Measurement of the optical properties of the OpTIC focussing light guides

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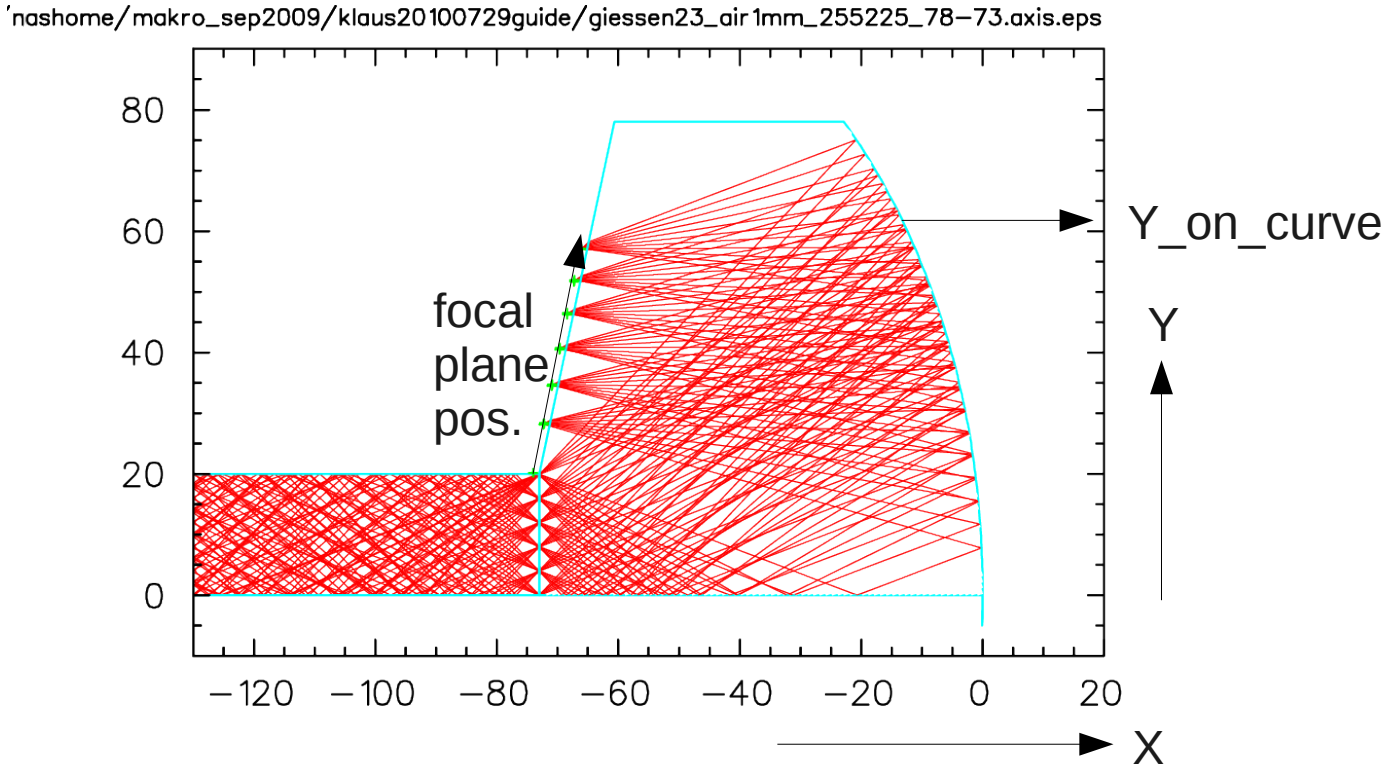
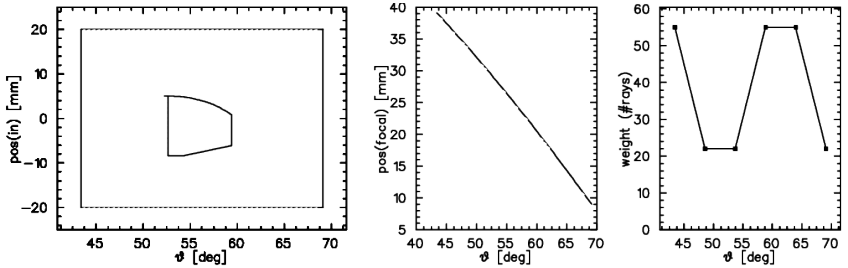
at GSI

