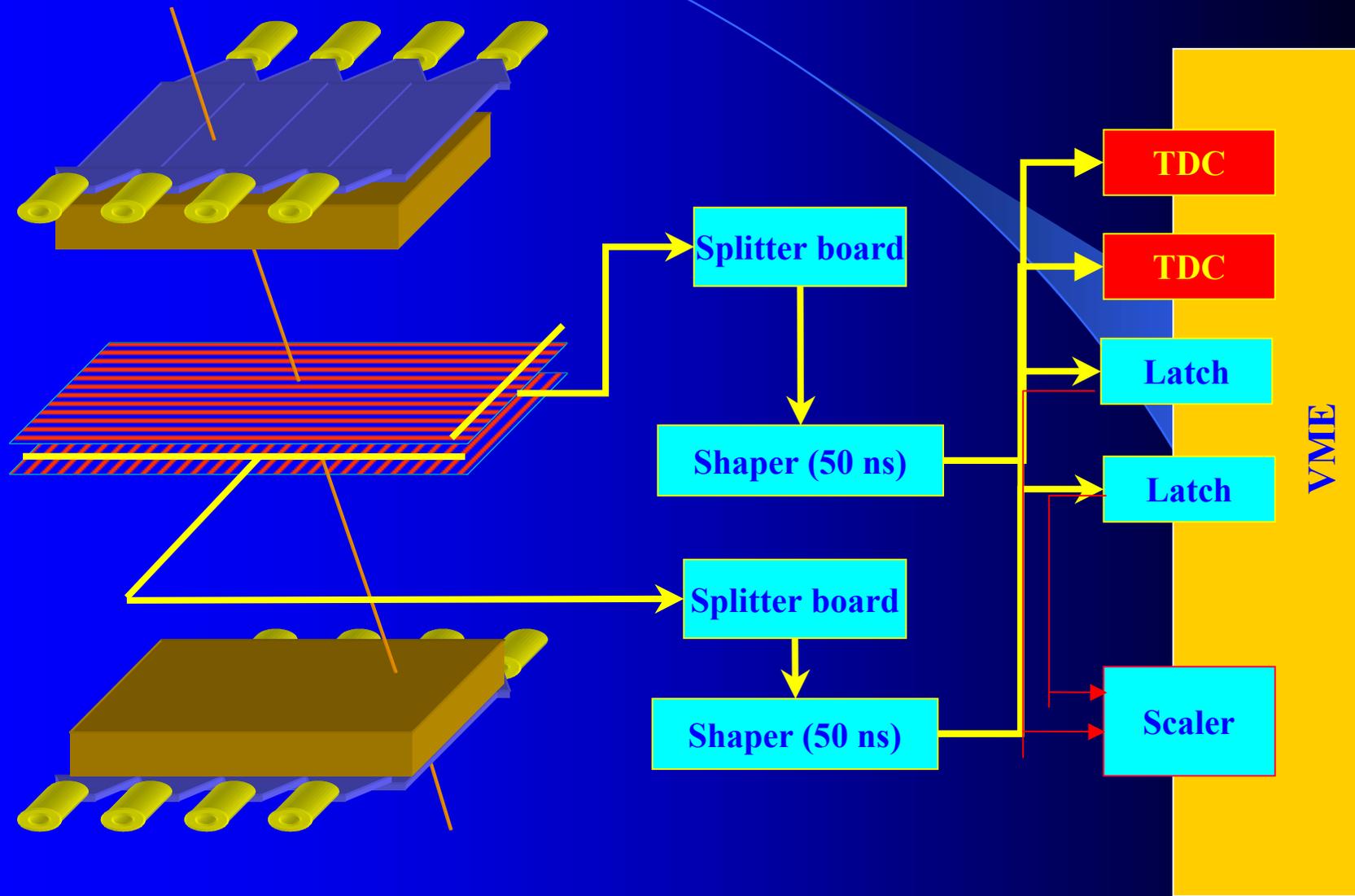
Gap currents

Single rates
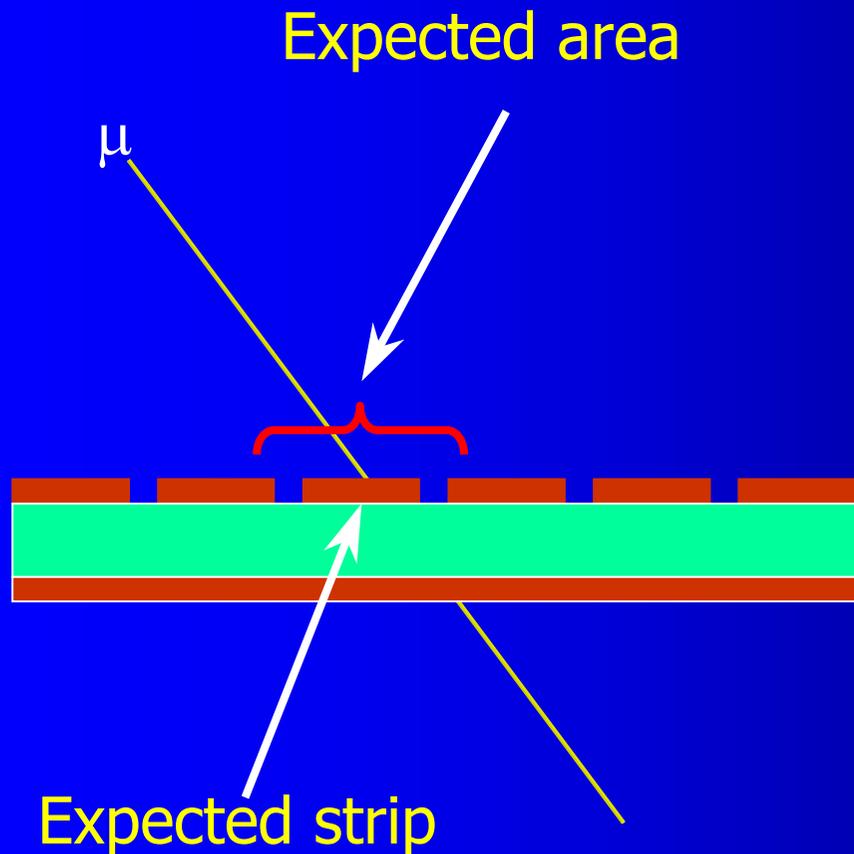

Single rate BOS-B 004

Single rates

Definitions (I)

- ✓ 10000 muons have been triggered for each run with fixed HV and threshold.

- ✓ To evaluate the RPC performances <u>golden</u> tracks were selected (1 single hit for each layer in drift chambers) reducing the sample to about 5000 events.

Definitions (II)

Expected area

μ

Expected strip

✓ The RPC is considered to be efficient if there is an hit in the "expected area" (defined as the expected strip ± 5 mm).

