PAUL SCHERRER INSTITUT

PSI

Wir schaffen Wissen – heute für morgen

Paul Scherrer Institut

Tobias Panzner,J.Stahn and U.Filges

Report from PSI

Neutron Optic Projects at PSI

high intensity reflectometer : SELENE (J. Stahn, T. Panzner)

adaptive optic : prototype I and II (M. Schneider, U. Filges, T. Panzner)

multichannel lenses : parabolic lens system for Boa (T. Panzner)

new beamline to test neutron optics : BOA (U. Filges, T. Panzner)

Status SELENE

first prototype was build and tested at AMOR :

detailed results can be found on http://arxiv.org/abs/1102.2747v1

scheme of SELENE

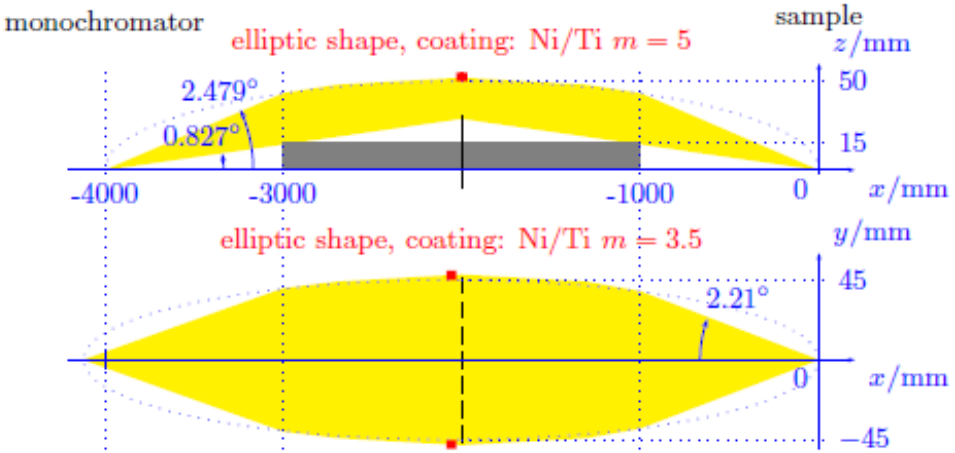
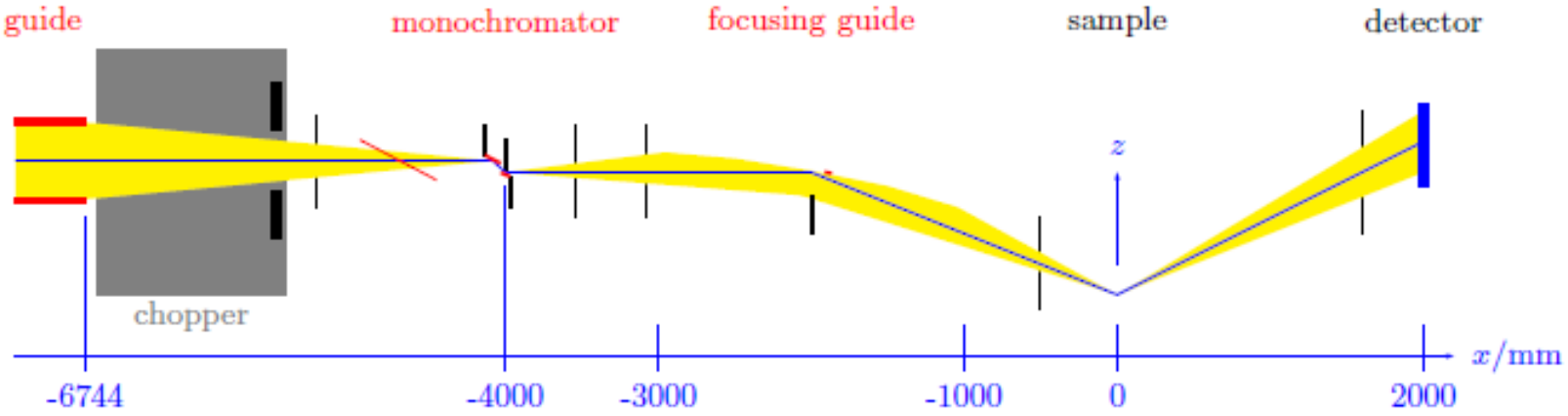


