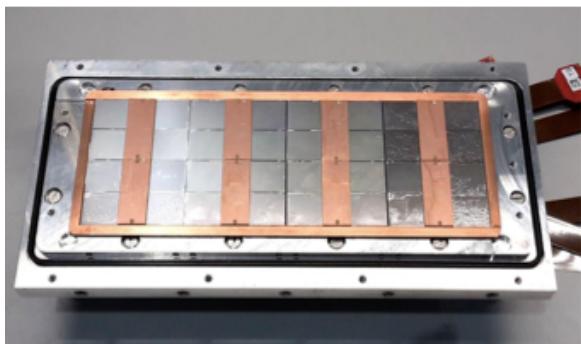


# Quad Module Guard optimization



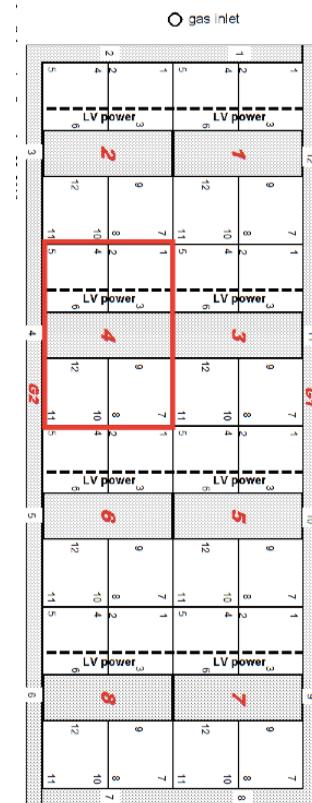
- Laser scan of one quad of the 8-quad module
- Need multiplexer to read out all quads. Not yet ready. So here 1 quad readout.
- Runs 970-984 laser makes a track over two chips; scanning the laser start position in 0.2 mm steps.
- Drift z position fixed at 6 mm from grid
- Another run 985 was taken with improved settings of the guard voltages

# QUAD Module settings

	Run 970-984 23/8/2019	Run 985 19/9/2019	Run 986 2/10/2019
Guard voltage CH2	-370 V	-386	-355
Guard Cage CH4	-360 V	-372	-372
(Guard) Wires CH5	-391? -390 V	-399	-395
Grid voltage	-340 V		
Drift voltage	-350 V / cm		
Cathode voltage	-1740 V		

New run propose  
 CH2 = -355 V  
 CH4 = -345  
 CH5 = -375

Orientation  
of quad



# QUAD Module settings

Run 986

**SET FIELD VALUES FOR QUAD**

Rgs(Ohm) 10M	Rg(Ohm) 95.5M	New CH1 (V) -340
Vgrid (V) -340	Distance Grid to guard (mm) 0.850	New CH2 (V) -355
Edrift (V/cm) -350	Drift distance to grid (mm) 40.000	New CH3 (V) -1740
Vguard perturbation (V) 15	Field resistor chain (Ohm/cm) 244M	New CH4 (V) -372
VGC perturbation (V) -11	Distance grid to guard wire (mm) 1.580	Iguard_cage (nA) 2464
New CH5 (V) -395		
Insert required values and press the "Voltages OK" button		
Vcathode source Wenzel CH1		
<b>Voltages OK</b> <b>Continue to set HVs</b>		

CH1 is Vgrid

CH2 is Vguard (central guard in the middle of the quad)

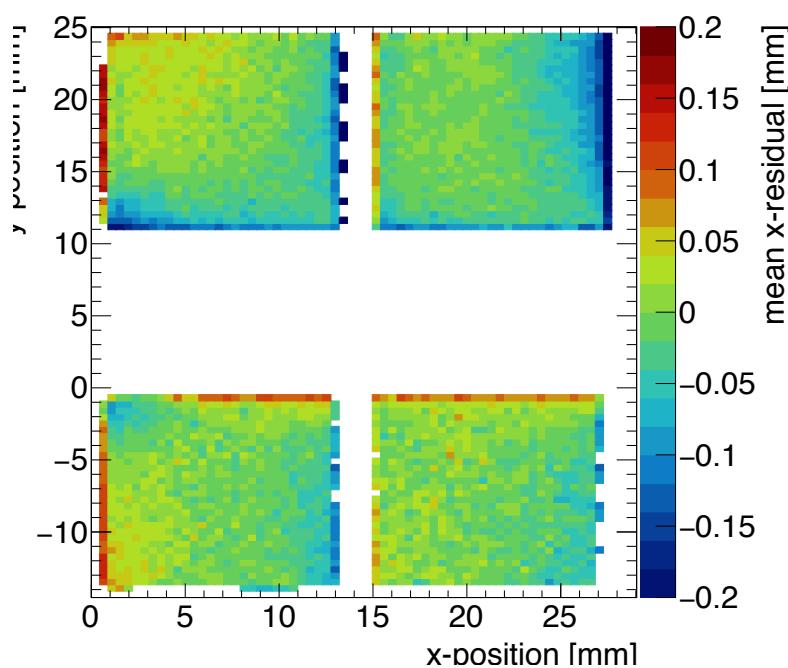
CH3 is Vcathode

CH4 is VguardCage (the guard edge surrounding the 8 quads)