Definitions (III)

Physical cluster

μ

Non physical cluster
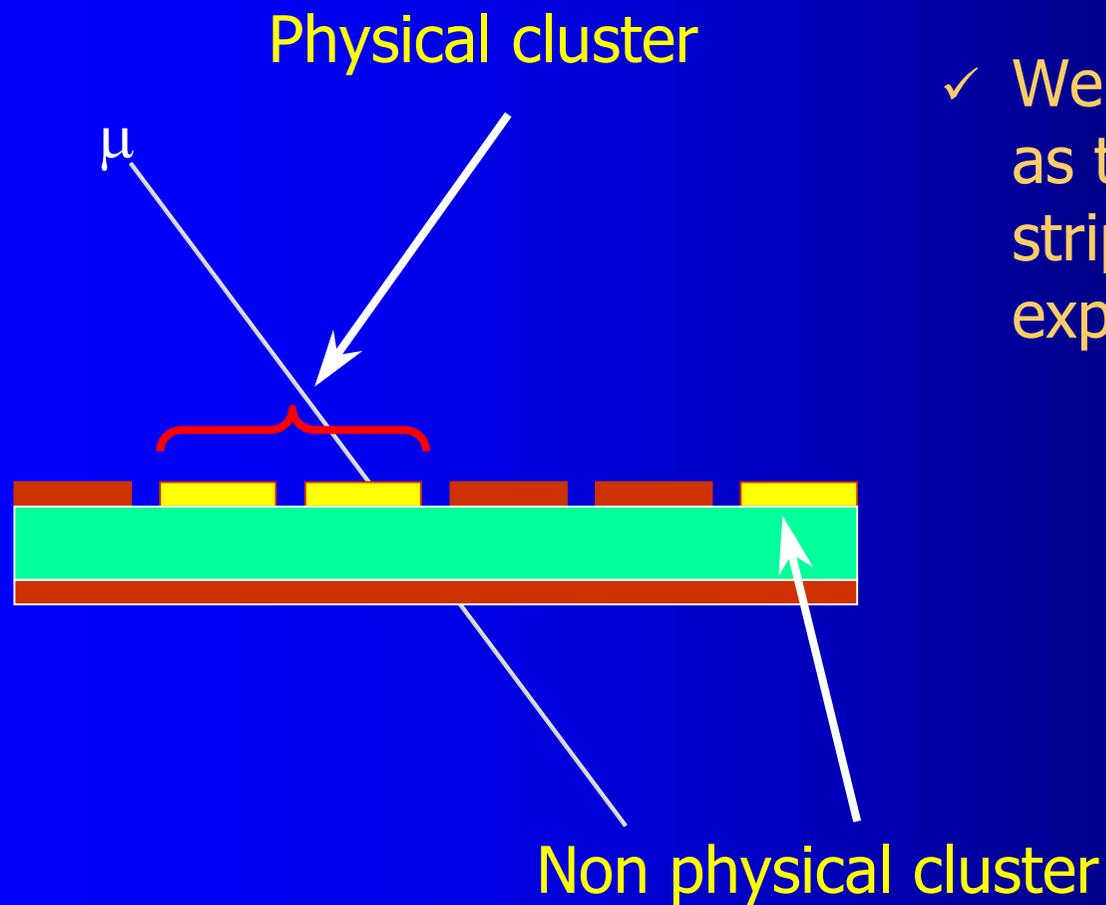
✓ We define Physical Cluster as the set of contiguous strips containing the expected one.
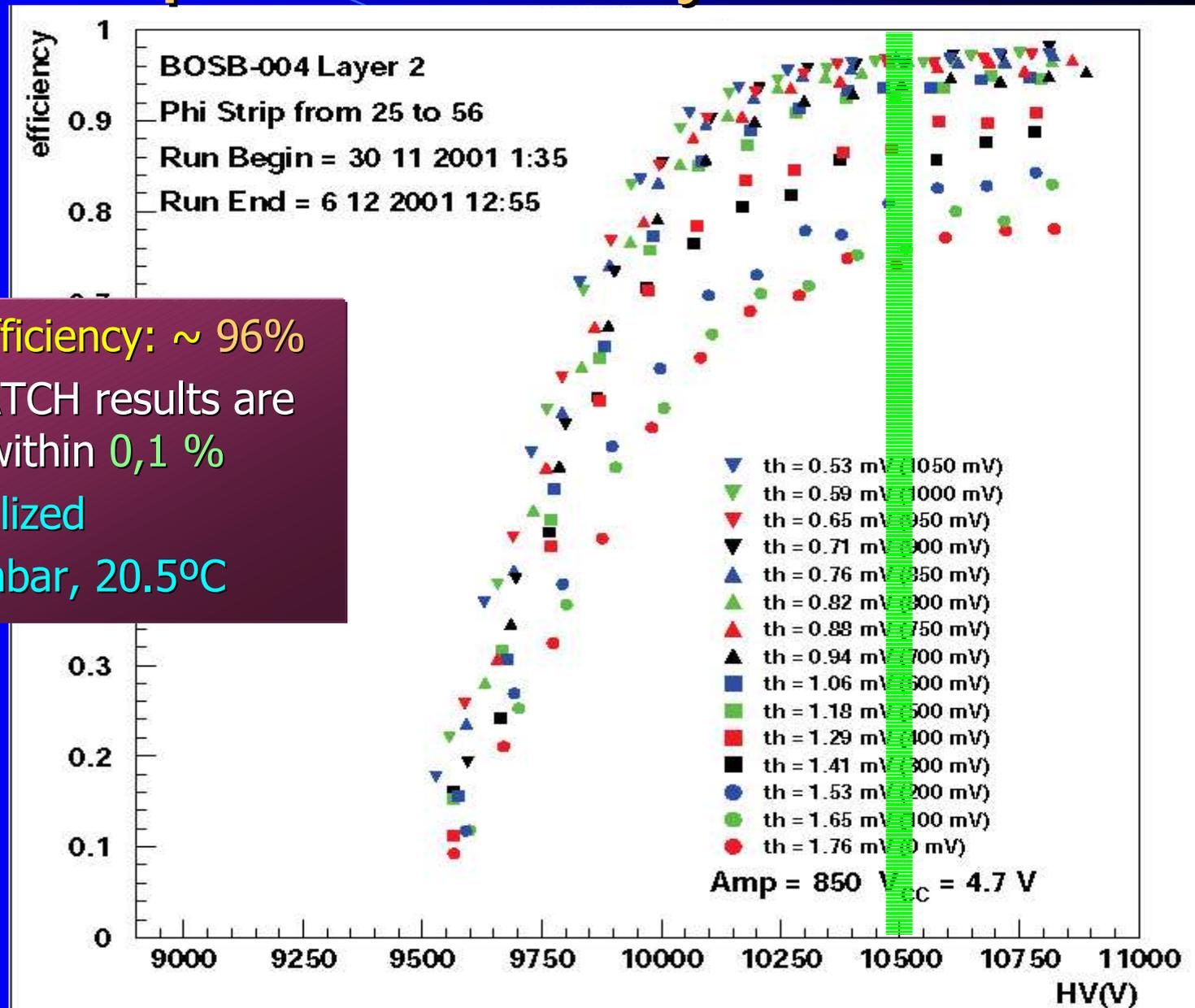
φ strips: Efficiency vs. HV

