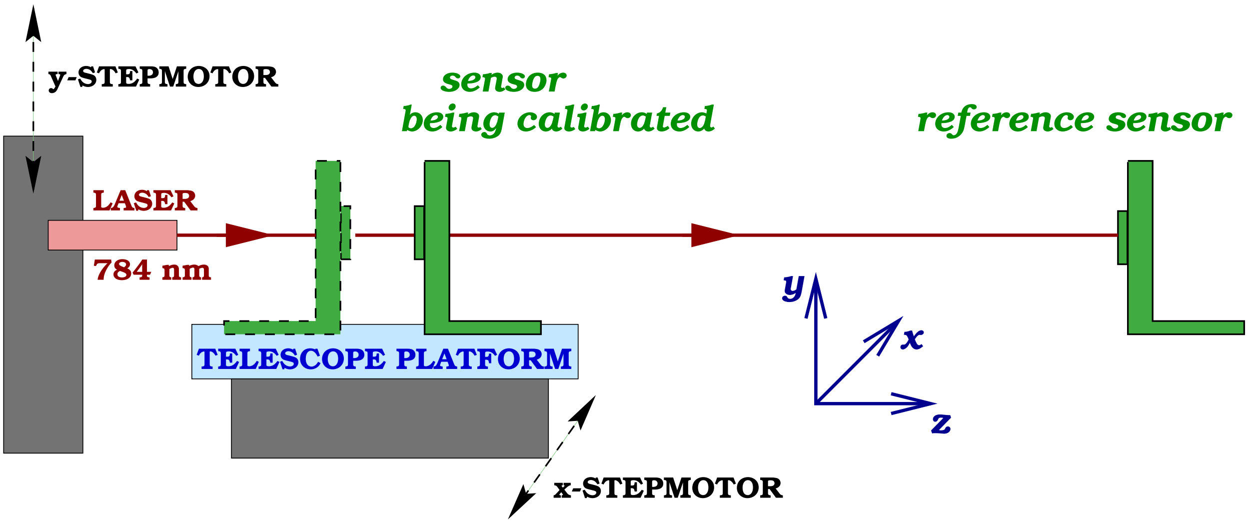
ALMY Sensors

Calibration Procedure

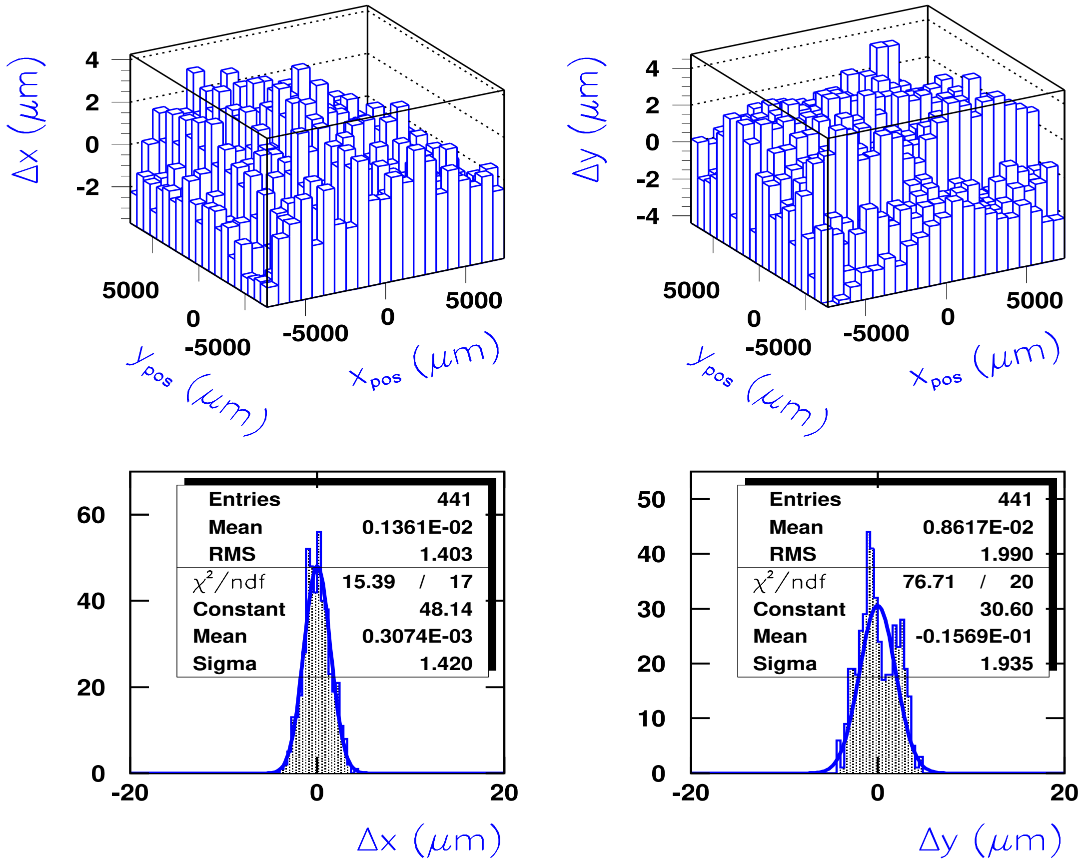


- position resolution
- refraction angle
- displacement measurement
- reflection corrections

Position Resolution

- **better than** 2 μm

