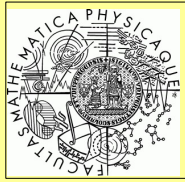**Christian Oswald*, J. Scheirich, P. Kodys,**
Z. Dolezal, Z. Drasal
(Charles University, Prague)

Status of the
Minimatrix Setup in Prague

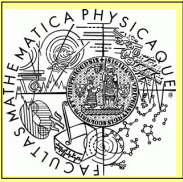5th Int. Workshop on DEPFET Detectors and Applications

*oswald@ipnp.troja.mff.cuni.cz

- **The new electronics**

- **A quick look at analysis**

- **Examples**

  - **Long-term stability of the system**

  - **Playing with readout sequences**

  - **Noise properties**

  - **Laser tests**
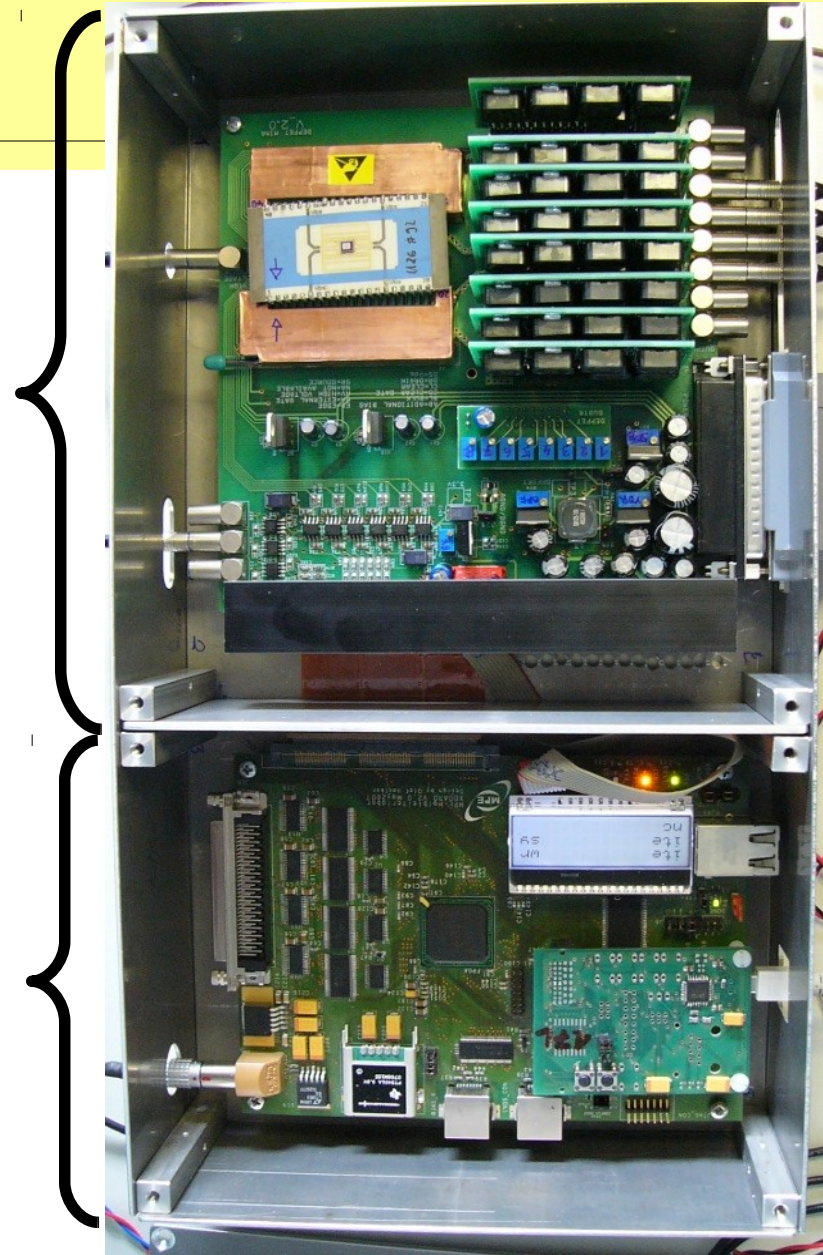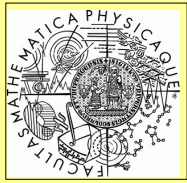
  - **Source measurements**