- ✓ **Plateau efficiency: ~ 96%**
- ✓ TDC e LATCH results are identical within 0,1 %
- ✓ HV normalized @ 1013 mbar, 20.5ºC
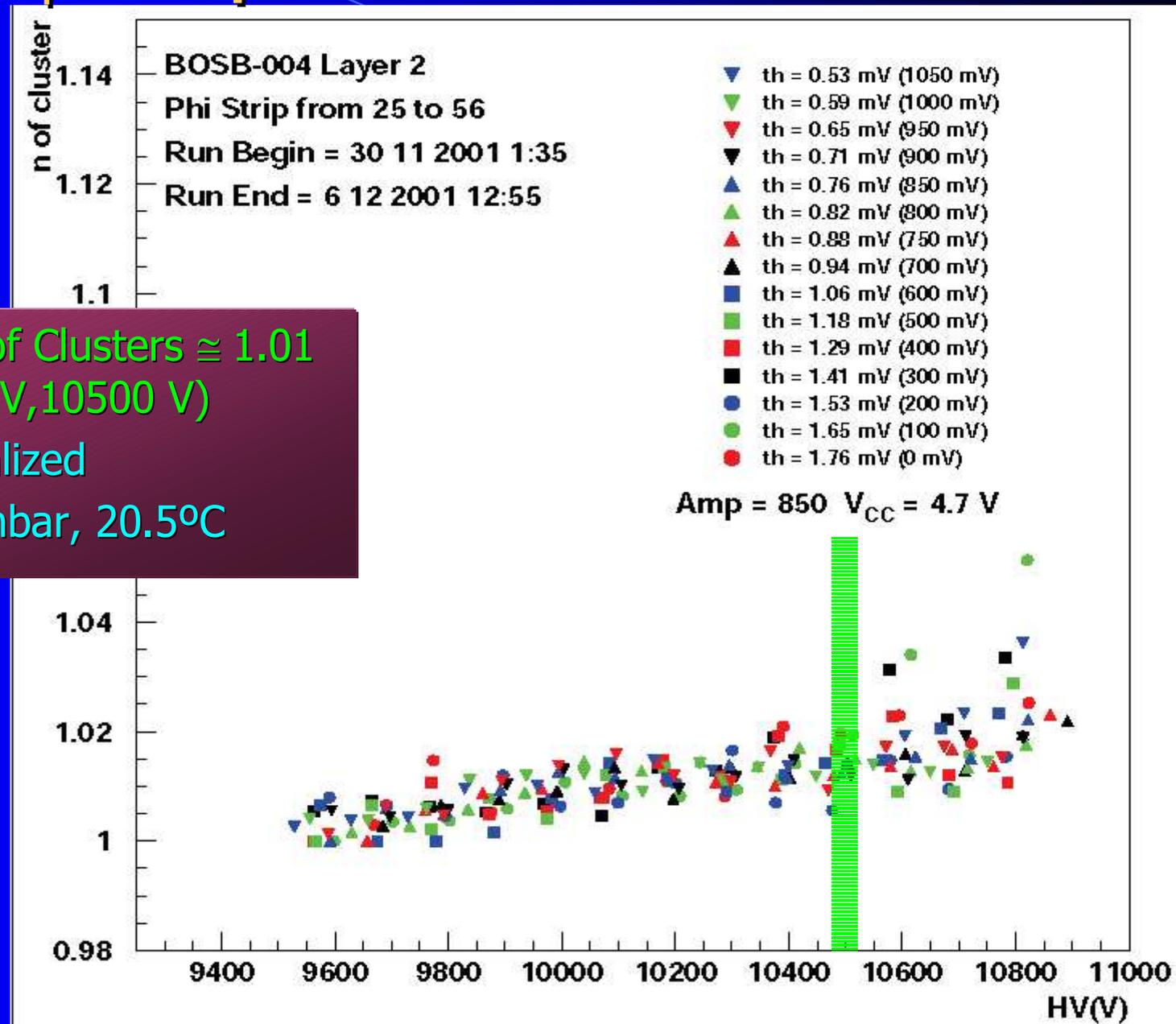
27/02/2002
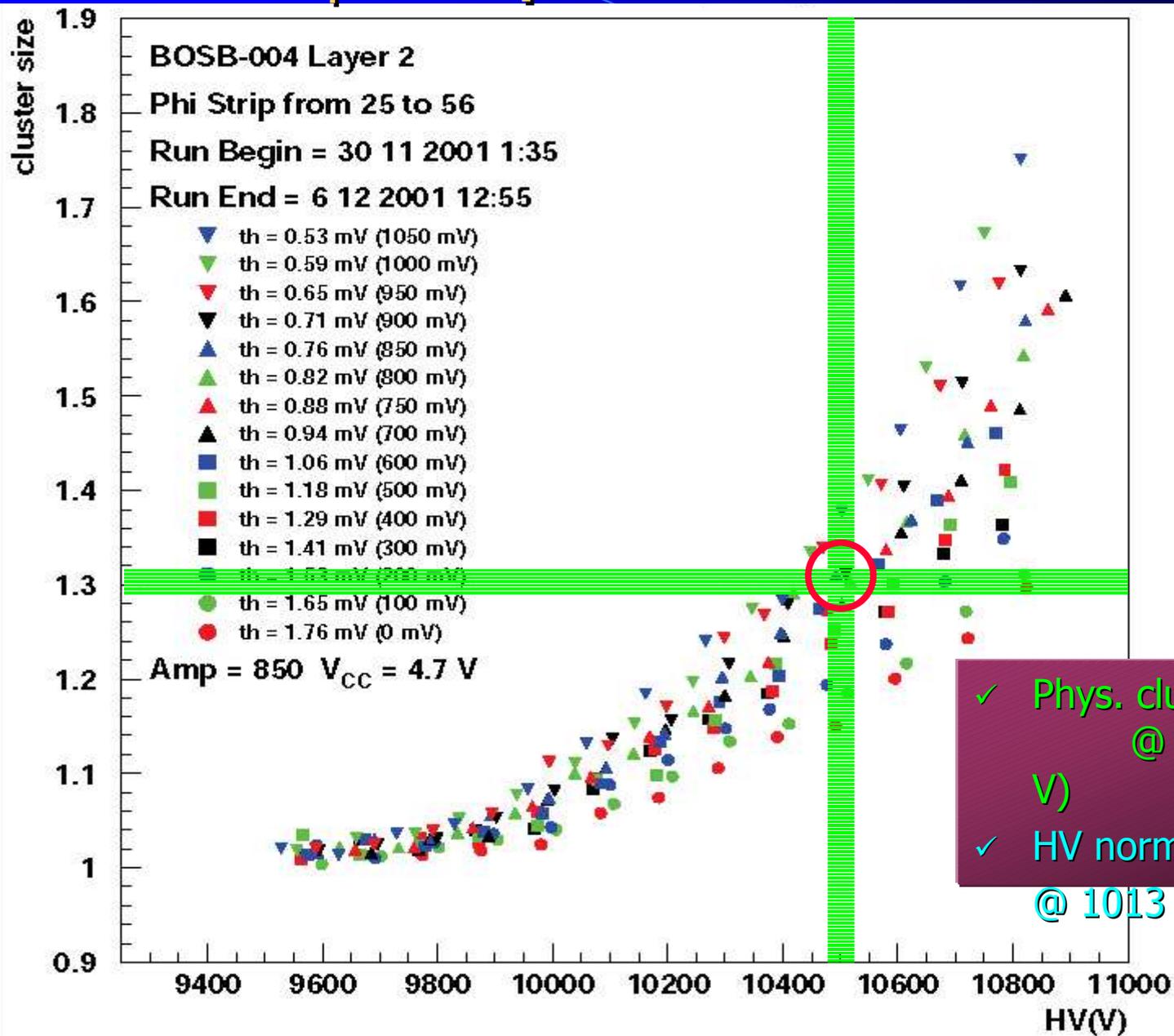
φ strips: Efficiency vs. Threshold