sensor ns036



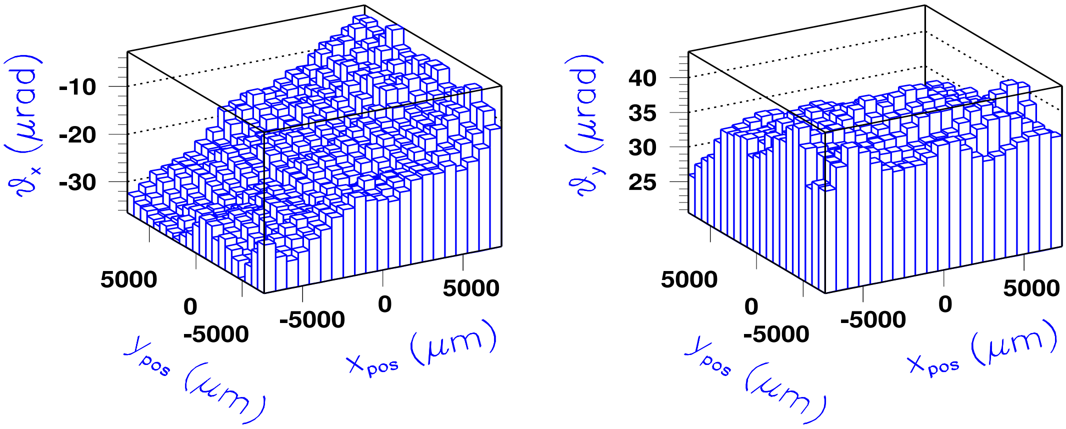
Entries	441
Mean	0.1361E-02
RMS	1.403
χ^2/ndf	15.39 / 17
Constant	48.14
Mean	0.3074E-03
Sigma	1.420

Entries	441
Mean	0.8617E-02
RMS	1.990
χ^2/ndf	76.71 / 20
Constant	30.60
Mean	-0.1569E-01
Sigma	1.935