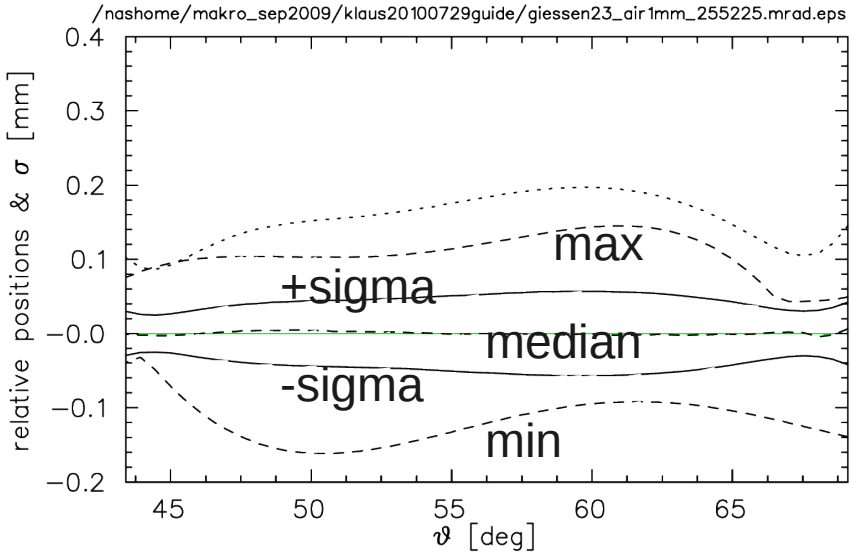
Focussing Light Guides – (old) Specs

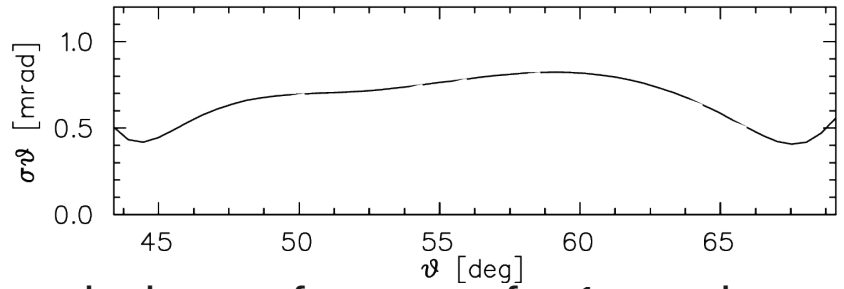


- imaging 25 degrees onto 32mm focal plane length
- foreseen for Philips dSiPM sensors, cooled (~253K)
- 1mm insulating gap between FLG block and sensor