- ✓ Plateau efficiency: ~ 96%
- ✓ TDC e LATCH results are identical within 0,1 %
- ✓ HV normalized @ 1013 mbar, 20.5ºC

27/02/2002
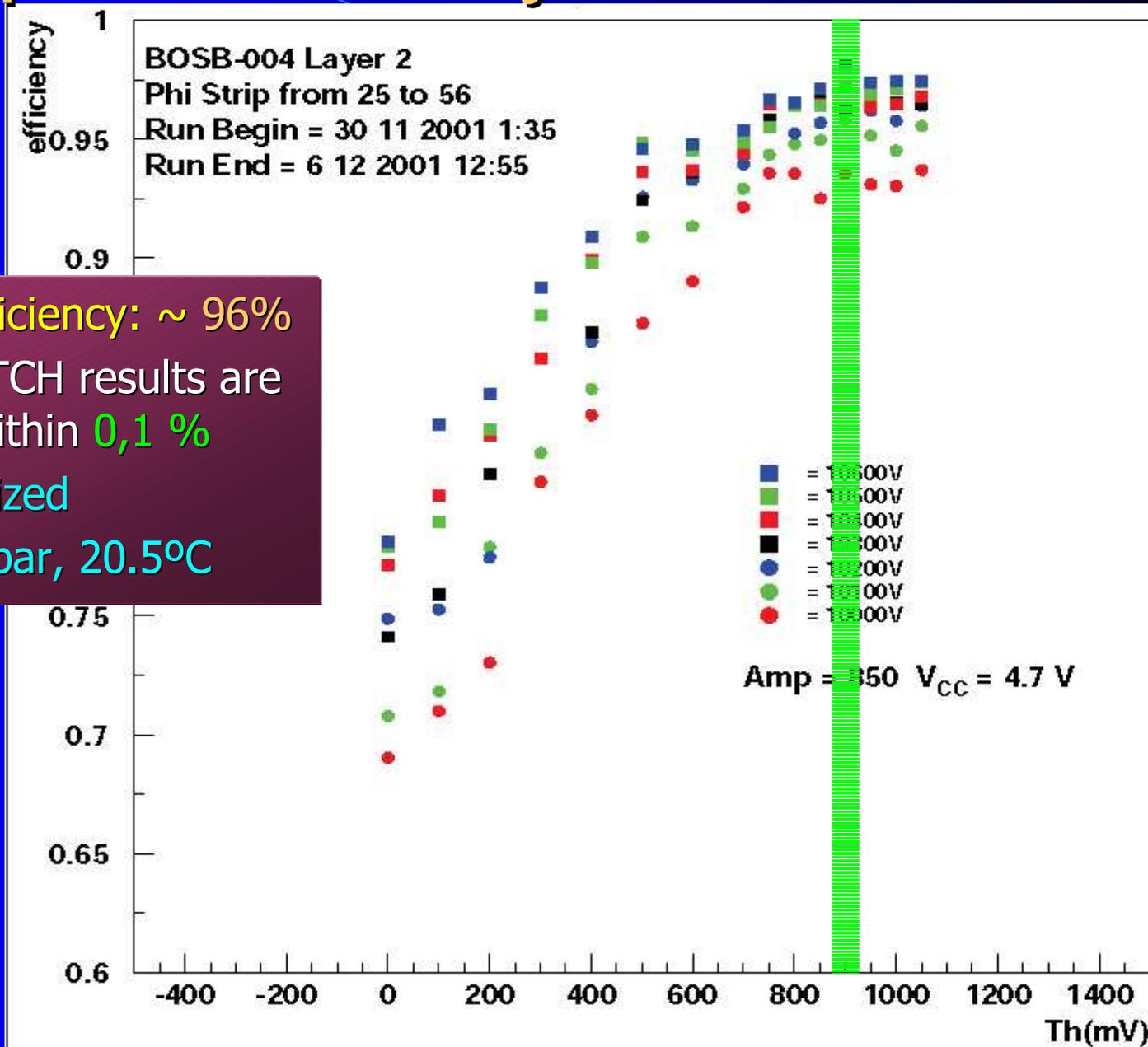
φ strips: N. of Clusters

- ✓ **Mean N. of Clusters ≅ 1.01 @ (0.71mV,10500 V)**
- ✓ HV normalized @ 1013 mbar, 20.5ºC

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φ strips: Cluster size

BOSB-004 Layer 2
Phi Strip from 25 to 56
Run Begin = 30 11 2001 1:35
Run End = 6 12 2001 12:55

- th = 0.53 mV (1050 mV)
- th = 0.59 mV (1000 mV)
- th = 0.65 mV (950 mV)
- th = 0.71 mV (900 mV)
- th = 0.76 mV (850 mV)
- th = 0.82 mV (800 mV)
- th = 0.88 mV (750 mV)
- th = 0.94 mV (700 mV)
- th = 1.06 mV (600 mV)
- th = 1.18 mV (500 mV)
- th = 1.29 mV (400 mV)
- th = 1.41 mV (300 mV)
- th = 1.53 mV (200 mV)
- th = 1.65 mV (100 mV)
- th = 1.76 mV (0 mV)