- **Conclusion**

- **new switcher (switching circuit,** *not* **ASIC switcher)**
  - **=> better gate/clear signals**

    (no ringing and overshoots,

    well defined rising/falling edges)

  - **=> more stable drain signals**

    (shape of the gate signal is directly visible

    on the drain current, improvement of the

    gate signals improved also drain signal)

- **shorter setting time (~ 500 ns) after clear/gate switch**
  - **=> faster + more flexible sequences**

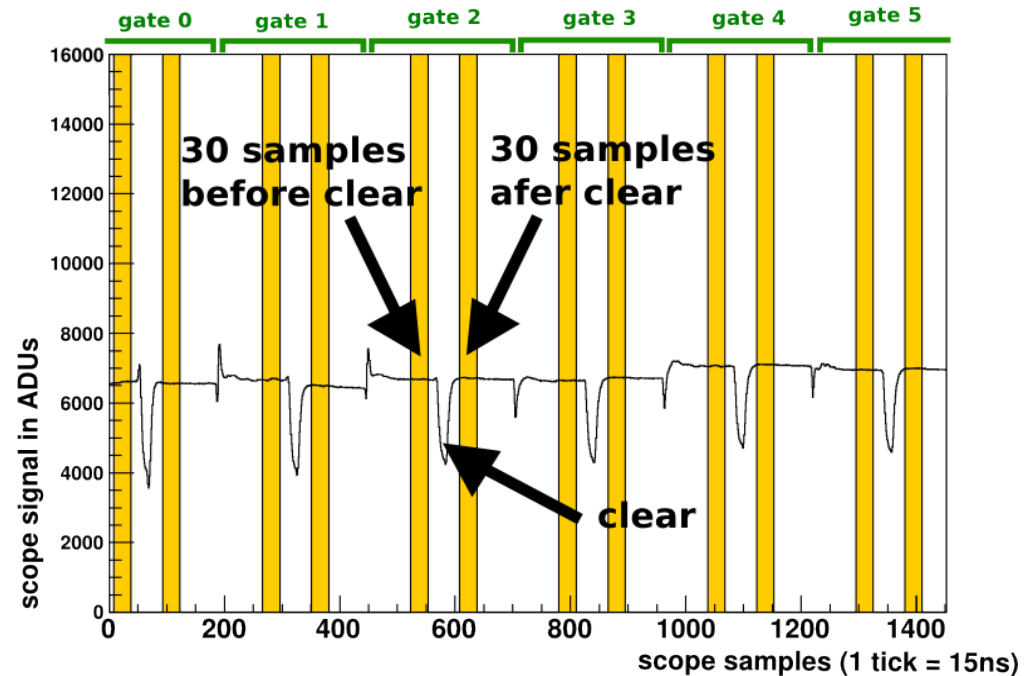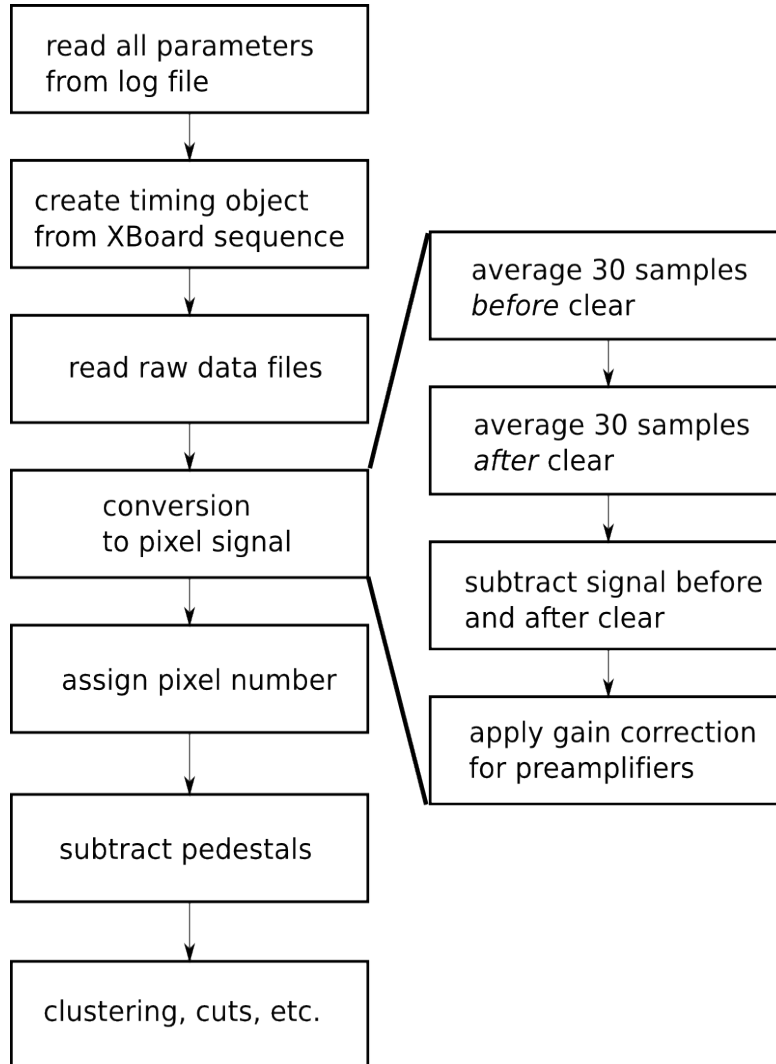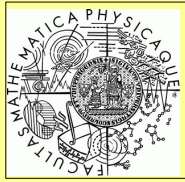- **lower noise (12 nA, ~ 19 electrons)**