photo of the real devise

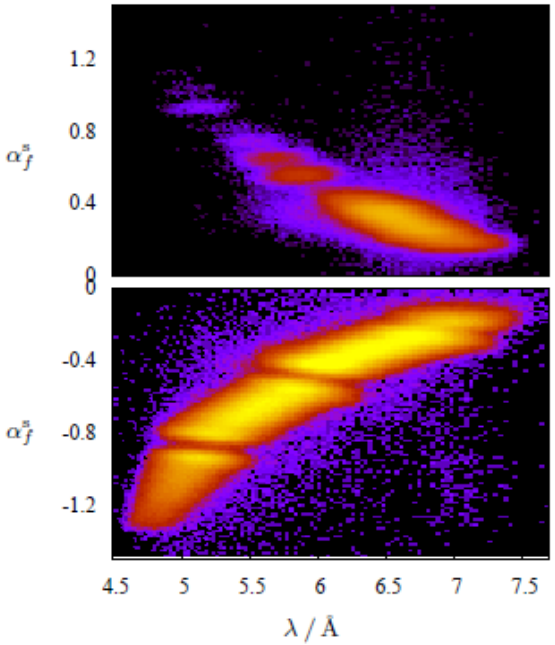
the real devise is made of 4 part of 500 mm : the measurements show problems at the edges of the parts - shape mismatches, imperfections

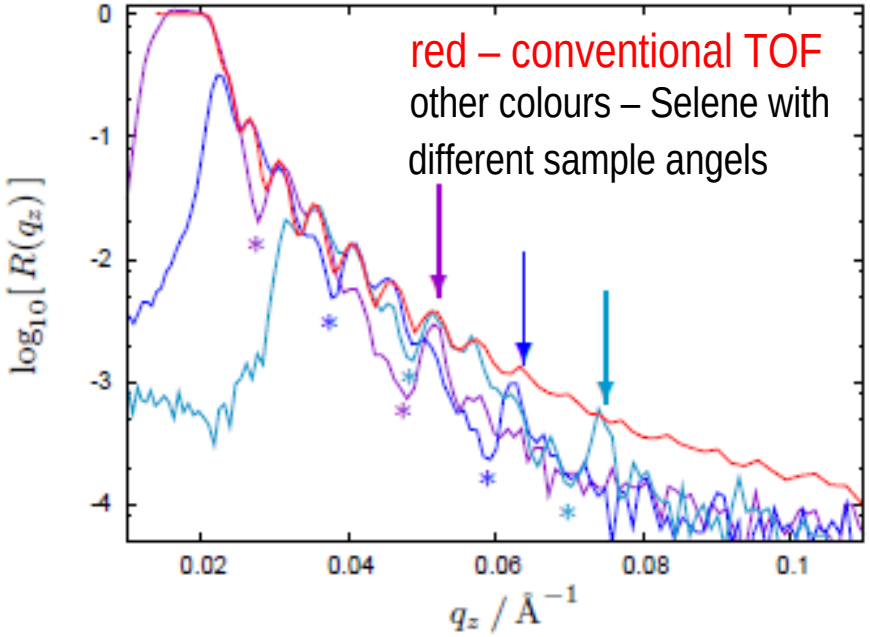
SELENE : monochromator set up (1000 Å Ni film on glass)