Amp = 850 V_{CC} = 4.7 V

✓ Phys. cluster size ≅ 1.3 @ (0.71mV,10500 V)
✓ HV normalized @ 1013 mbar, 20.5ºC
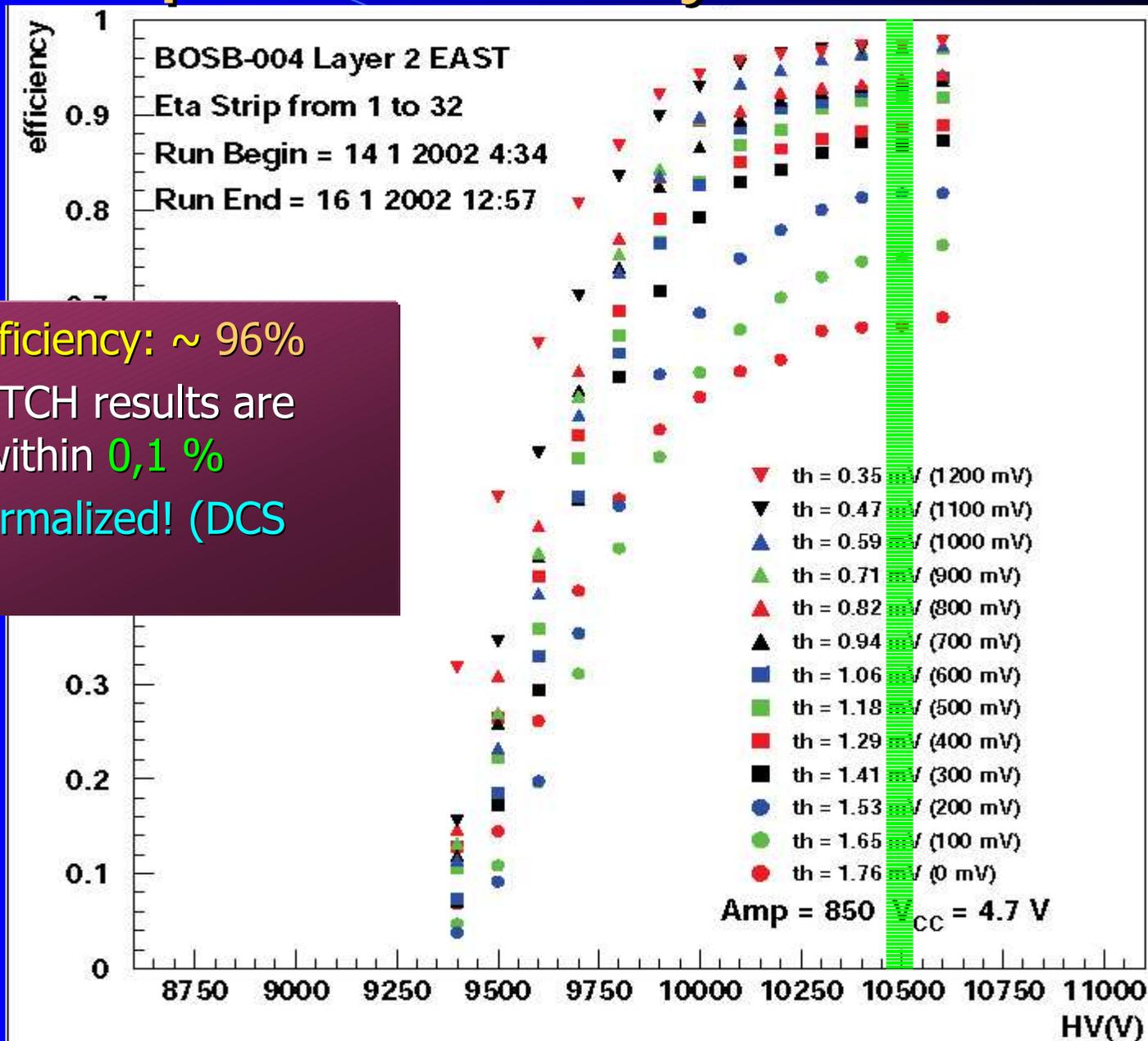
14

η strips: Efficiency vs. HV

- ✓ **Plateau efficiency: ~ 96%**
- ✓ TDC e LATCH results are identical within 0,1 %
- ✓ HV not normalized! (DCS problem.)