PREAMPs, Switchers

XBoard Sequencer

- read all parameters from log file
- create timing object from XBoard sequence
- read raw data files
- conversion to pixel signal
  - average 30 samples *before* clear
  - average 30 samples *after* clear
  - subtract signal before and after clear
  - apply gain correction for preamplifiers
- assign pixel number
- subtract pedestals
- clustering, cuts, etc.
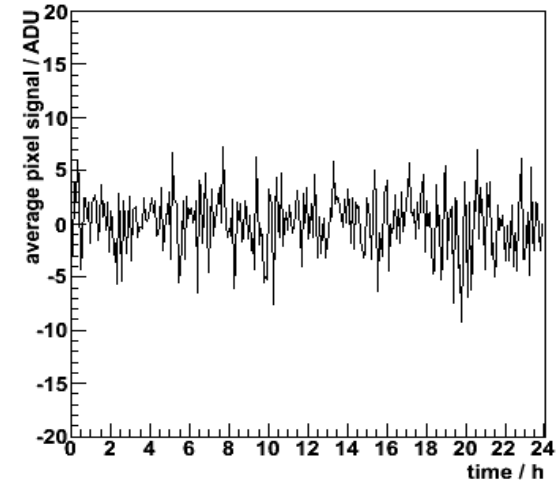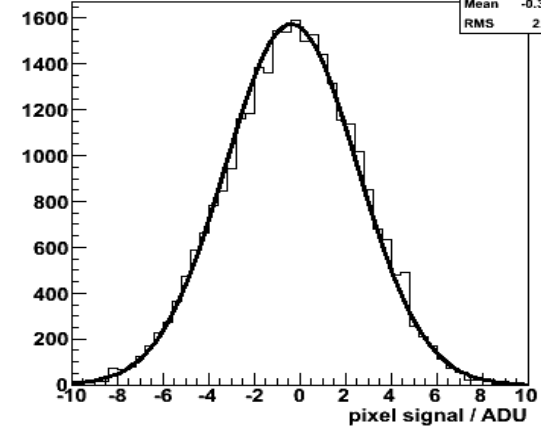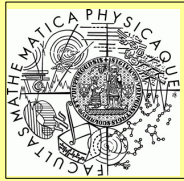
- **Measurement conditions:**