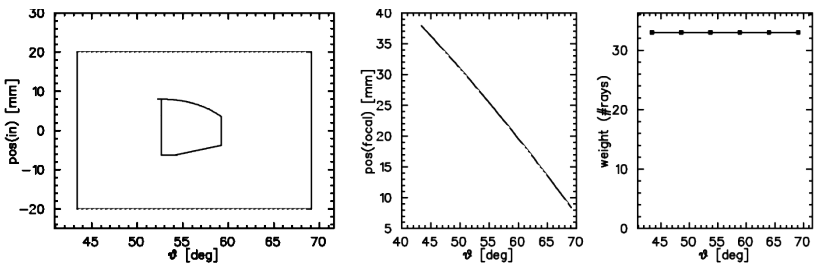
FLG performance sheet

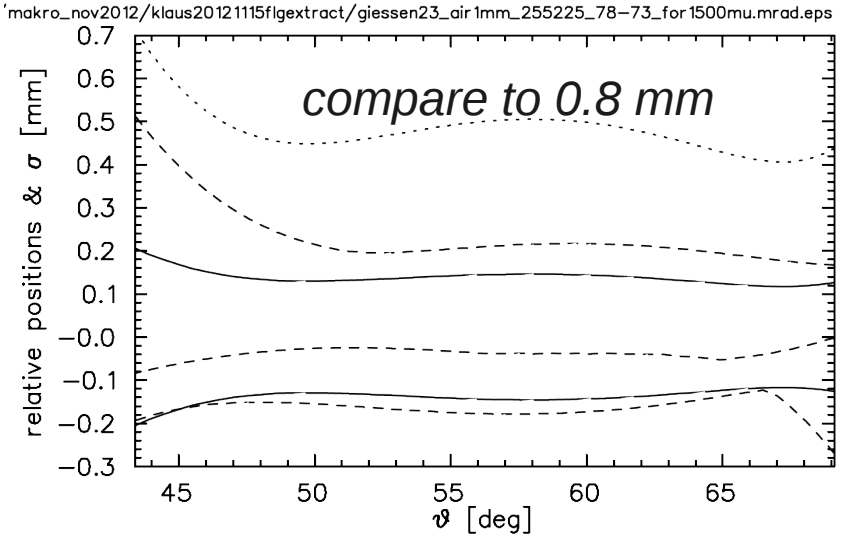


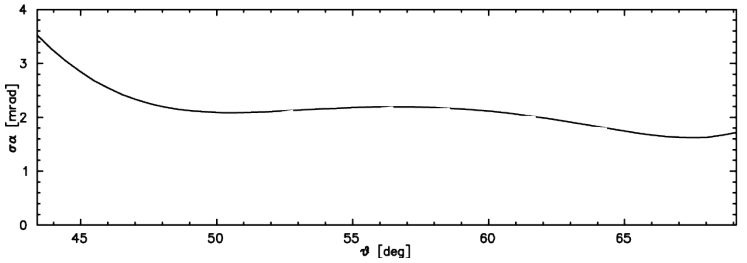




design performance for 1mm air gap

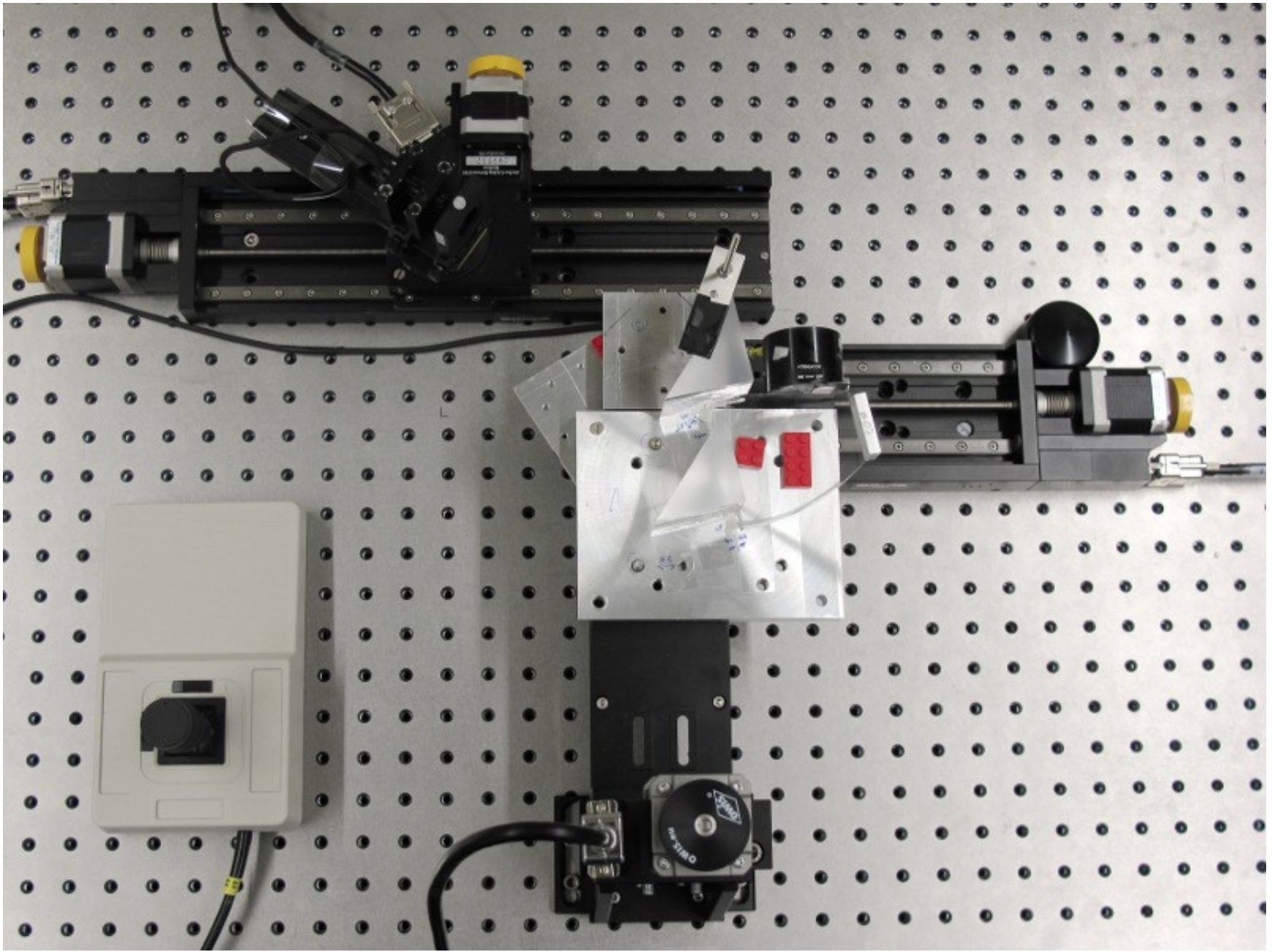