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η strips: Efficiency vs. Threshold
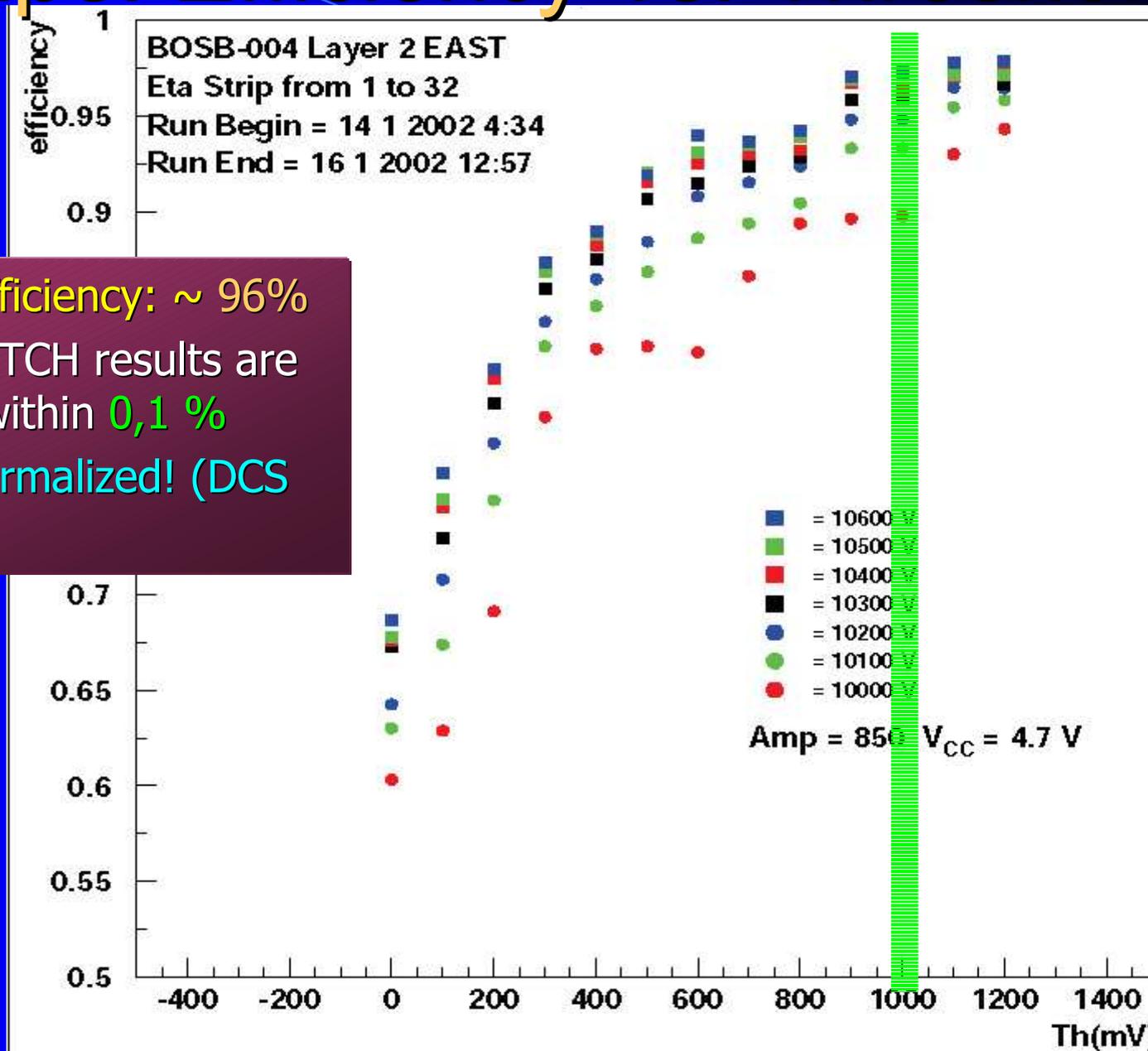
- ✓ **Plateau efficiency: ~ 96%**
- ✓ TDC e LATCH results are identical within 0,1 %
- ✓ HV not normalized! (DCS problem.)
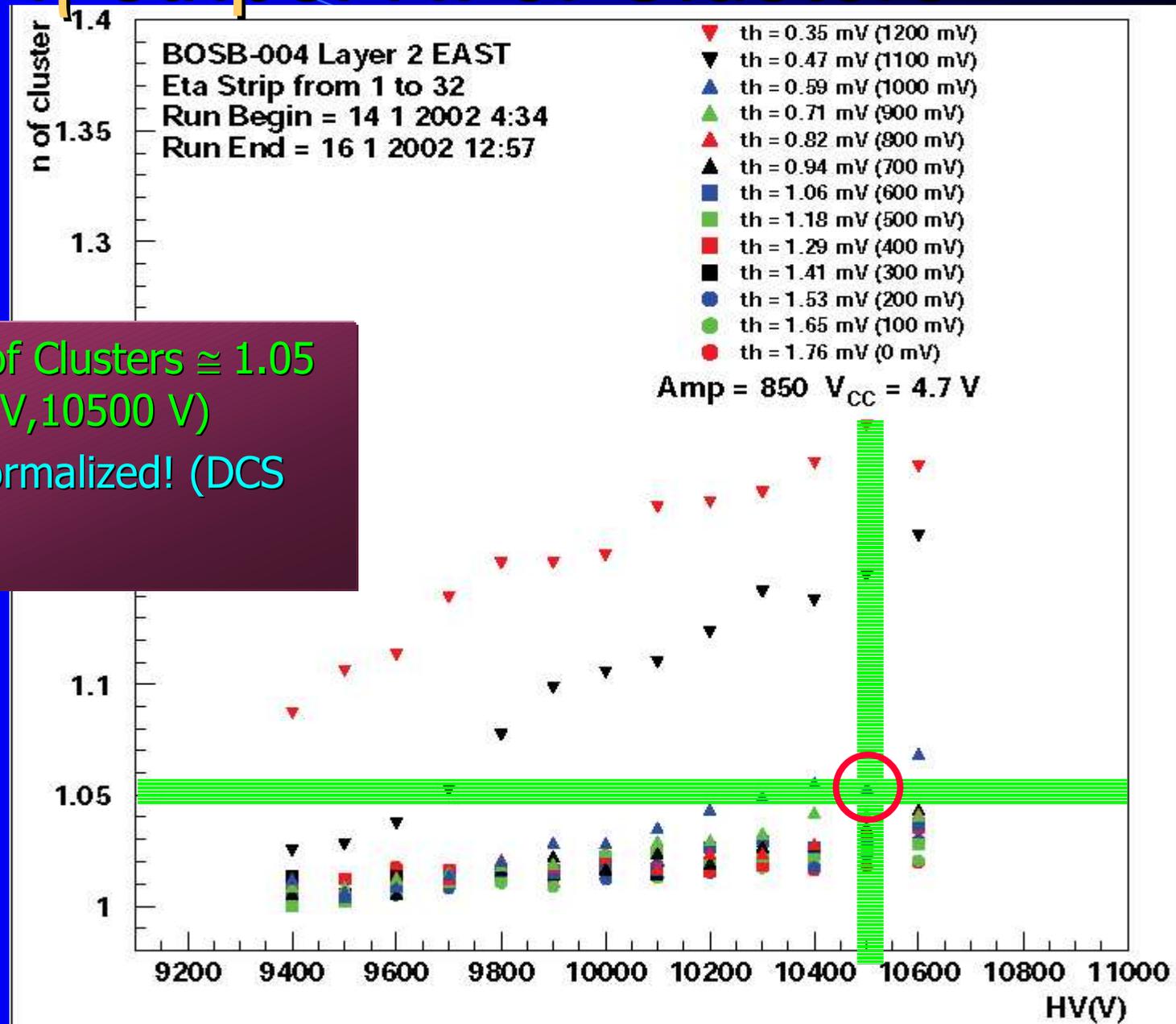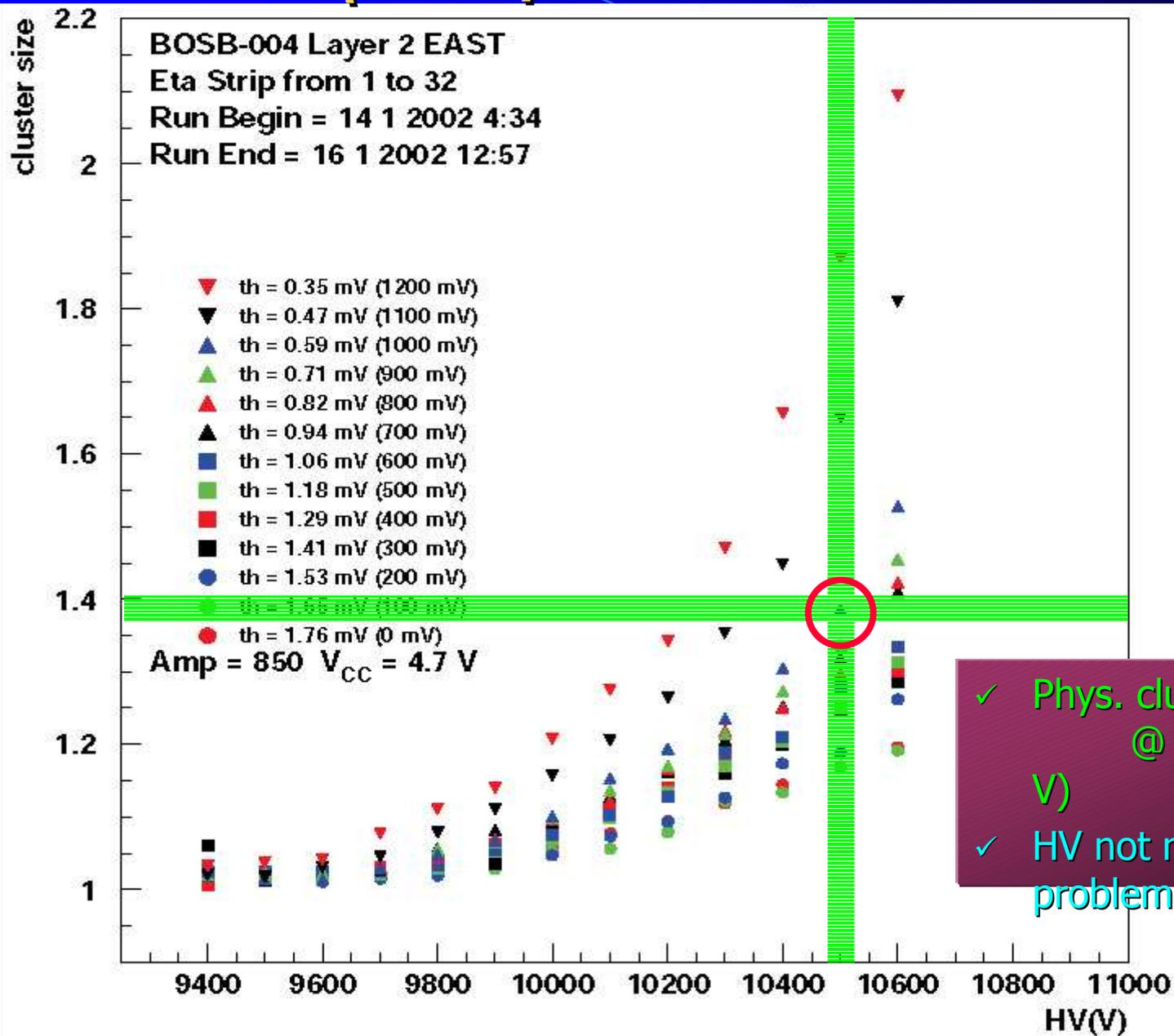
η strips: N. of Clusters