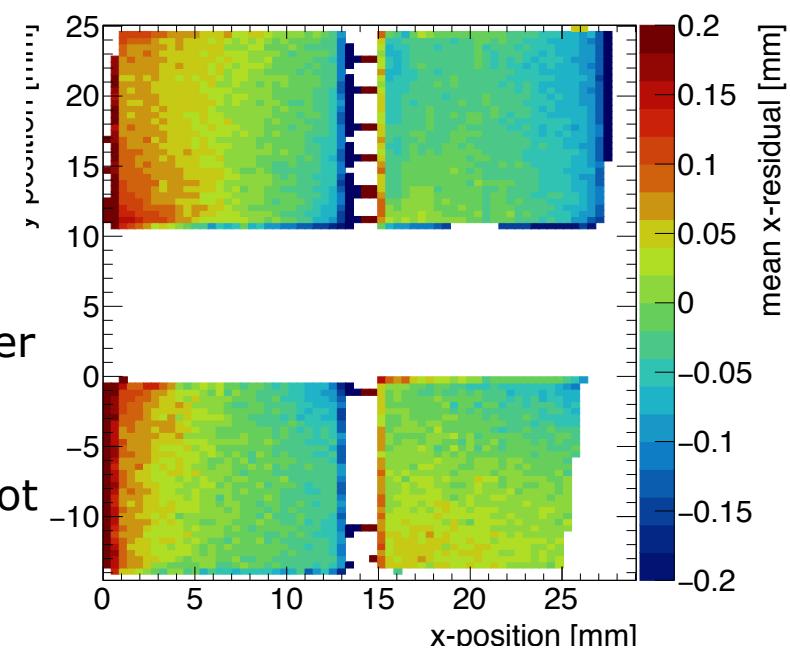
CH5 is Vwire (the wires over de gap between chips)

# QUAD deformations 2D

Runs 985



Run 986



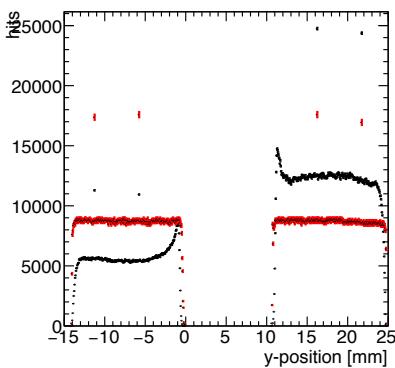
This is contrary to  
my (too naïve)  
expectations

The guard however  
is better tuned ...