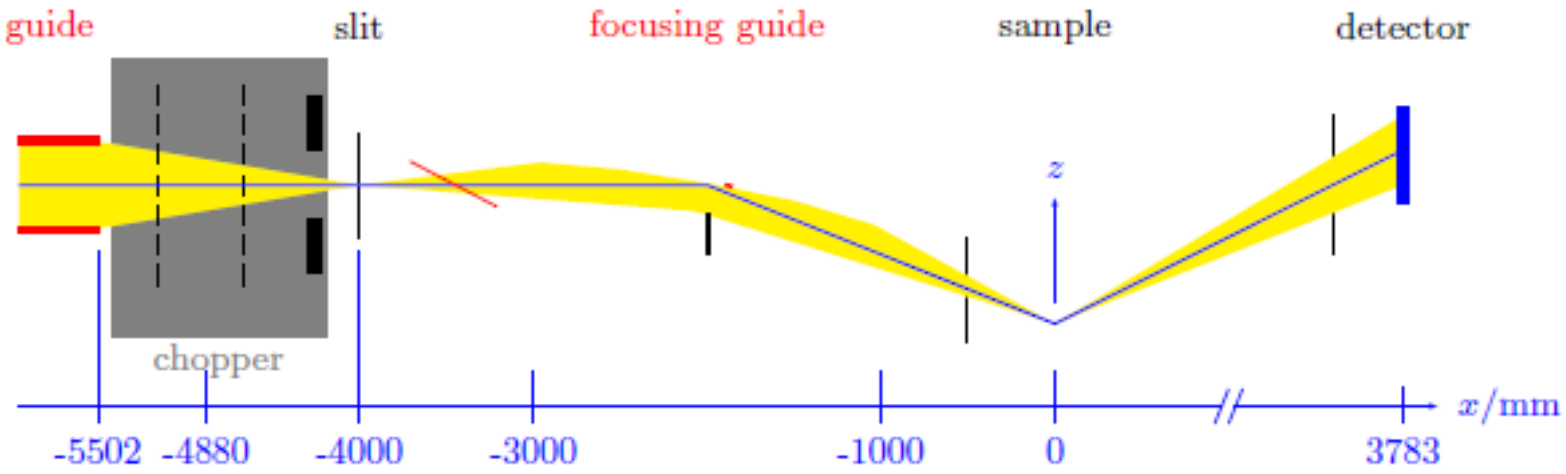
after reflection at the sample

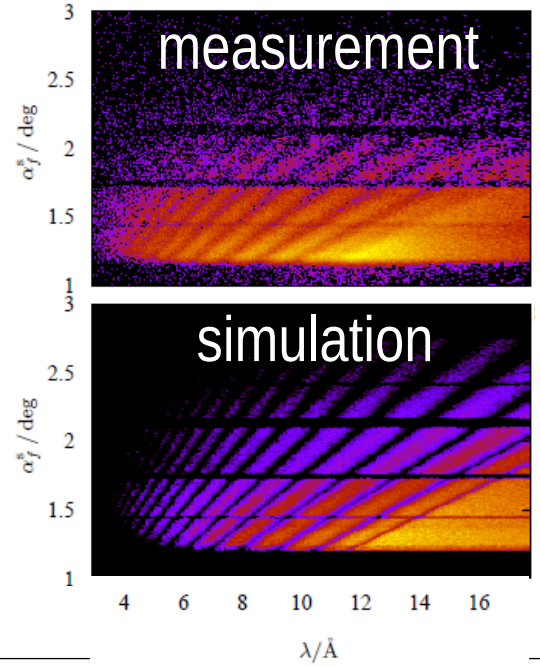
at sample position

