Laser tests of DEPFET edge effect

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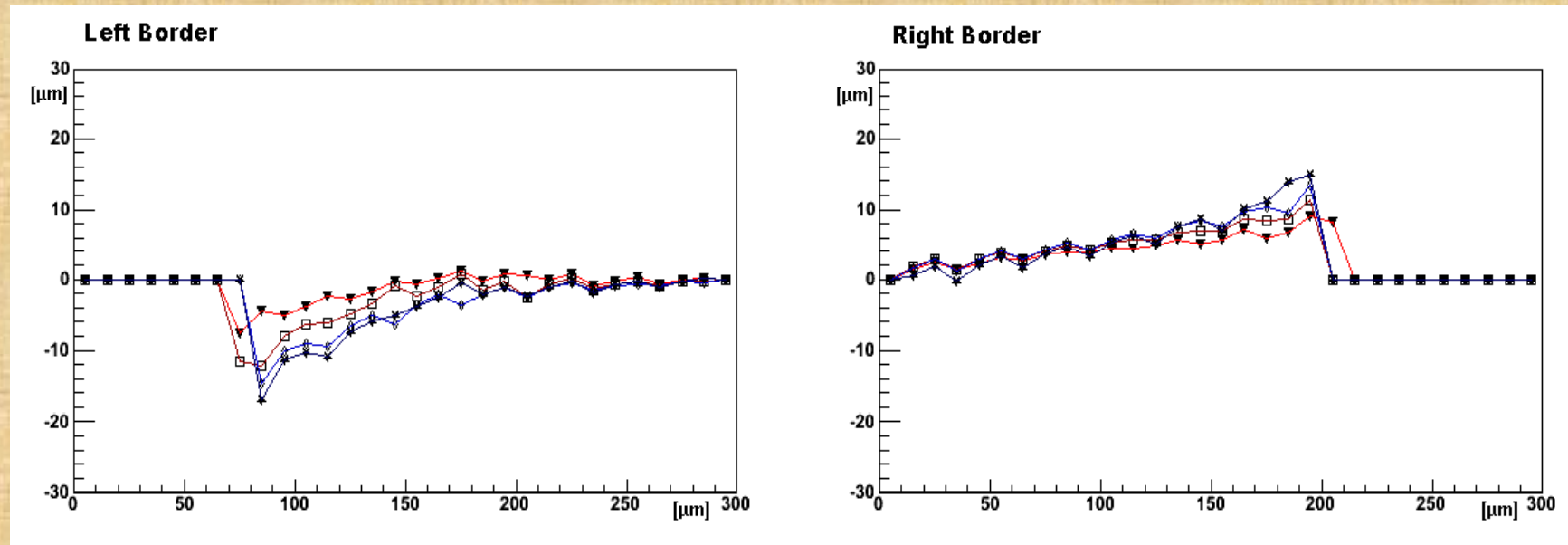Charles University in Prague
Institut of Particle and Nuclear Physics

Laser test setup

- DEPFET Matrix
  - 64 x 256 pixels
  - Pixels 32 μm x 24 μm
- Laser properties
  - Wavelenght 682 nm
  - Pulselenght 3 ns
- Engines
  - Basic step 1.25 μm
- About 200 μm wide border area was measured
  - 10 μm step
 - Bulk Voltage from 4 V to 11 V with respect to source
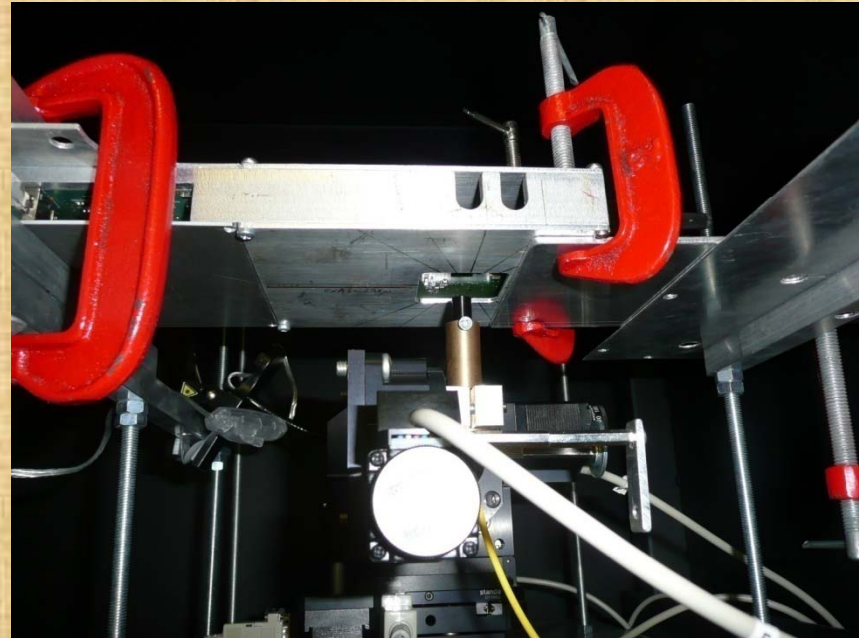
Results