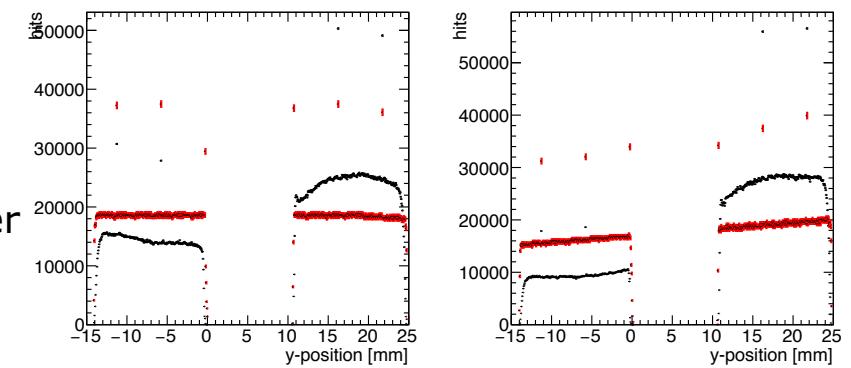
The guard cage not

# QUAD Module efficiency vs y

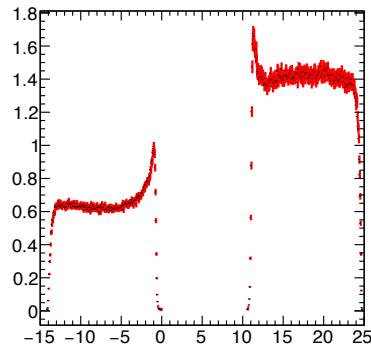
Run 985



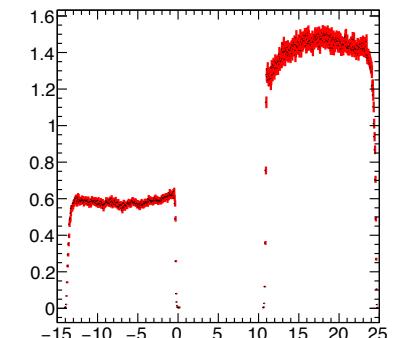
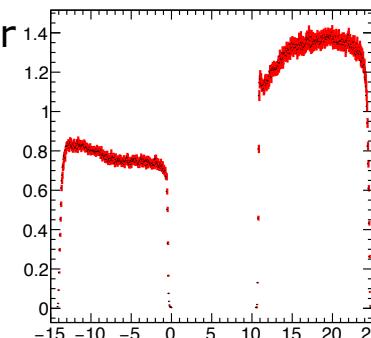
Run 986



It became better  
with the new  
Guard voltage

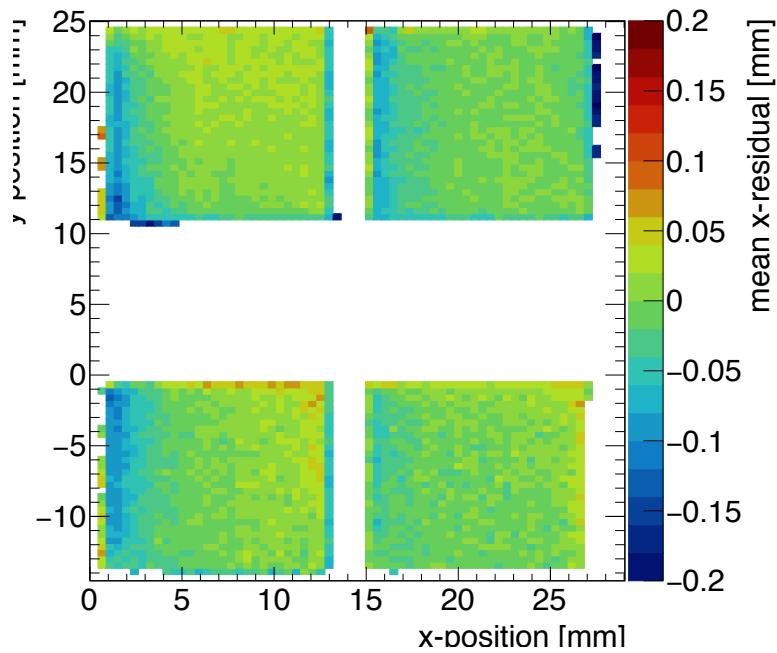


Efficiency is flatter  
and no sign of  
migration



# QUAD deformations 2D

Runs 970-984

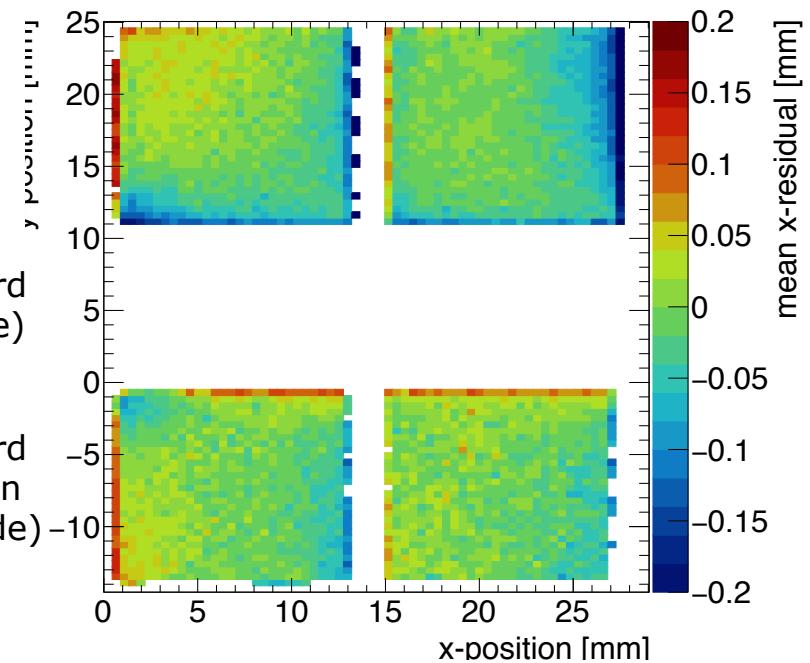


y dependence is introduced due to wrong Guard voltage; wrong direction

The retune of the Guard cage was OK (left edge)