- ✓ Mean N. of Clusters $\cong$ 1.05 @ (0.59mV,10500 V)
- ✓ HV not normalized! (DCS problem)

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η strips: Cluster size

BOSB-004 Layer 2 EAST
Eta Strip from 1 to 32
Run Begin = 14 1 2002 4:34
Run End = 16 1 2002 12:57

Legend:
- th = 0.35 mV (1200 mV)
- th = 0.47 mV (1100 mV)
- th = 0.59 mV (1000 mV)
- th = 0.71 mV (900 mV)
- th = 0.82 mV (800 mV)
- th = 0.94 mV (700 mV)
- th = 1.06 mV (600 mV)
- th = 1.18 mV (500 mV)
- th = 1.29 mV (400 mV)
- th = 1.41 mV (300 mV)
- th = 1.53 mV (200 mV)
- th = 1.76 mV (0 mV)

Amp = 850 V_{CC} = 4.7 V

- Phys. cluster size $\cong$ 1.4 @ (0.59 mV, 10500 V)
- HV not normalized! (DCS problem)

η and φ Efficiency
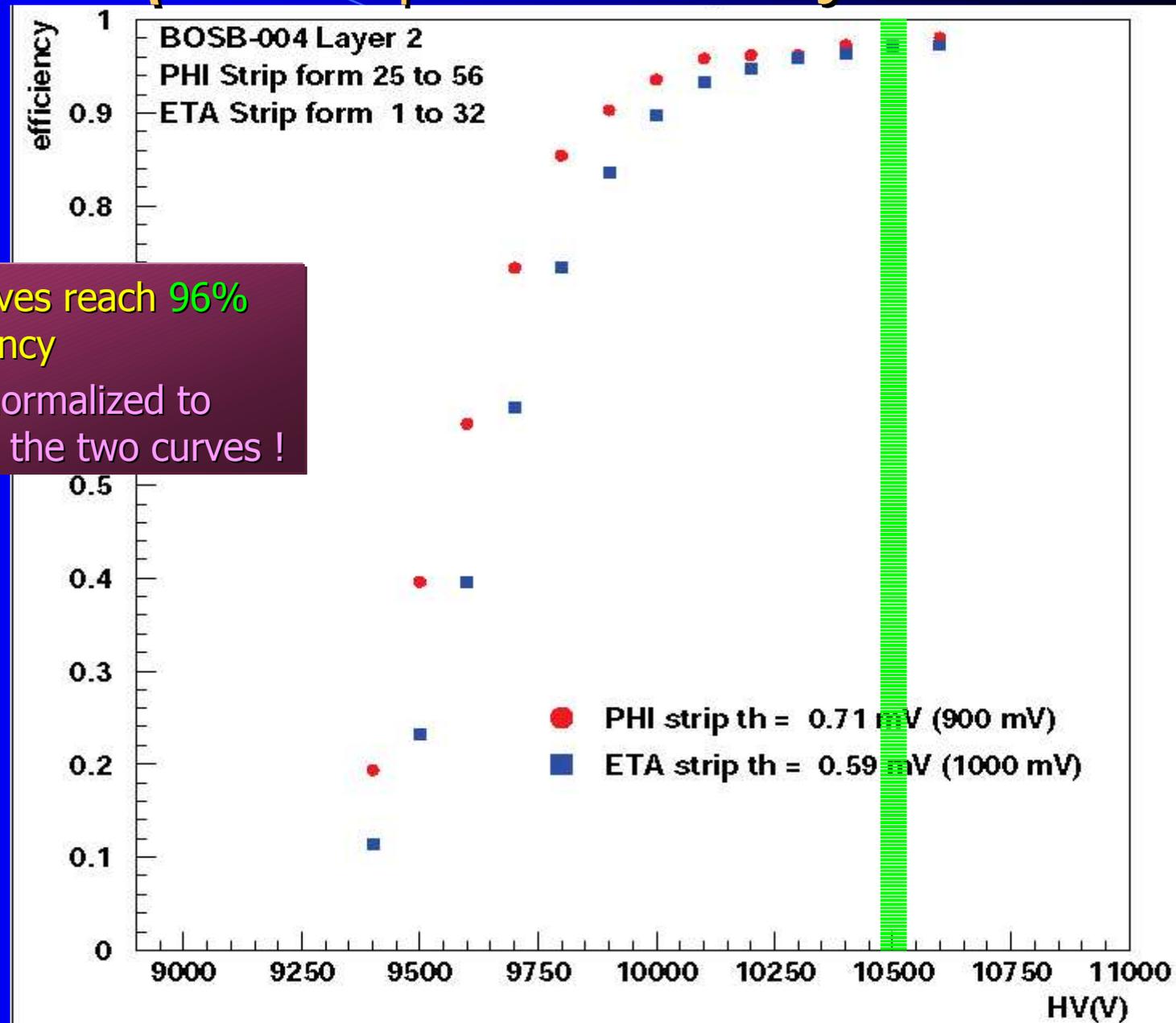
- ✓ Both curves reach 96% of efficiency
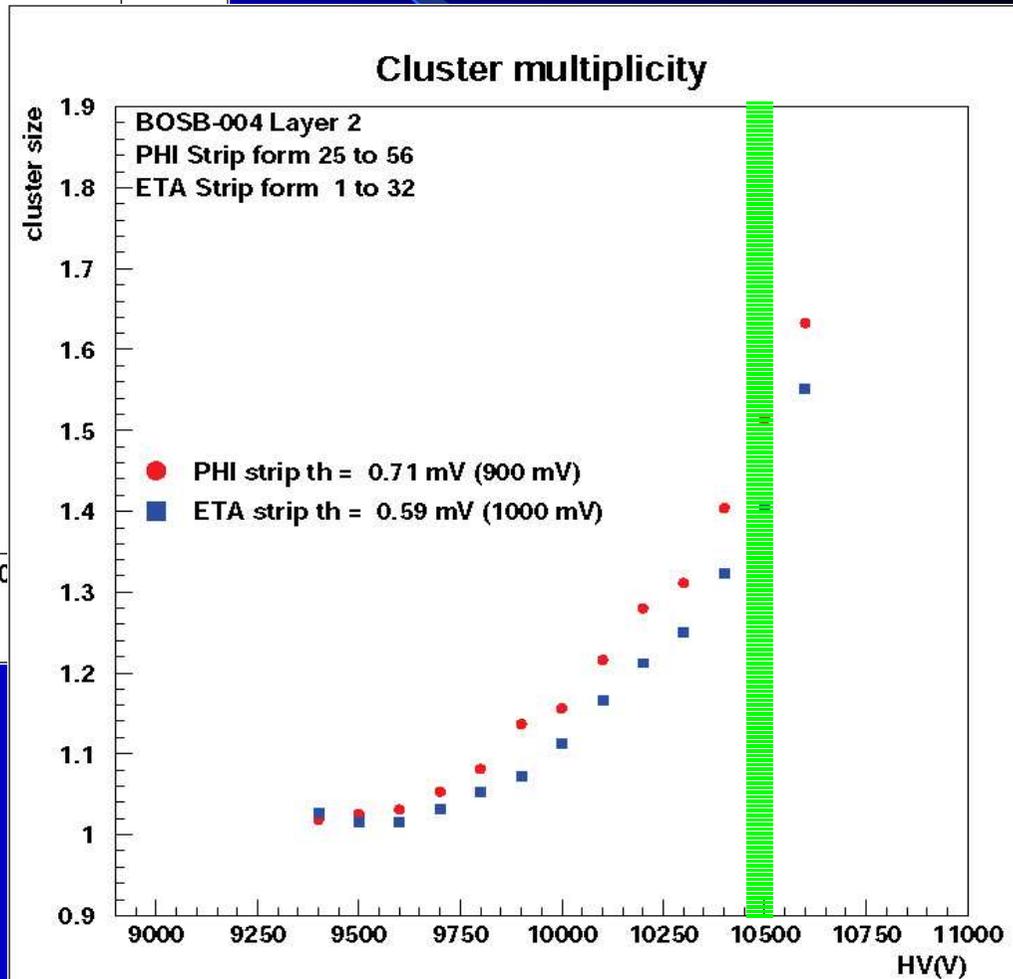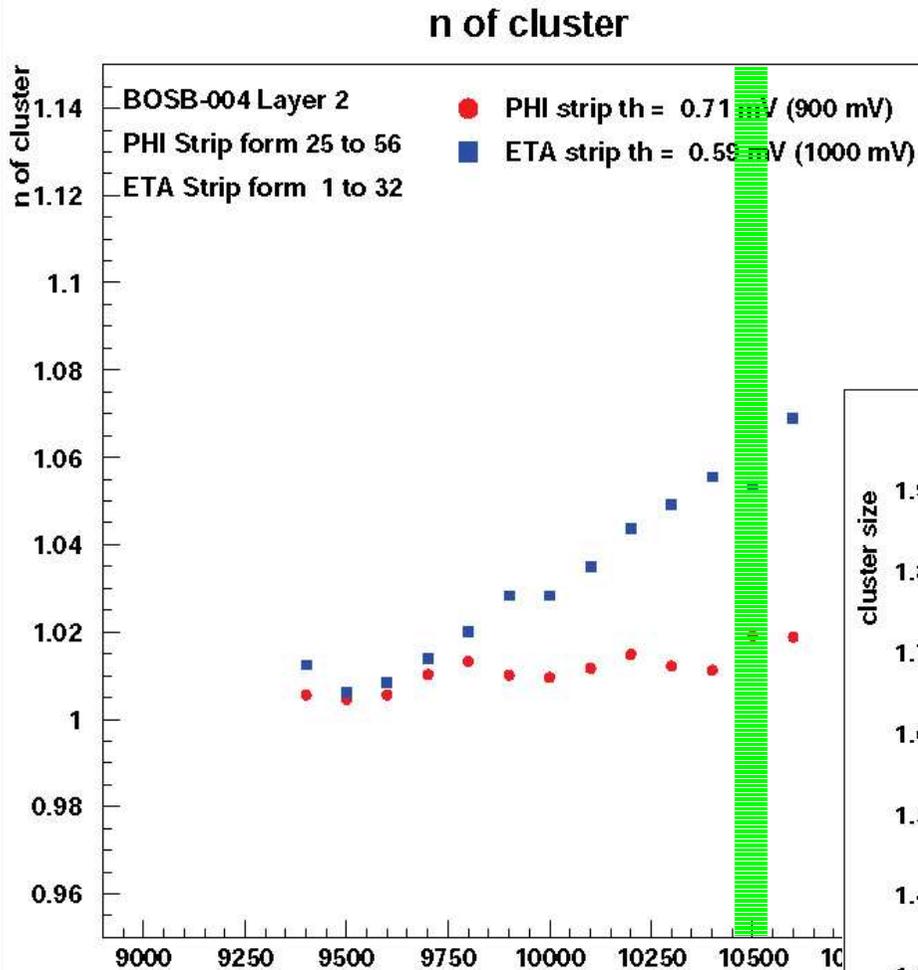- ✓ HV not normalized to compare the two curves !

BOSB-004 Layer 2
PHI Strip form 25 to 56
ETA Strip form 1 to 32

PHI strip th = 0.71 mV (900 mV)
ETA strip th = 0.59 mV (1000 mV)

η and φ Cluster size

n of cluster

BOSB-004 Layer 2
PHI Strip form 25 to 56
ETA Strip form 1 to 32

● PHI strip th = 0.71 mV (900 mV)
■ ETA strip th = 0.59 mV (1000 mV)

Cluster multiplicity

BOSB-004 Layer 2
PHI Strip form 25 to 56
ETA Strip form 1 to 32

● PHI strip th = 0.71 mV (900 mV)
■ ETA strip th = 0.59 mV (1000 mV)

HV(V)

✓ η strips are a little noisier than φ strips (under investigation).
✓ HV not normalized to compare the two curves !

27/02/2002   M.D.P.

Conclusions

✓ The results show a good RPC behavior for both φ and η plane:

  ➢ Efficiency ~ 96 %
  ➢ Cluster size 1.3 - 1.4 } @ working point.

✓ TDC and LATCH give identical results with shaped signals.

✓ The analysis tools to fully test up to 8 RPCs together are ready.

✓ We're ready for massive tests.