  - **black box**

  - **standard sequence**

  - **no source/laser**

- **Pixel signal =**

$$\langle U_{before\,clear} \rangle \; - \; \langle U_{after\,clear} \rangle$$

- **Signal evaluated for individual pixels
  => pixel signal constant over 24h!**

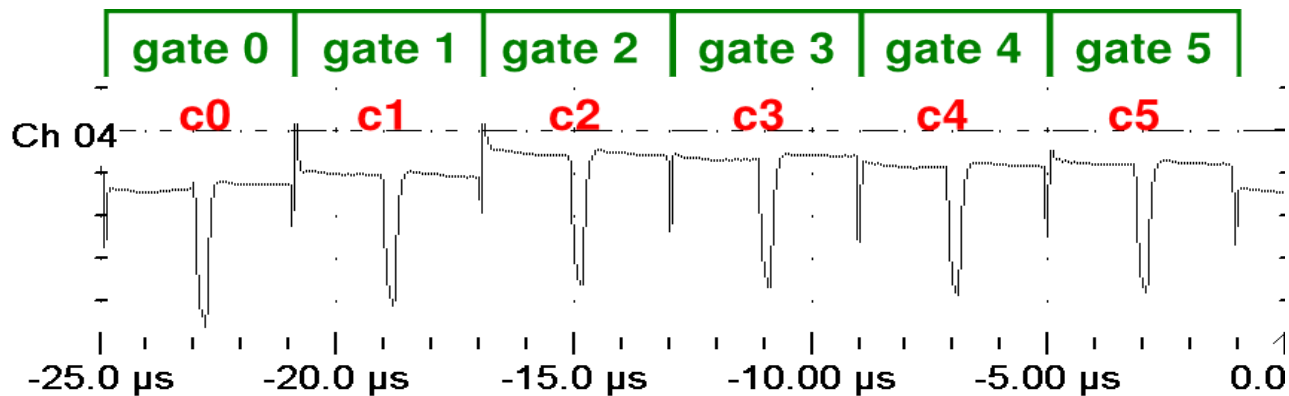- **Standard deviation is
  less than 3 ADUs = 12 nA**

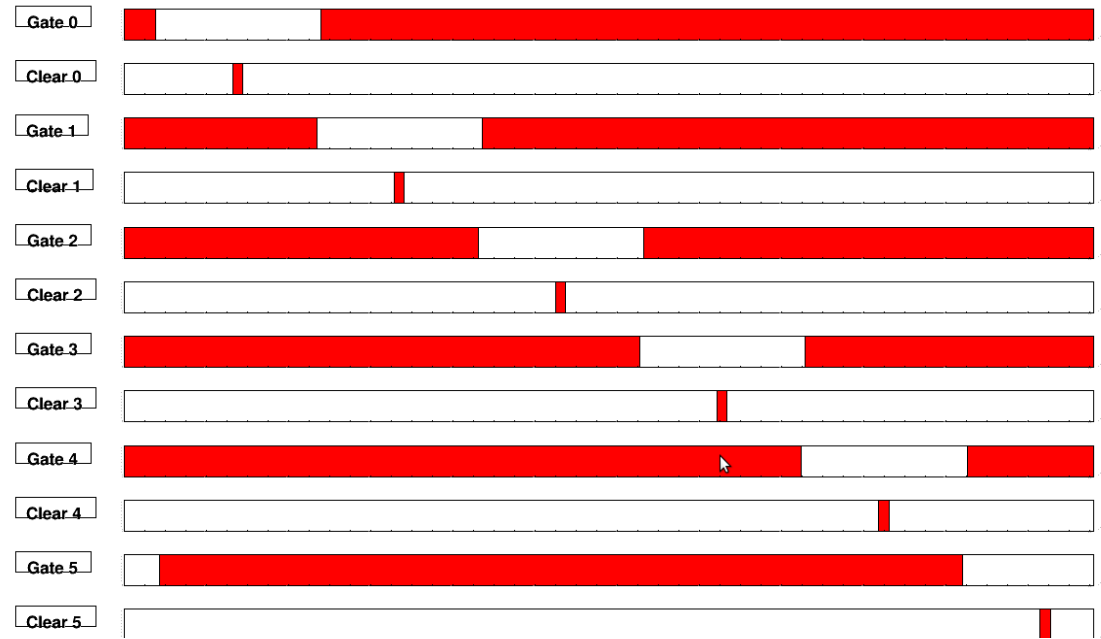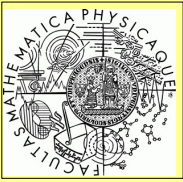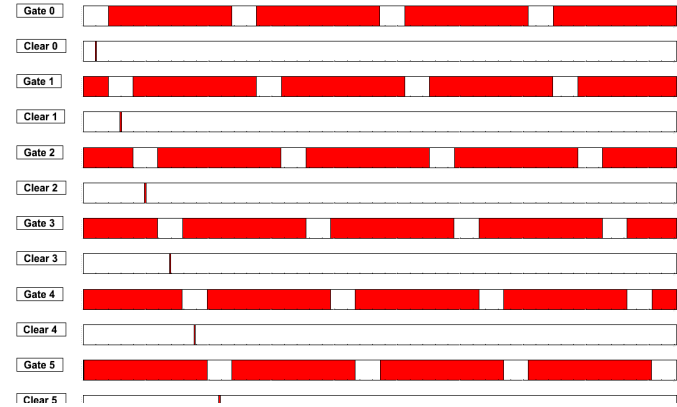Long term stability of Minimatrix system