•Summary displacement plots show the difference between position of laser and COG position calculated from the data(in x axis). A subset of data is shown for:
4 V (triangles), 6 V (squares), 8 V (rhombs), 10 V (stars). Bulk Voltages are with respect to source.

•The same dependence was found in y axis by bottom and top border.

•The misposition on the border is 18 µm at 10 V and decreases to 8 µm at 4 V.
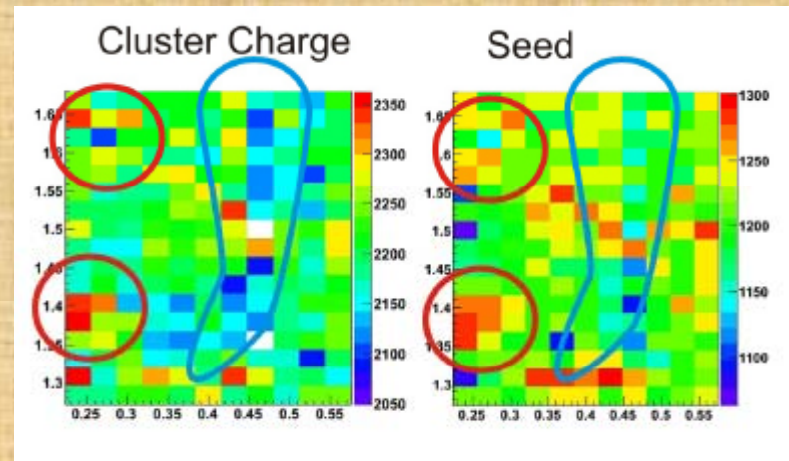
Results

Laser test
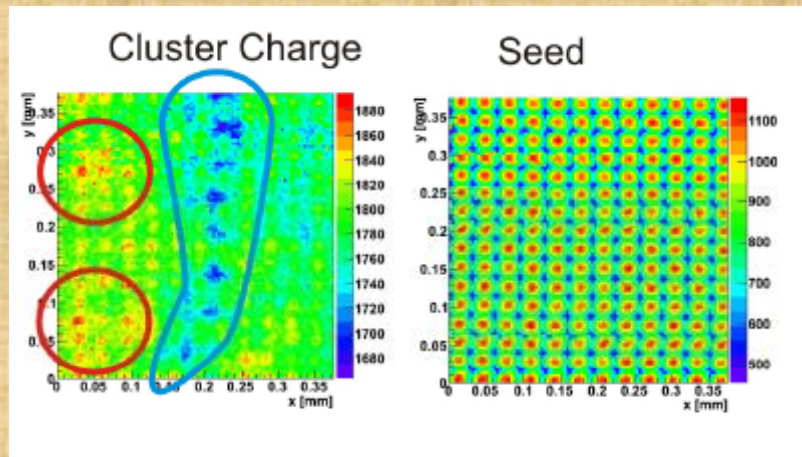
- Aproximately 5000 seeds per pixel
- Variation 4% (peak to peak)

Beam test – CERN 2009

- Aproximately 260 seeds per pixel
- Variation 15% (peak to peak)

Both tests were done on the same area of the same DEPFET module and with the same results

Laser test measures the variation of charge collection between pixels more precisely than beam test

Laser test is useful for measurement of gain variation between pixels

The only disadvantage of Laser test is the need for transparent backplane

Conclusion

- Misposition on edges is reduced by decreasing Bulk Voltage (at 4 V with respect to source by factor of about 2).

- Cluster Charge, Cluster Size and Seed is the same by decreasing Bulk Voltage

- Our recommendation is to use **lower** Bulk Voltage
  - **From 4 V to 5 V** with respect to source

Thank you for your attention

Thanks to Zbyněk for presentation of this talk