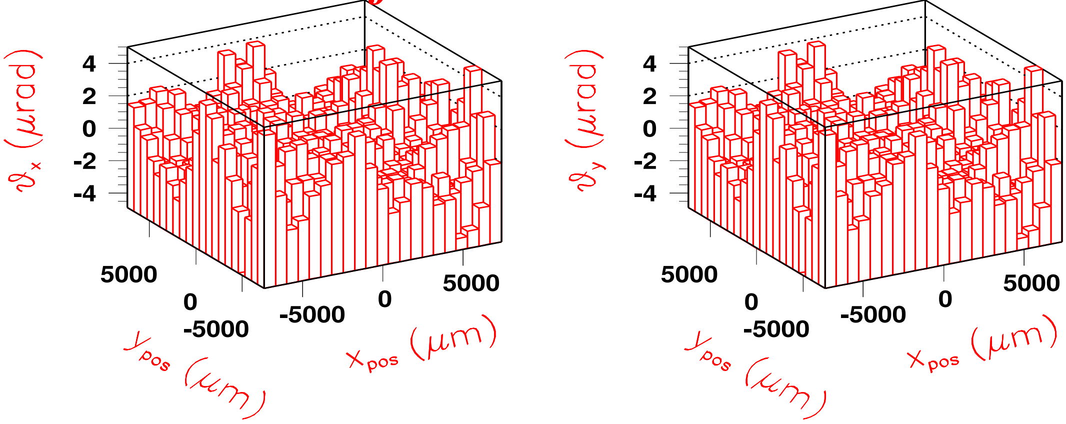
Refraction Angle

- 6-parameter function fit applied for ϑ_x and ϑ_y

sensor ns036



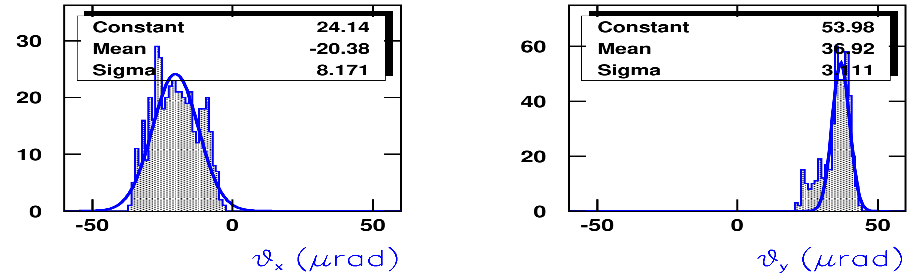
after the correction



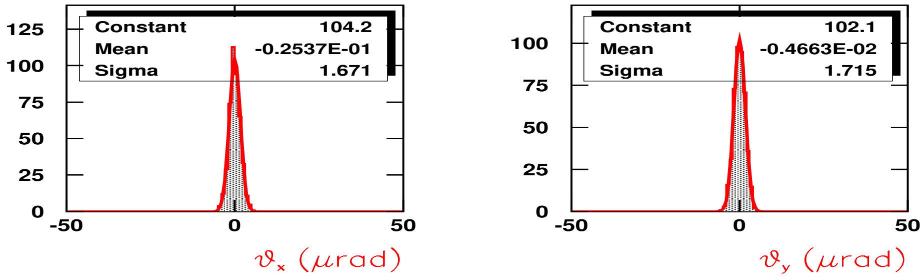
Refraction Angle

sensor	before	correction	after	correction
	$\sigma(\vartheta_x)$ [μrad]	$\sigma(\vartheta_y)$ [μrad]	$\sigma(\vartheta_x)$ [μrad]	$\sigma(\vartheta_y)$ [μrad]
ns031	4.2	10.7	2.4	4.6
ns035	10.2	8.6	2.5	5.1
ns023	6.7	8.5	2.3	2.2
ns036	8.2	3.1	1.7	1.7
ns013	5.5	3.1	2.8	2.5
ns014	2.1	3.8	1.1	1.5
ns016	4.8	8.7	2.2	2.9
ns027	4.9	4.3	4.5	3.3