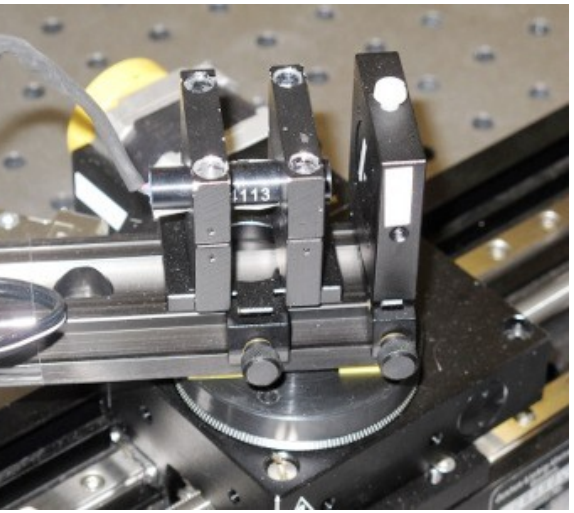


used together with H10515B100 PMT

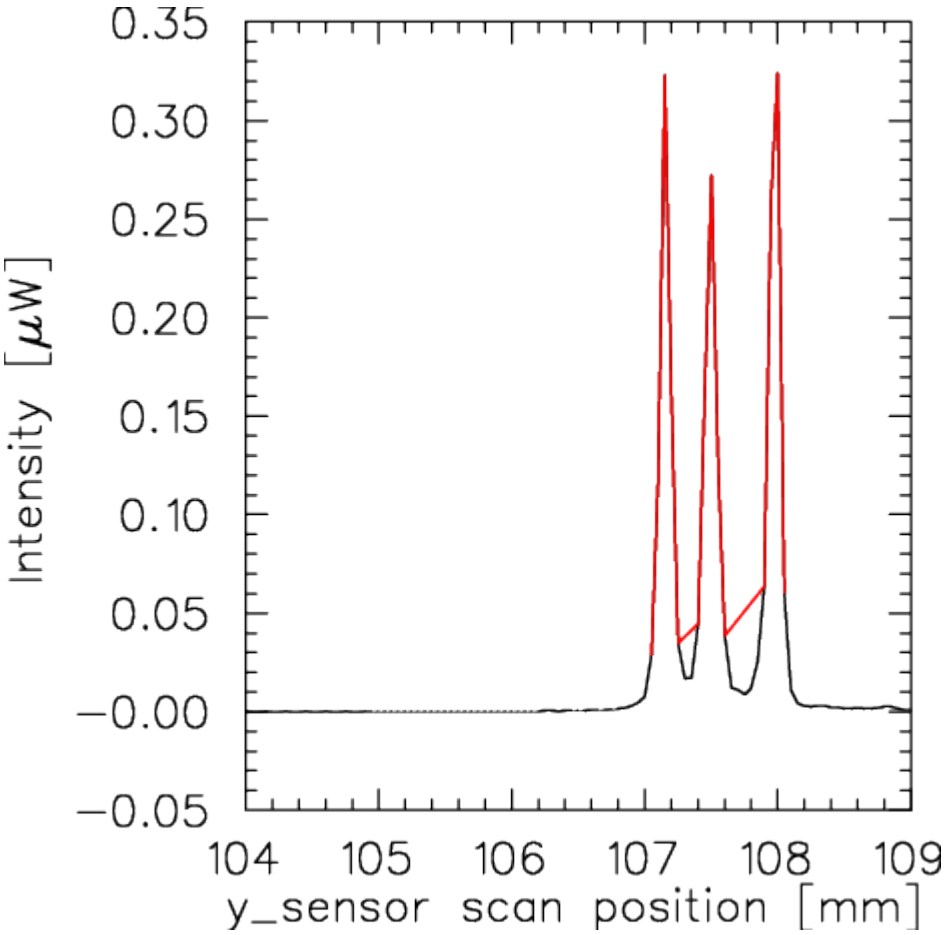
Experimental setup 1



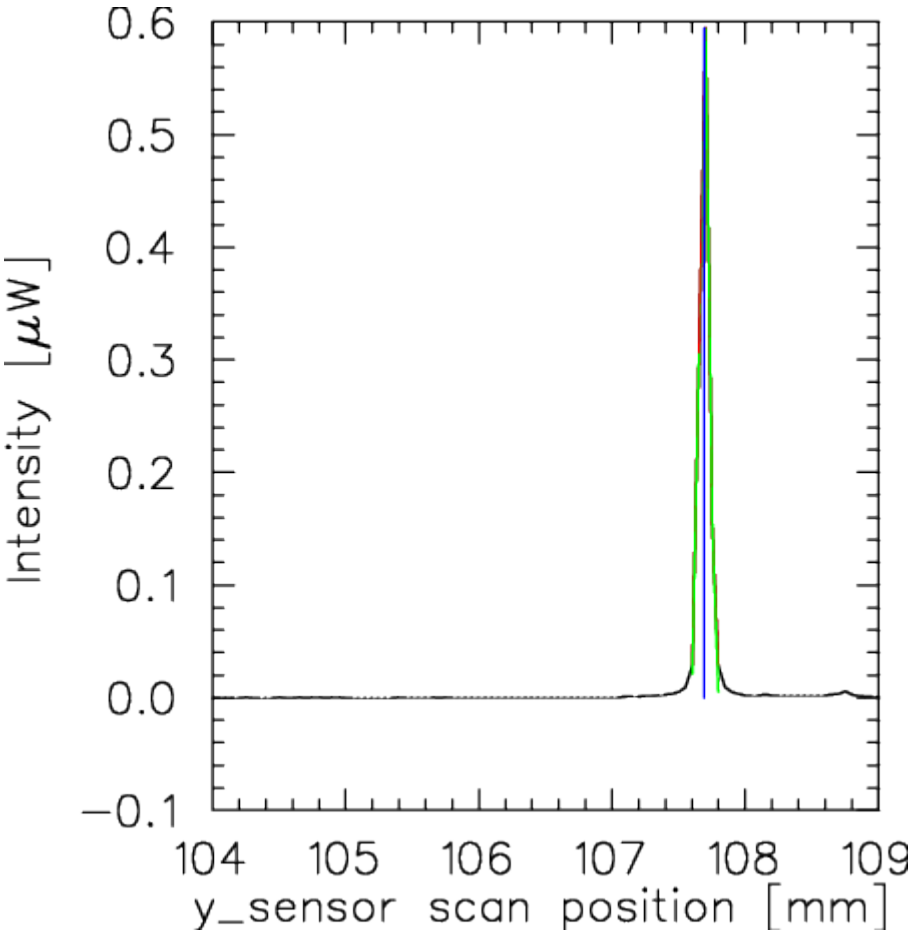
Experimental setup 2



Raw scanning results