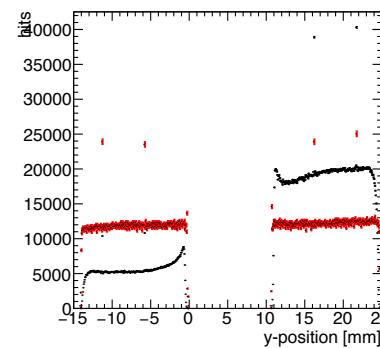
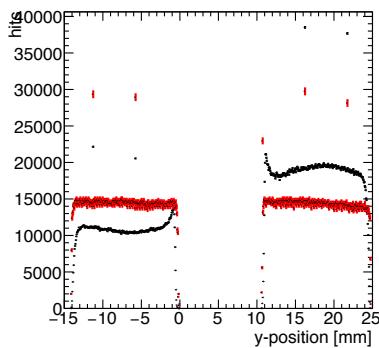
The retune of the Guard wires spoilt the chip on the right top (right side)  
The change is too big.

Run 985

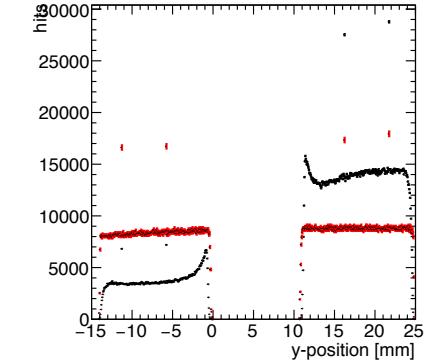
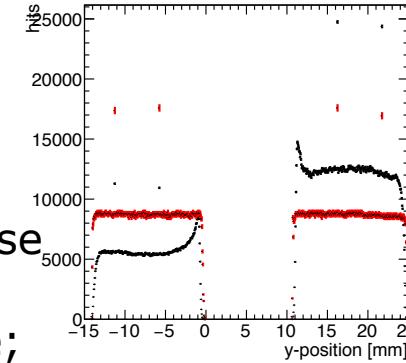


# QUAD Module efficiency vs $y$

Runs 970-984

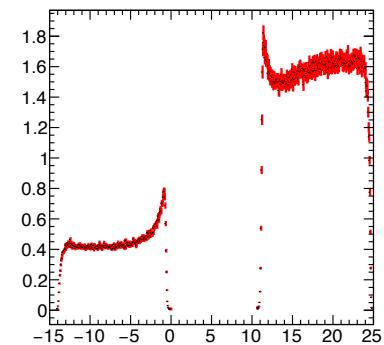
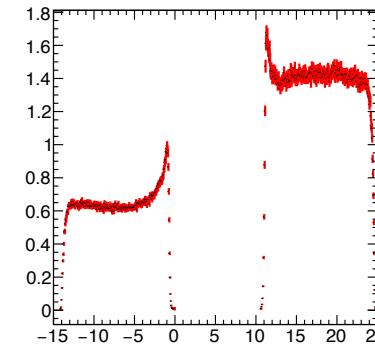


Run 985



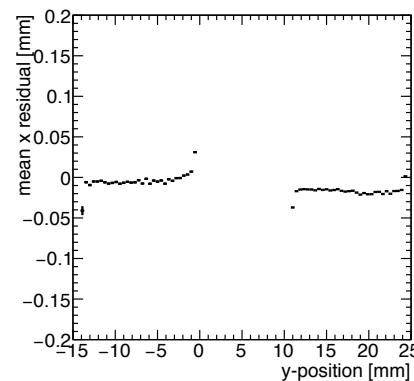
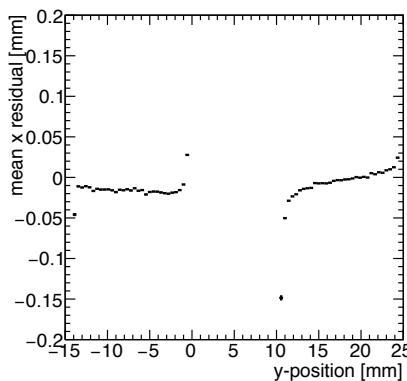
It became worse  
with the new  
Guard voltage;