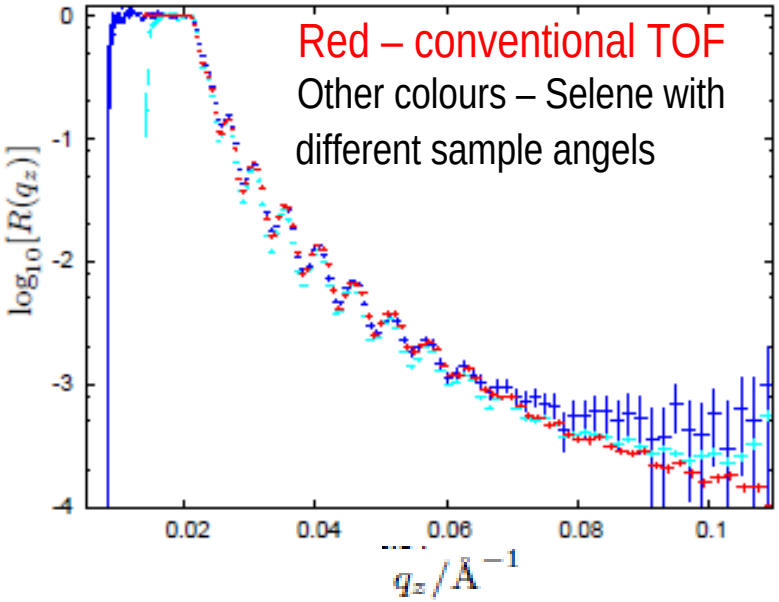




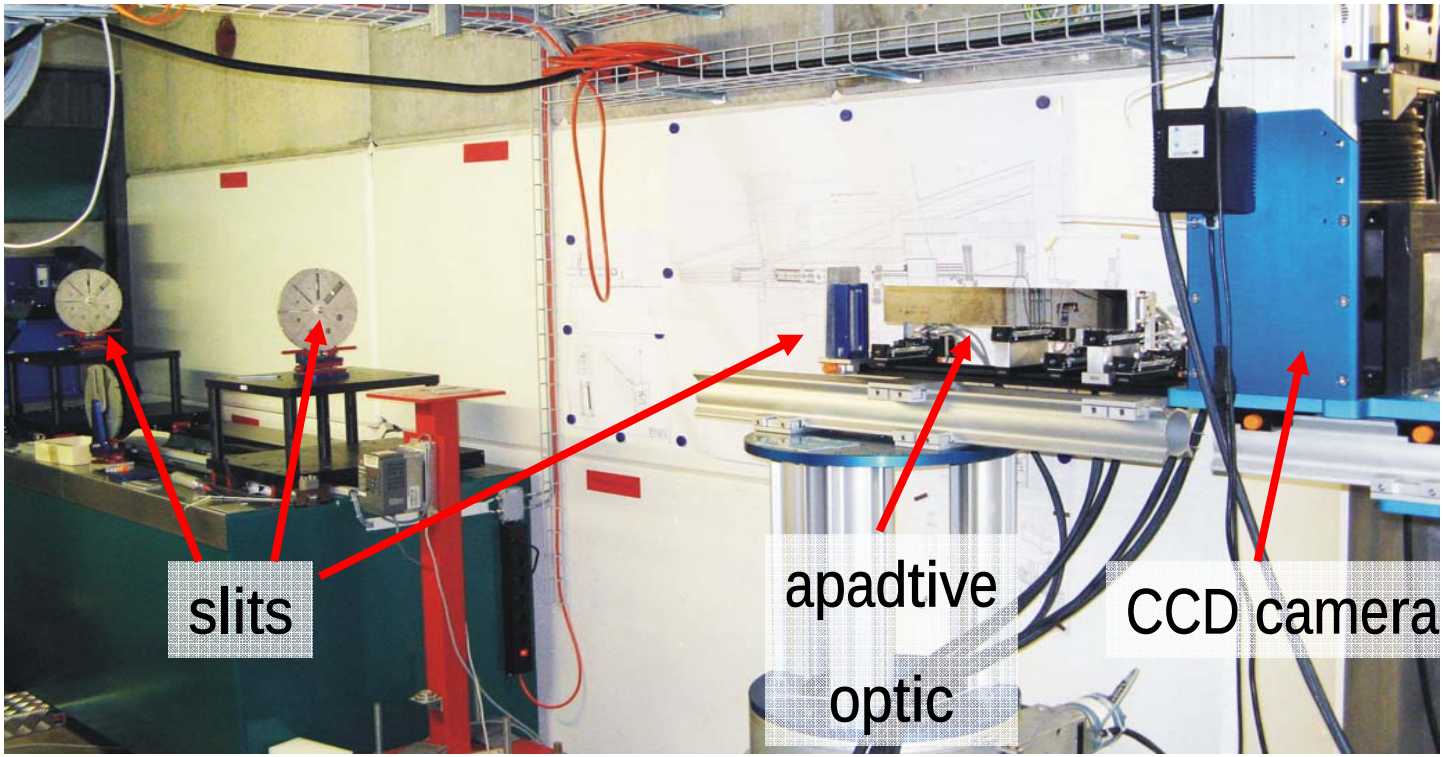
SELENE : TOF set up (1000 Å Ni film on glass)