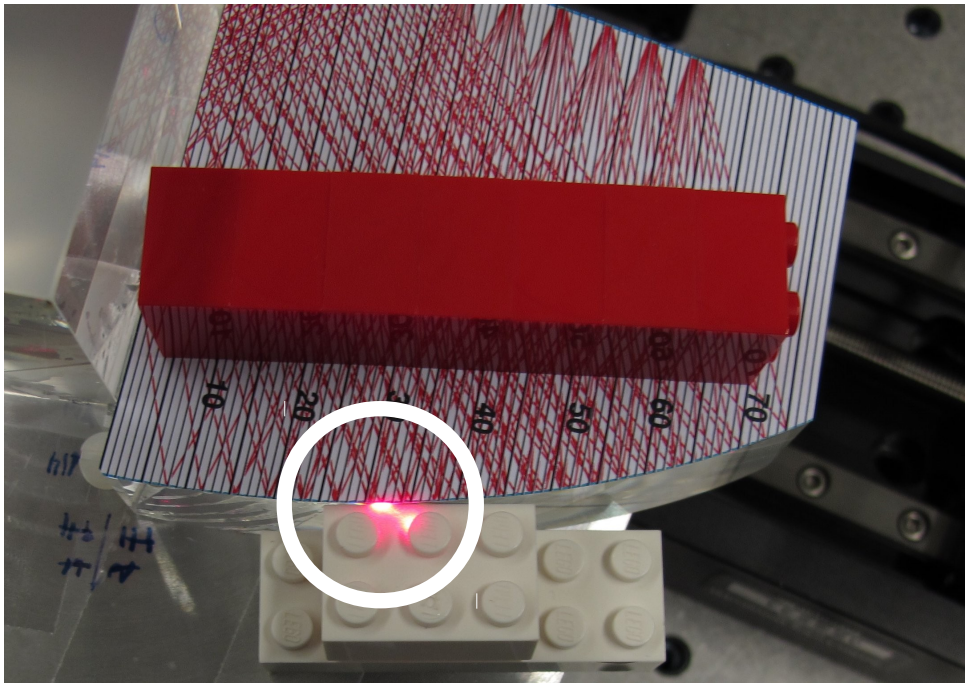


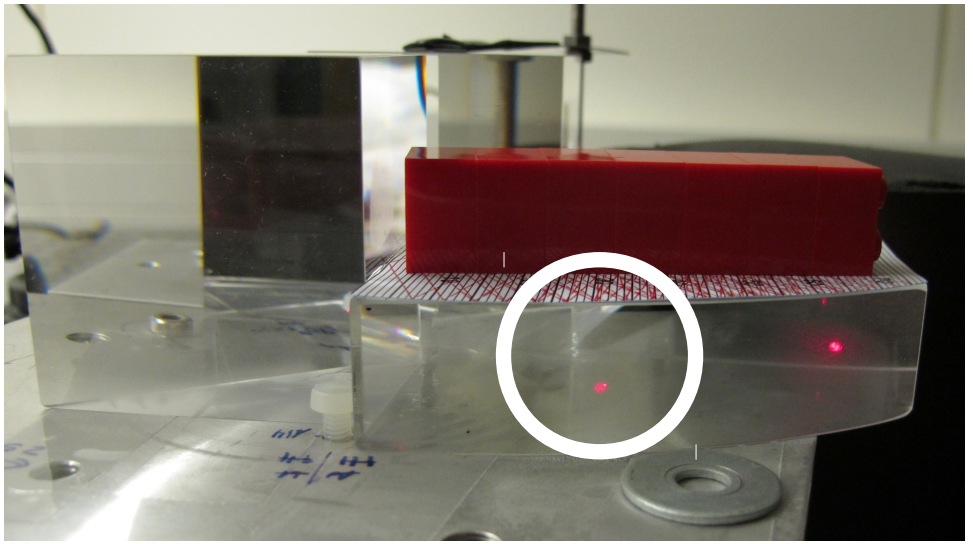
laser beam entering at FLG bevel

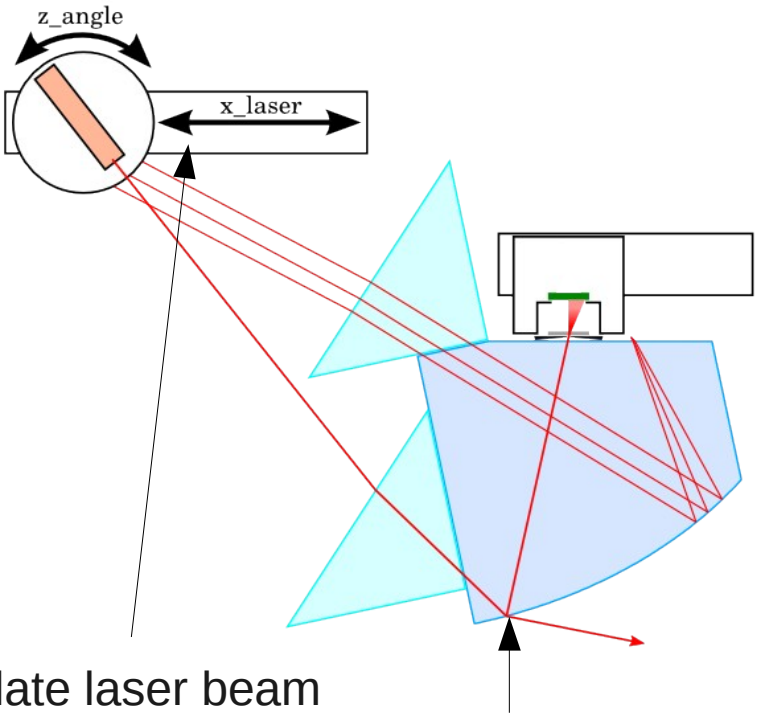


Gaussian fit to intensity curve
center of gravity position

Calibration example