wrong direction

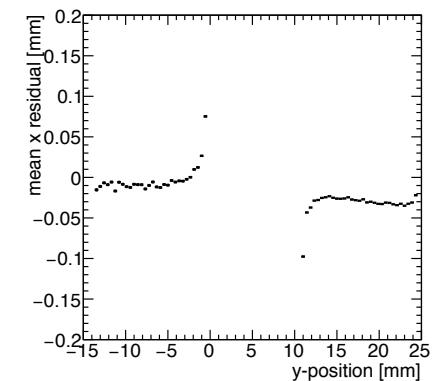
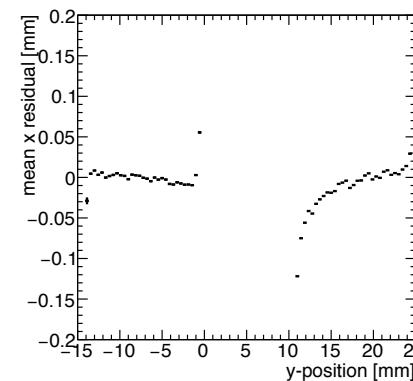


# QUAD deformations $\gamma$

Runs 970-984



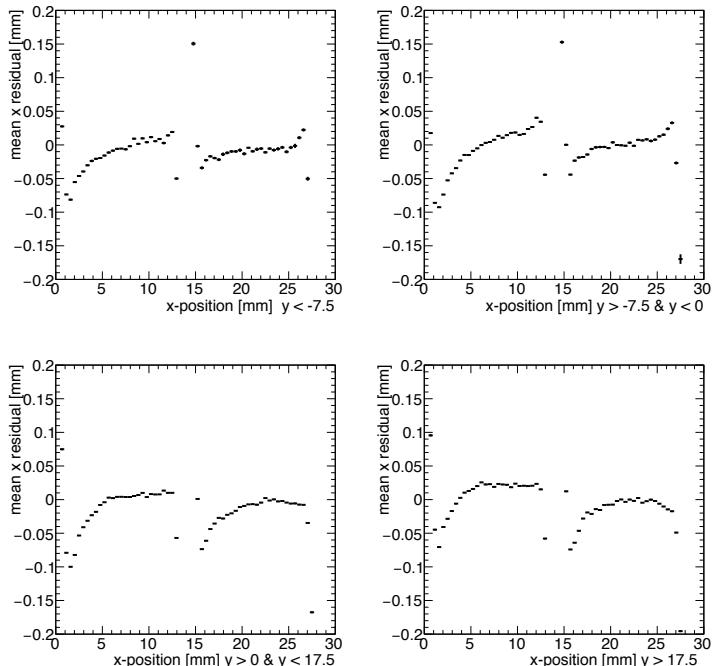
Run 985



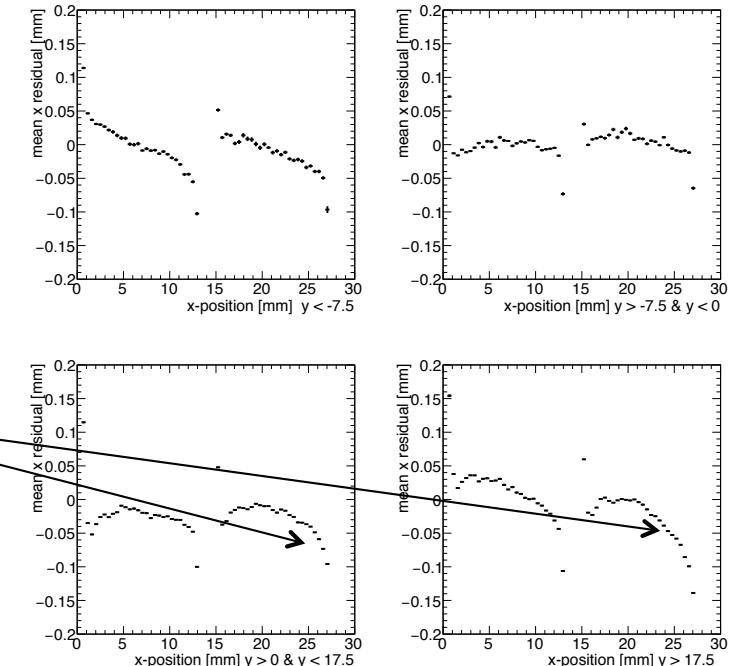
It became worse with the new Guard voltage;  
wrong direction

# QUAD deformations x

Runs 970-984



Run 985



The retune of the Guard cage was OK (left edge)

The retune of the Guard wires spoilt the chip on the right top (right side)  
The change is too big.