sensor ns036



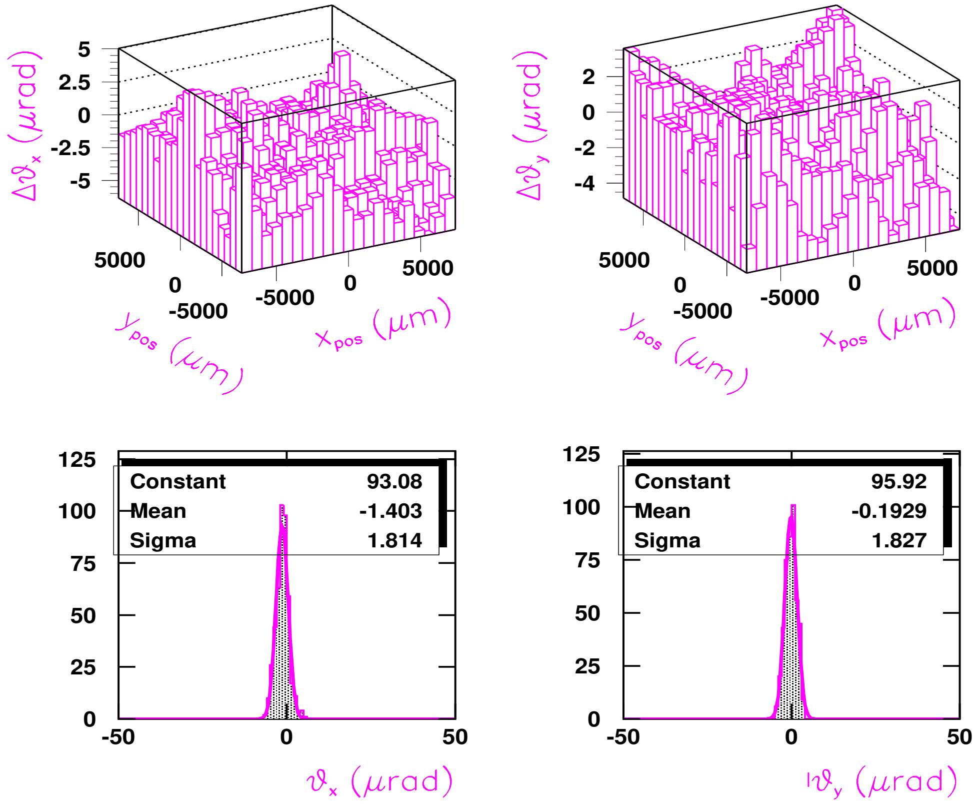
after the correction



- **refraction angle determined with precision of 2-3 μrad**

Difference in refraction for two sensor orientations

sensor ns036

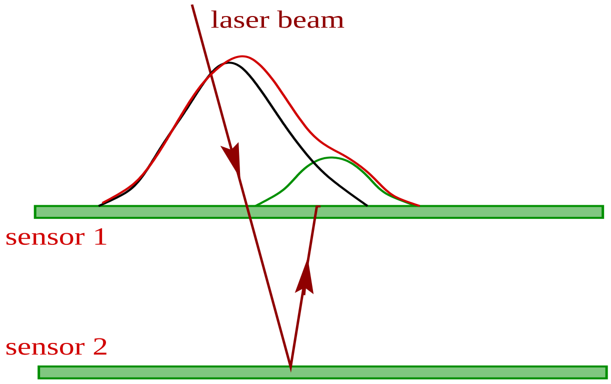


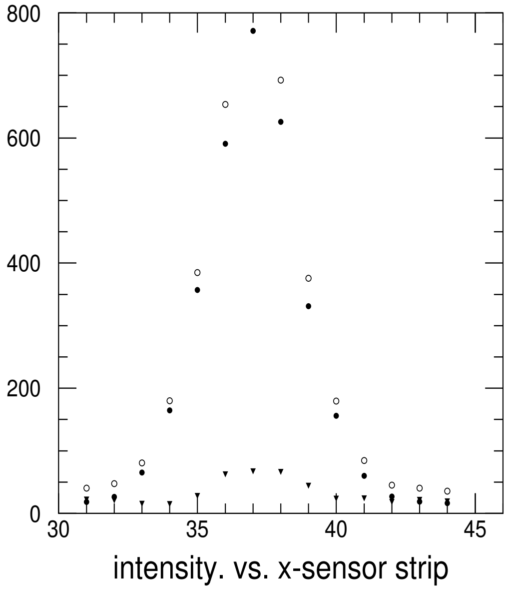
Calibration Parameters

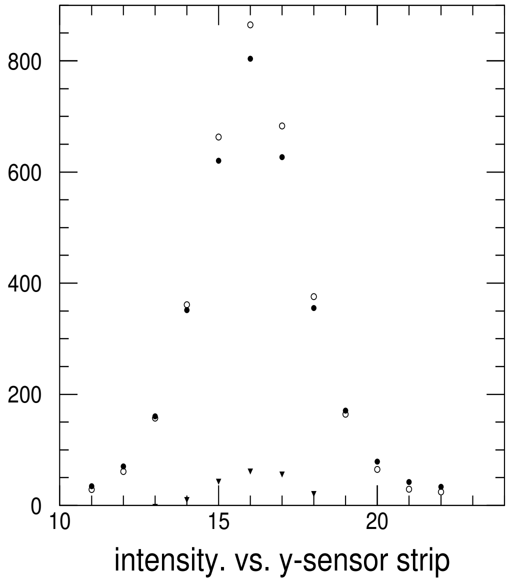
refraction angle: $\vartheta_{x,y} = p1 + p2 \bullet x + p3 \bullet y + p4 \bullet x \bullet y + p5 \bullet x^2 + p6 \bullet y^2$

sensor	ϑ_x							ϑ_y						
	displ.	p1	p2	p3	p4	p5	p6	displ.	p1	p2	p3	p4	p5	p6