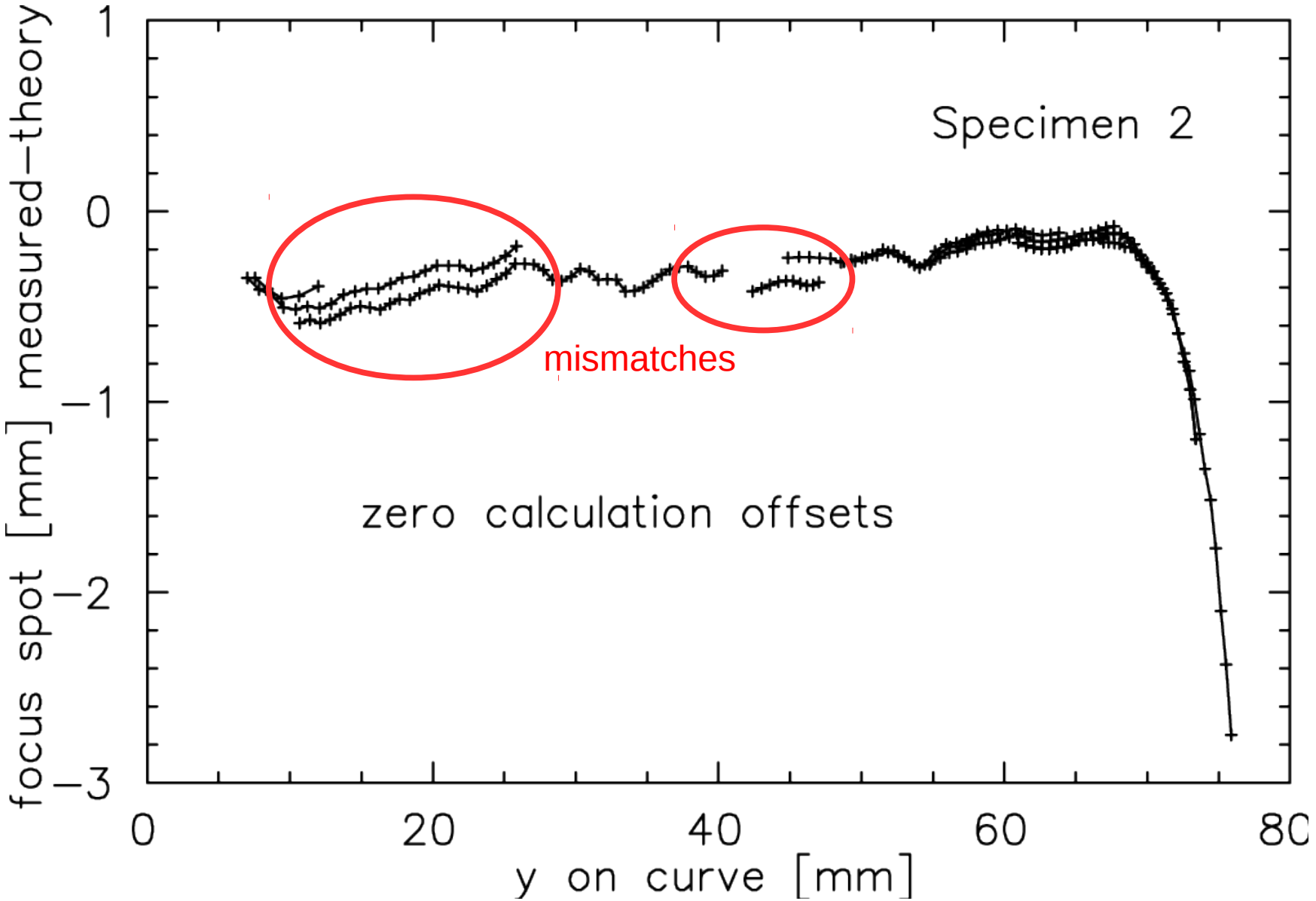




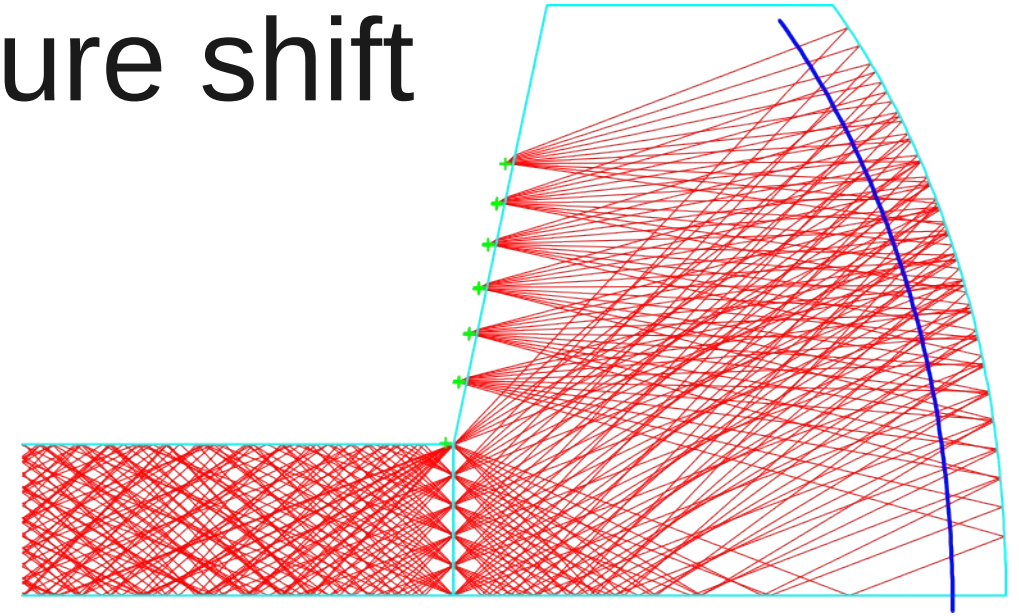
relate laser beam
coordinates with position on curvature

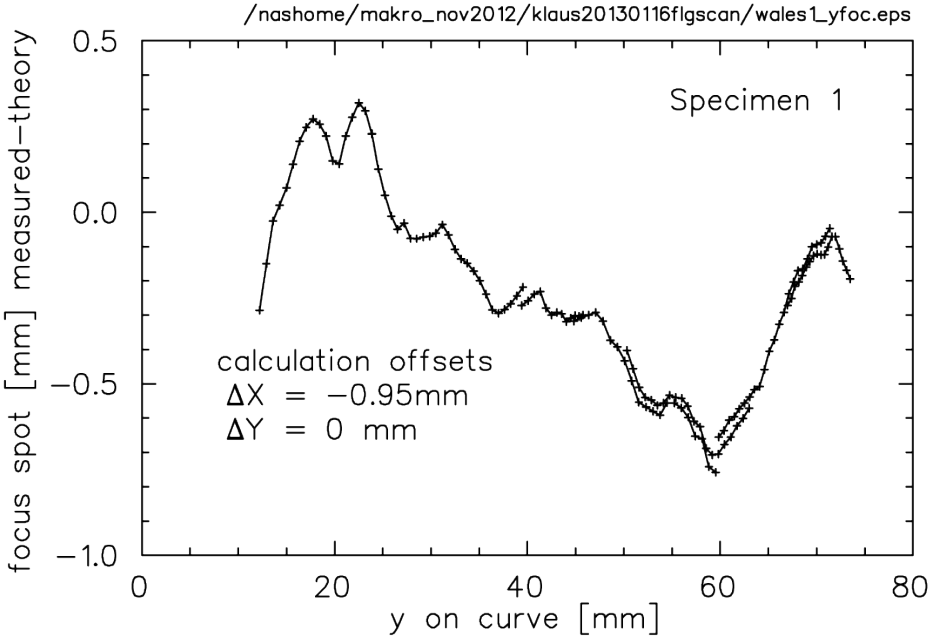
two different methods
for visualising laser spot