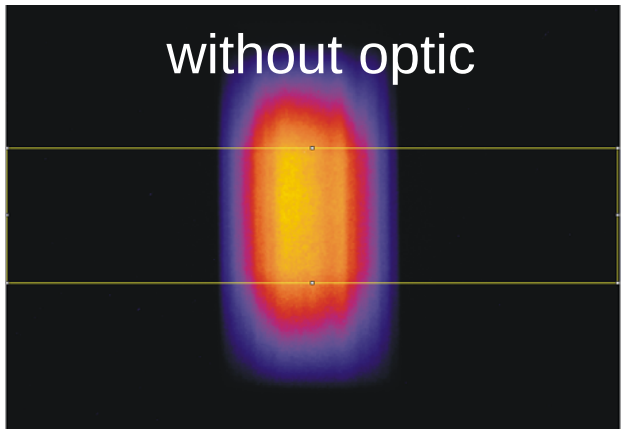


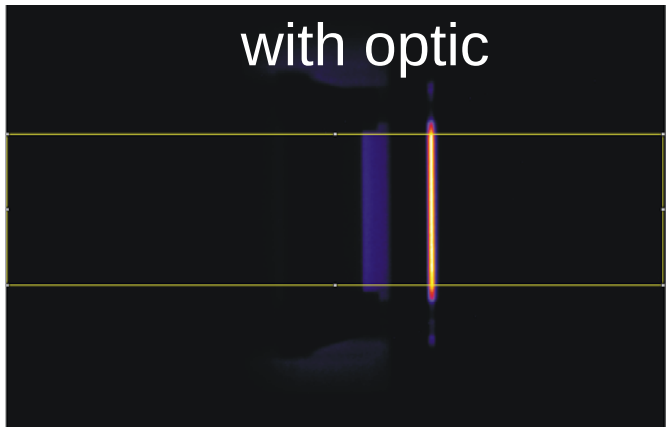




adaptive optic : set up at BOA



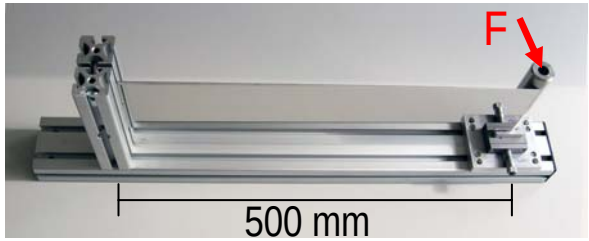


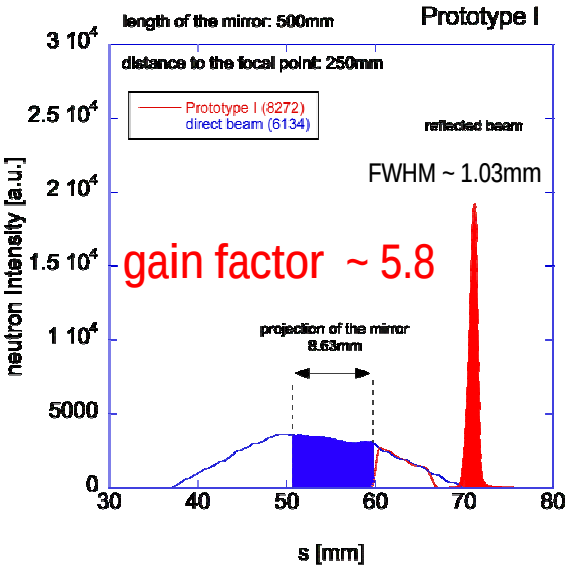


adaptive optic (parabolic shape)