ns031	0	-8.79	-0.4e-3	0.5e-3	-0.9e-7	0.4e-7	-0.2e-7	0	27.37	0.5e-3	-0.2e-2	0.8e-7	-0.6e-8	-0.3e-7
ns035	1	-6.55	-0.2e-2	0.6e-3	-0.8e-7	0.5e-7	0.3e-8	-1	-4.26	0.5e-3	-0.2e-2	0.5e-7	-0.2e-7	-0.3e-6
ns023	-9	0.61	-0.1e-2	0.4e-3	-0.2e-8	0.5e-7	-0.1e-7	9	-10.28	0.3e-3	0.2e-2	-0.5e-7	0.7e-8	-0.3e-7
ns036	4	-20.56	-0.2e-2	0.2e-3	-0.6e-7	0.7e-8	-0.9e-7	-13	38.14	0.1e-3	-0.9e-3	0.7e-8	-0.2e-7	-0.1e-6
ns013	10	-15.84	-0.8e-3	-0.2e-3	0.1e-7	0.2e-8	0.4e-8	-20	-24.89	-0.6e-4	-0.4e-3	0.4e-7	0.2e-7	-0.2e-7
ns014	15	5.57	-0.4e-3	-0.2e-3	-0.2e-7	0.2e-7	0.6e-7	-14	3.16	-0.2e-3	-0.8e-3	0.6e-7	0.9e-8	-0.7e-7