Pixel signal distribution

h_signal	
Entries	28700
Mean	-0.3474
RMS	2.888

- **frame rate: 255 kHz**

- **4 x 1452 samples / frame**

- **clear: 255 ns**
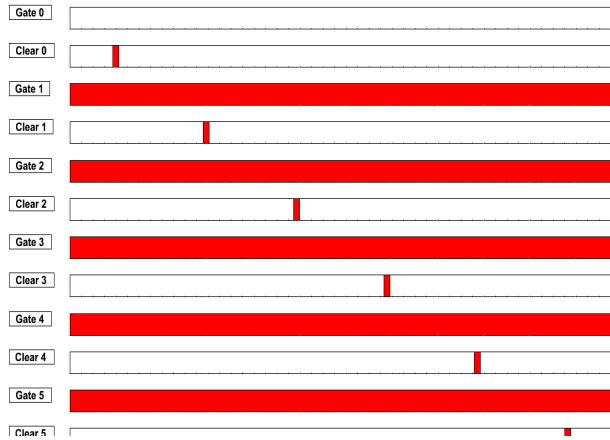
readout
of only one gate
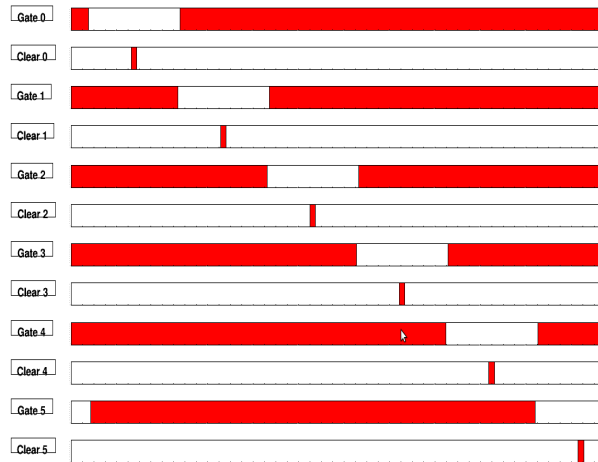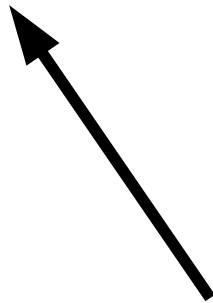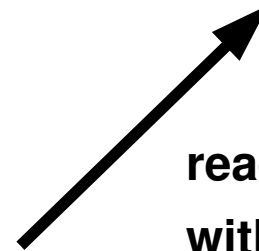
readout

without clearing

standard sequence
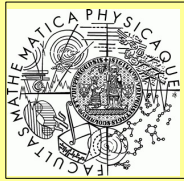
one gate open
continously

clearing of
neighbour rows
visible!