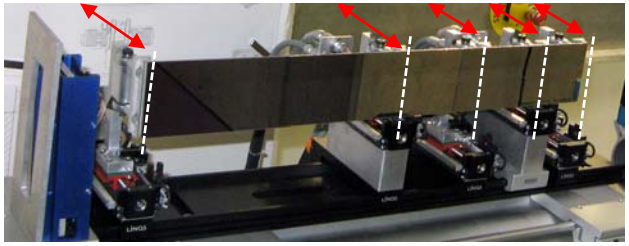
experiments performed by M. Schneider, U. Filges, T. Panzner

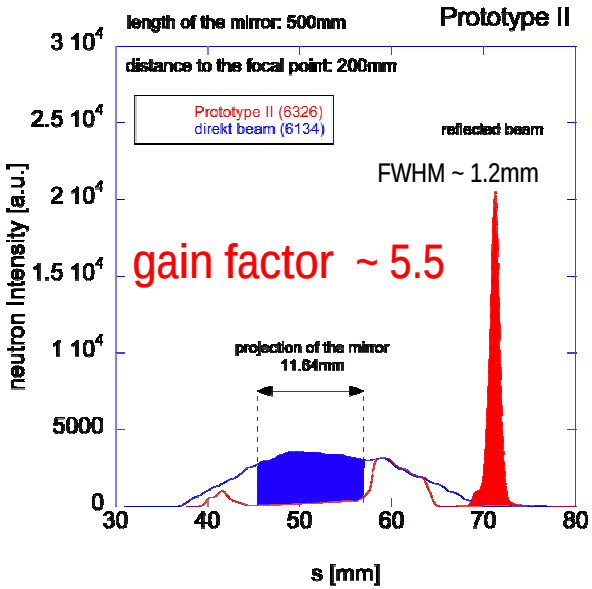
Prototype I





Prototype II

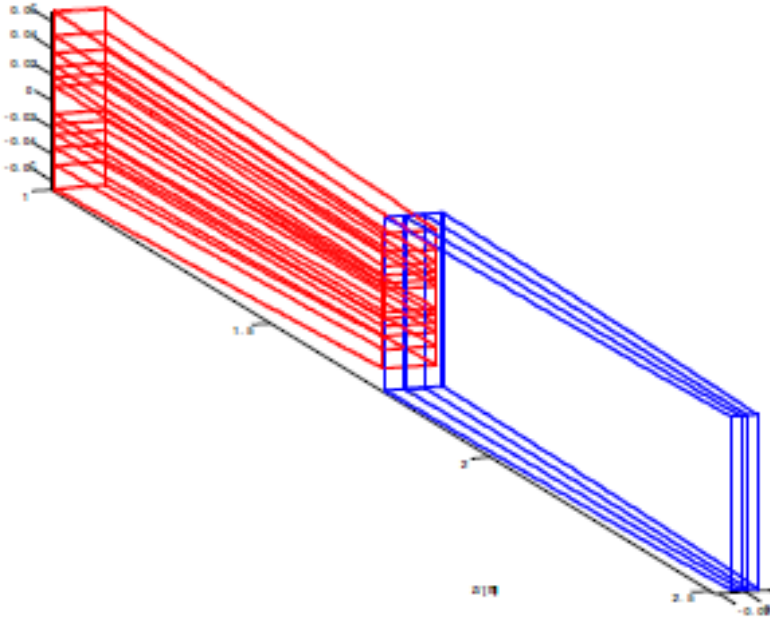


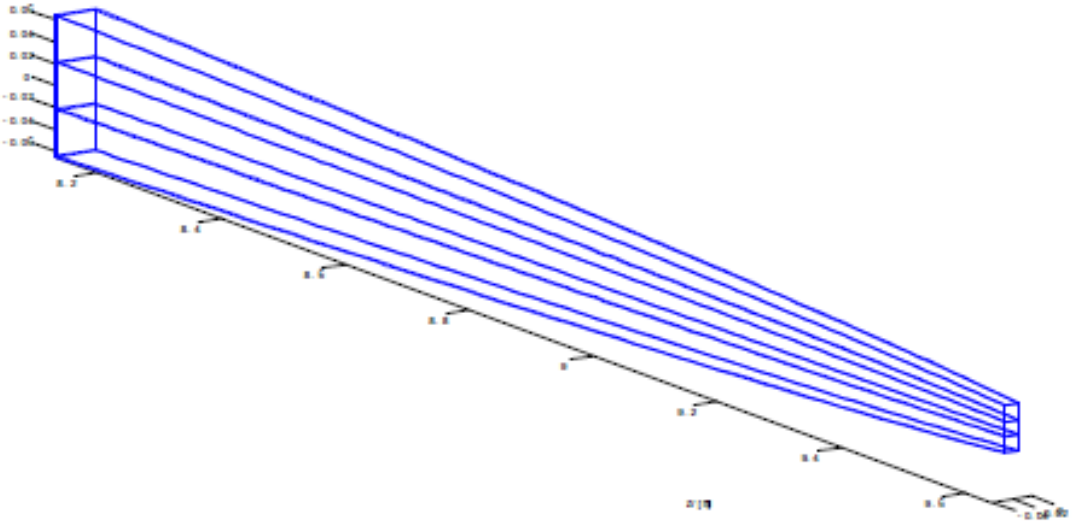


multichannel optic for BOA (only simulations)

ad on lens system for BOA to focus in 2 dim on samples of 5x5 mm