Reflection Corrections





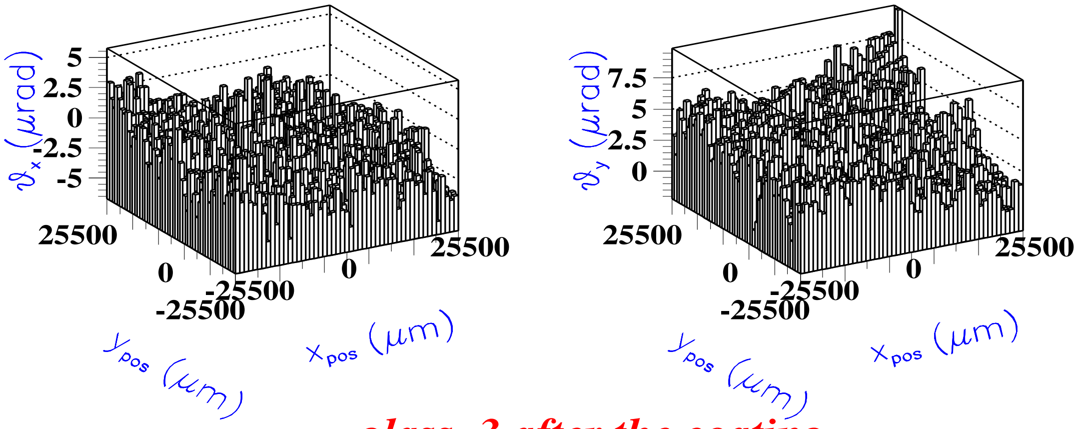


- **implemented into the read-out software, applied online**

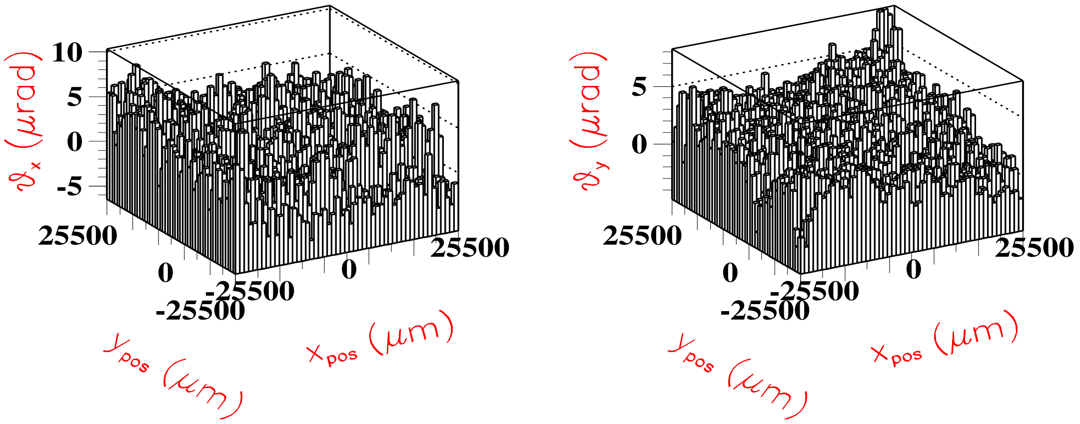
The New Glass Substrate

Scan of a 10 cm diameter glass wafer:

glass_3 before the coating



glass_3 after the coating



The New Glass Substrate

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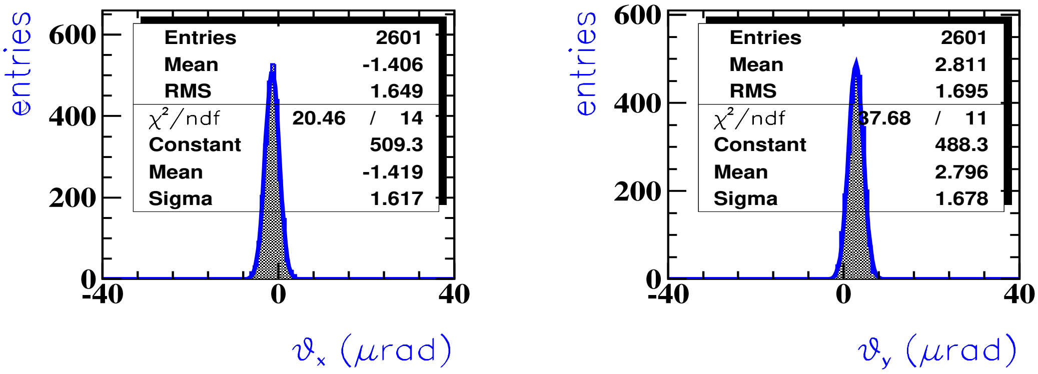
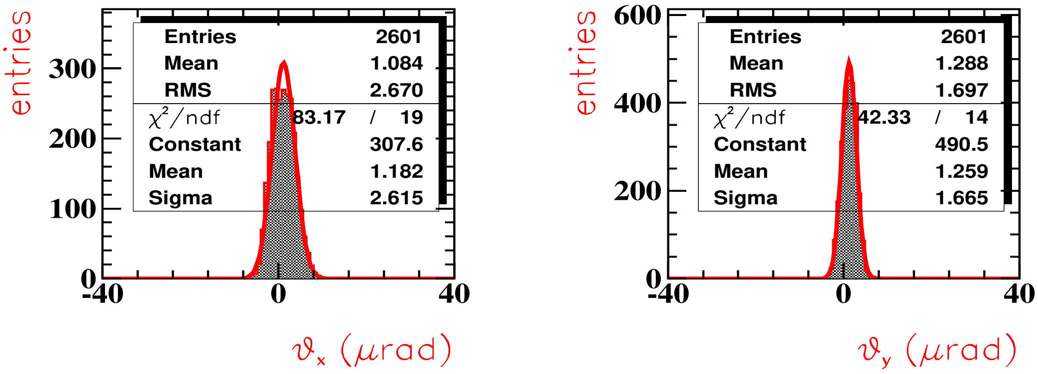
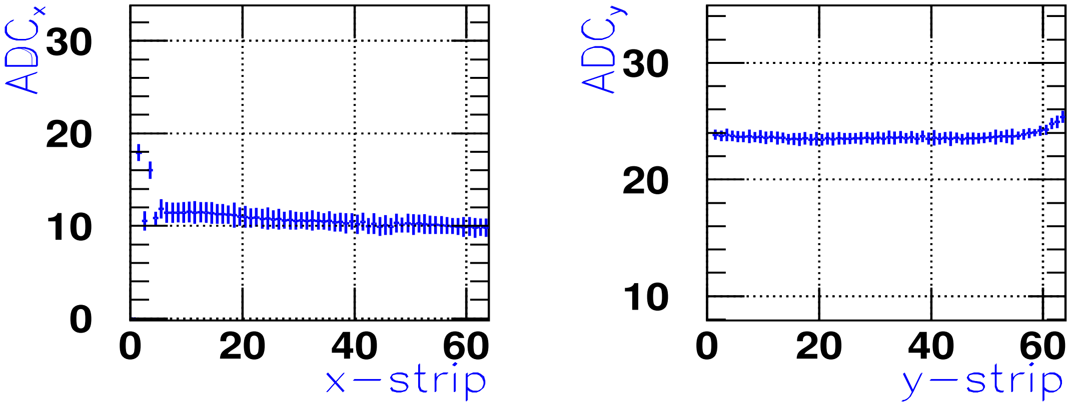


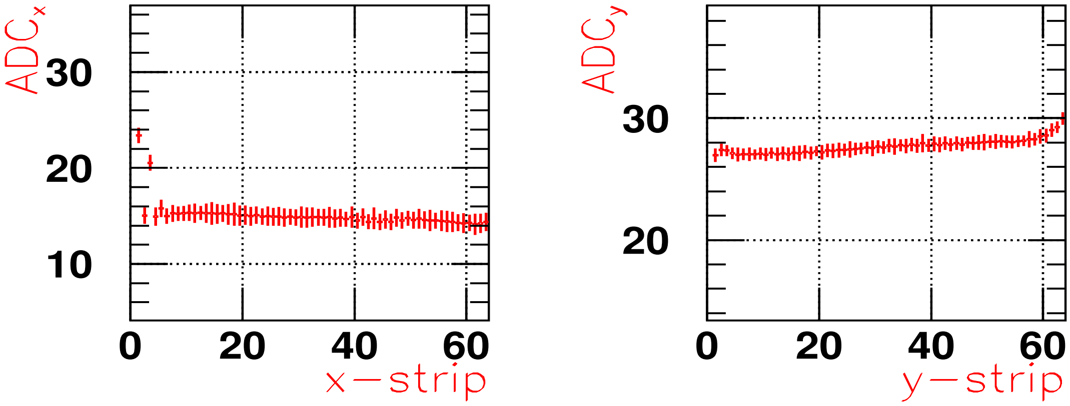
glass_3 after the coating



- no calibration needed anymore !

Influence of the Light on Sensor Performance


ns012: background, lights off


ns012: background, lights on

Influence of the Light on Sensor Performance