Gate 0
Clear 0
Gate 1
Clear 1
Gate 2
Clear 2
Gate 3
Clear 3
Gate 4
Clear 4
Gate 5
Clear 5

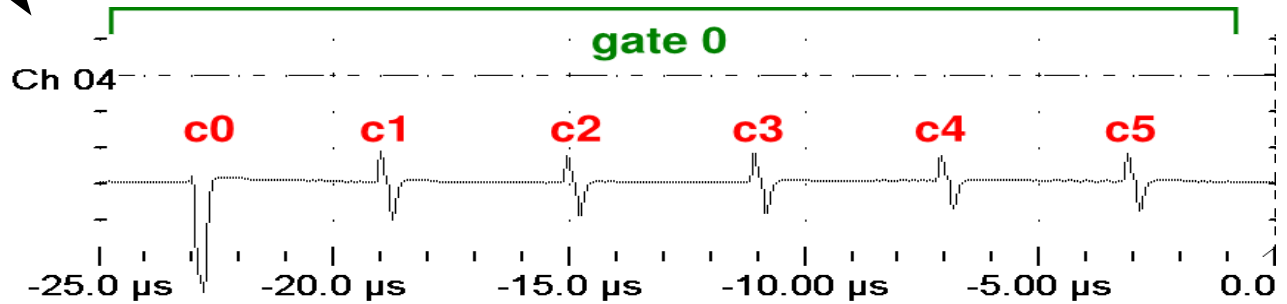gate 0

Ch 04

c0 c1 c2 c3 c4 c5

-25.0 µs   -20.0 µs   -15.0 µs   -10.00 µs   -5.00 µs   0.0
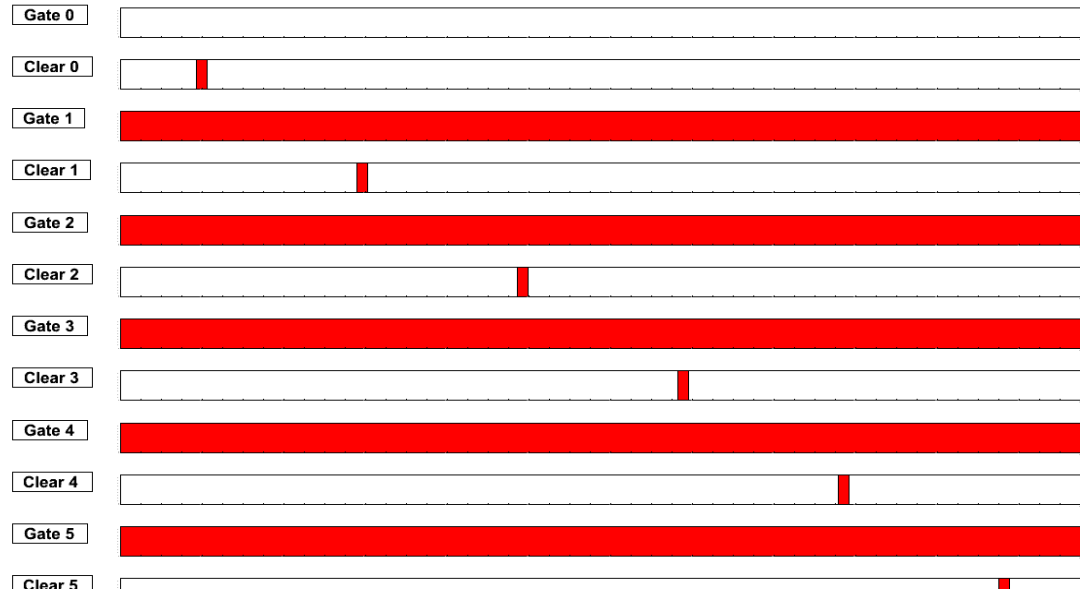
Name	Sample Rate	Input Range	DC Offset	Vert. Scale	Coup
Ch 01	65.0 MHz	4.000 V pk-pk	0 mV	1 V/div	D(
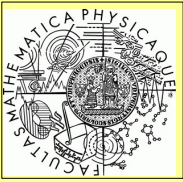
Laser scan of matrix backside