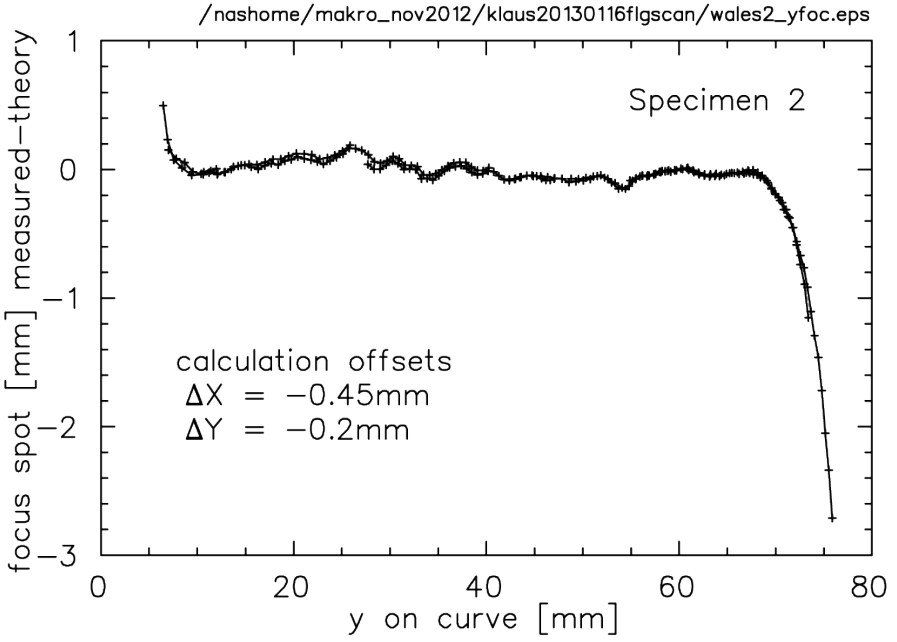
Raw result

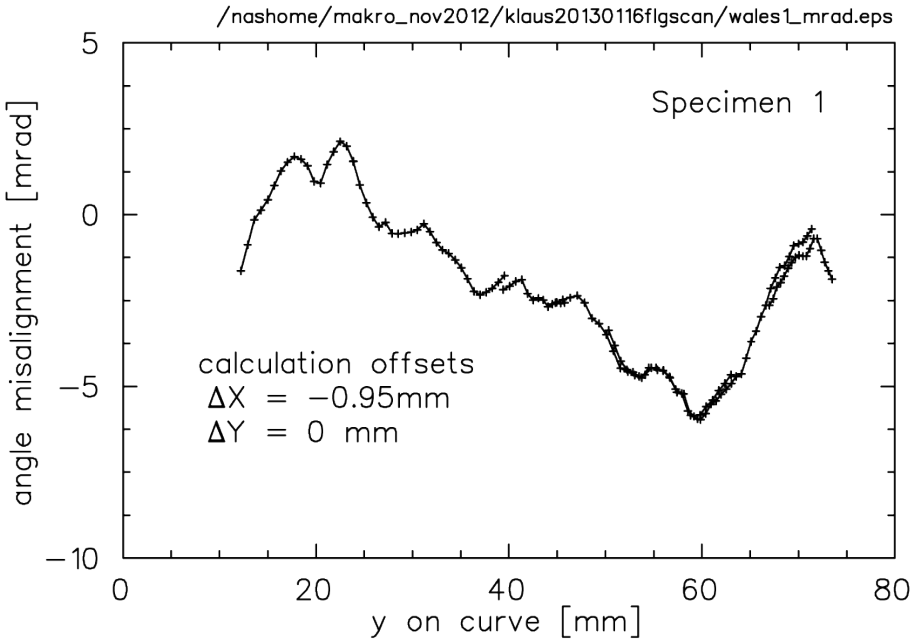

Specimen 2
mismatches
zero calculation offsets
focus spot [mm] measured−theory
y on curve [mm]
1
0
−1
−2
−3
0
20
40
60
80