(2 columns, step size: 10 \ 2.5 um, λ: 660 nm)

2nd column   **3rd column**
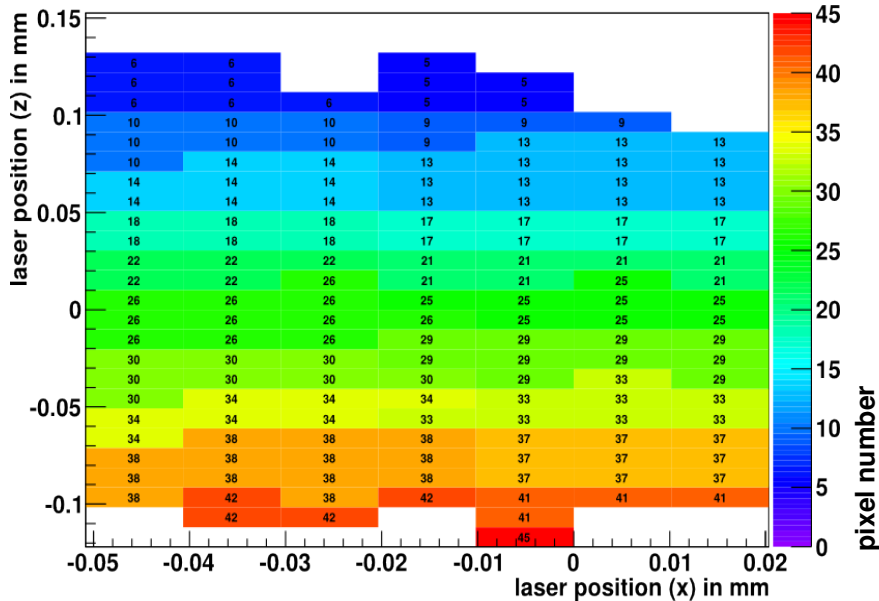
- **first pixel assignment was wrong!**
- **Laser test provides quick check of actual layout**
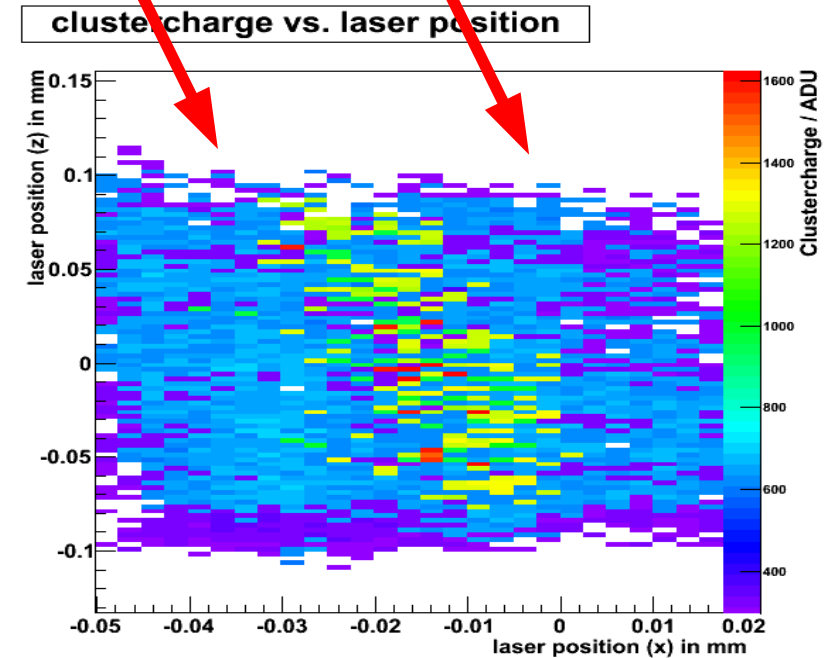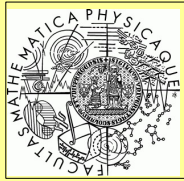
- **2 columns: clustering impossible**
- **4 columns: effective matrix size 4 x 12 => 2 x 10**
- **edge effects!**

- **24uS = 1 frame = 40kB   <=> 24h = 3.600.000.000 frames = 144 TB**

   => online event preselection necessary: 24h ~ 1GB depending on activity

- **only 2 matrix columns (4 possible with 8 channel scope card)**

   => clustering difficult

**Sr90
spectrum**

h_spectrum	
Entries	718
Mean	1251
RMS	873.6

**only 718 hits
(14000 preselected events)**
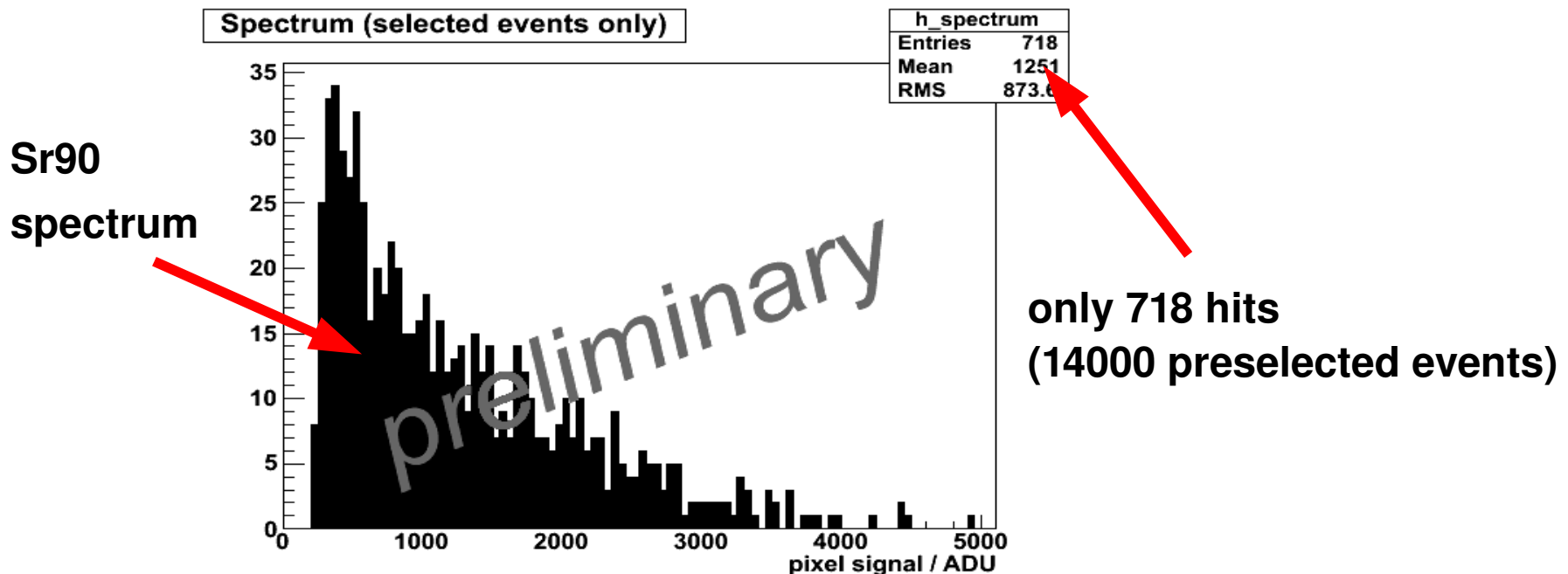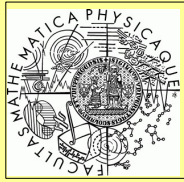
- **All standard tests possible: noise, laser, source, readout sequences**
- **Strength of the System:**
  - **full signal is aquired: 'one can see what happens inside the pixels'**
  - **flexible setting of readout sequences**
- **Drawback:**
  - **mini matrix is 'mini' (4 x 12 pixels)**
    => low statistics
    => edge effects
  - **big raw data files**

THANKS TO ZBYNEK FOR PRESENTING!

Please send any comments/questions/suggestions to:

oswald@ipnp.troja.mff.cuni.cz/ j.scheirich@gmail.com