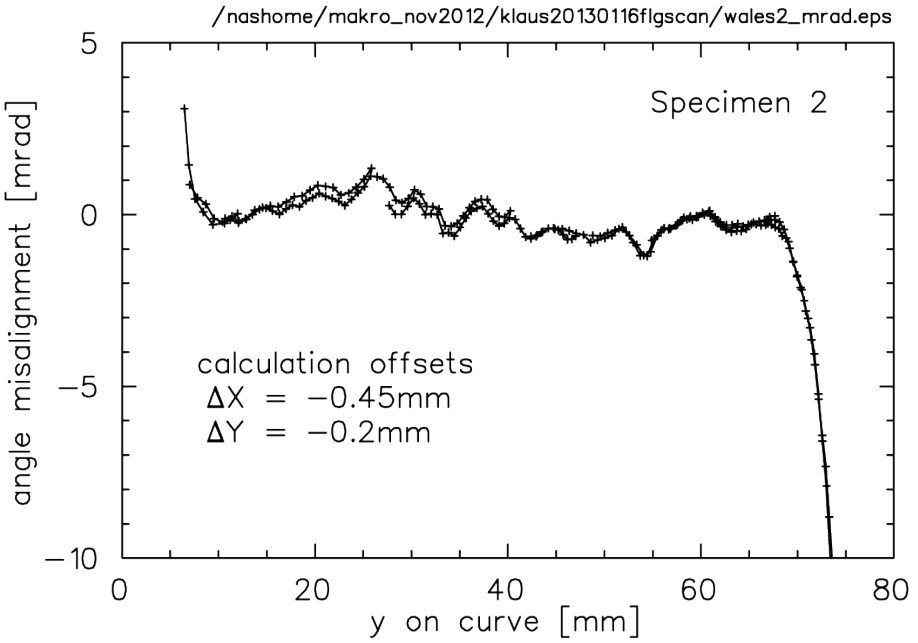
Curvature shift

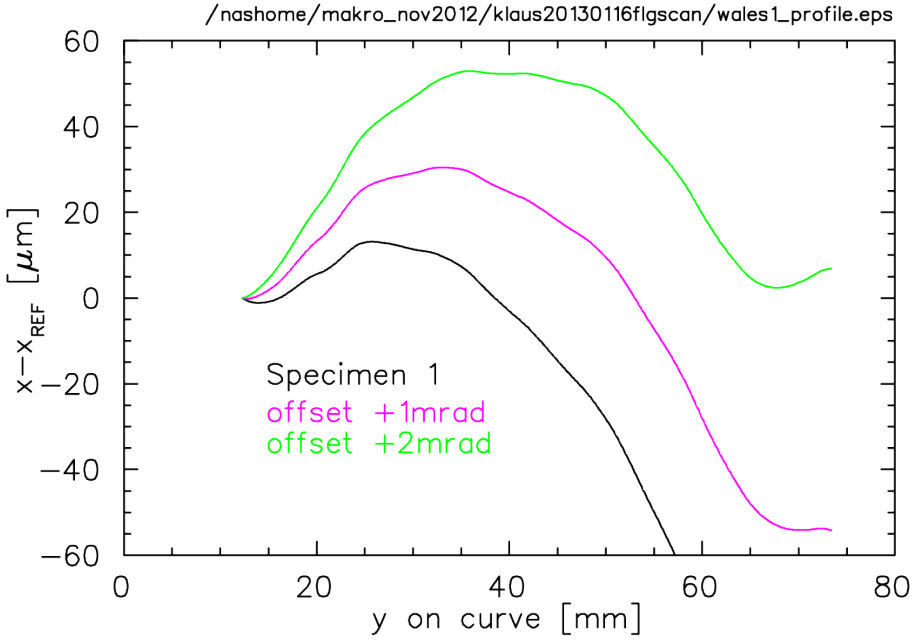


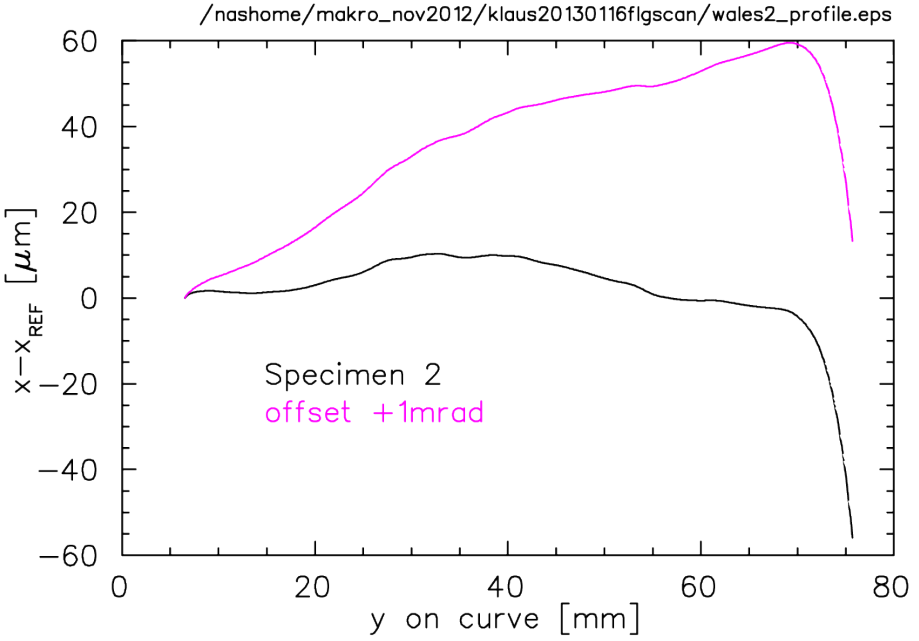





/nashome/makro_nov2012/klaus20130116flgscan/wales1_mrad.eps
Specimen 1
calculation offsets
ΔX = −0.95mm
ΔY = 0 mm
angle misalignment [mrad]
y on curve [mm]
5
0
−5
−10
0
20
40
60
80


/nashome/makro_nov2012/klaus20130116flgscan/wales2_mrad.eps
Specimen 2
calculation offsets
ΔX = −0.45mm
ΔY = −0.2mm
angle misalignment [mrad]
y on curve [mm]
5
0
−5
−10
0
20
40
60
80


/nashome/makro_nov2012/klaus20130116flgscan/wales1_profile.eps
Specimen 1
offset +1mrad
offset +2mrad
x−x_REF [μm]
y on curve [mm]
60
40
20
0
−20
−40
−60
0
20
40
60
80


/nashome/makro_nov2012/klaus20130116flgscan/wales2_profile.eps
Specimen 2
offset +1mrad
x−x_REF [μm]
y on curve [mm]
60
40
20
0
−20
−40
−60
0
20
40
60
80

Conclusion on FLG pieces from OpTIC

- two sample pieces from OpTIC
- Specimen 2 fulfills the original specifications in the centre zone 10mm-70mm, falloff outside
- Specimen 1 is non-conformant, but for the currently intended use with MaMPTs about matches the pixel width w=0.8mm of Hamamatsu H10515B100 tube

ATTENUATOR
ON
OFF