1500 mm free space would be avaible





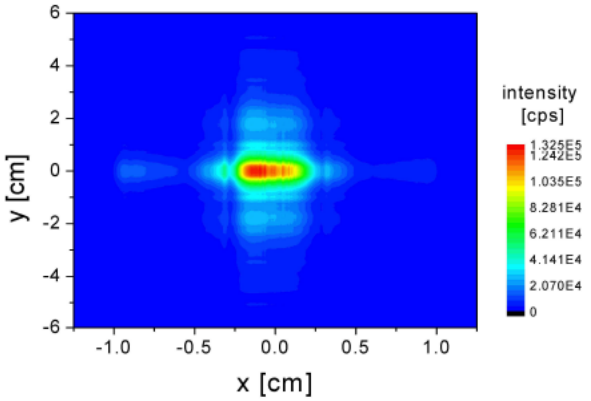
idea 1 : two 1 dim focusing lenses behind each other

idea 2 : one 2 dim focusing lens (technological more difficult)

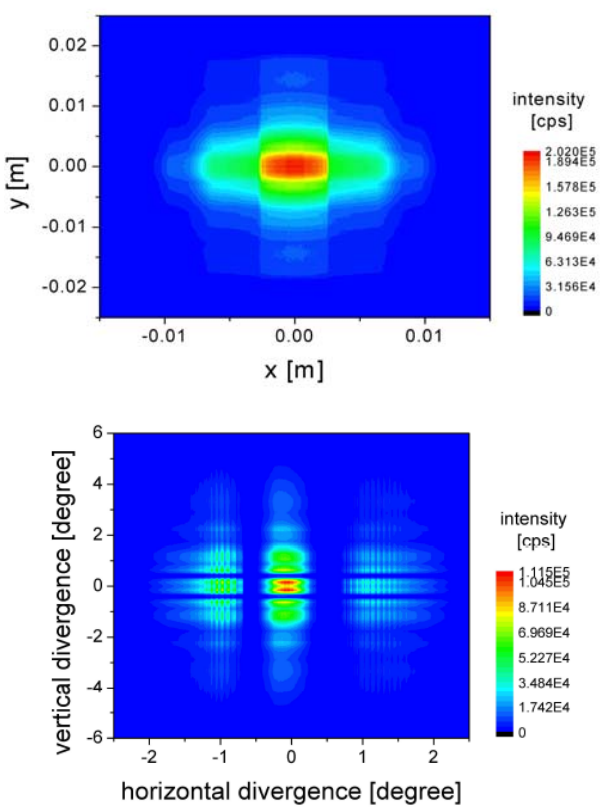
results of the 2 ideas

	Intensity [cps]	gain
Without focusing optics	(1.382+/-0.001) 10^7	-
2 lens system	(2.2397 +/- 0.0004) 10^8	16.2
1 lens system	(2.1604 +/- 0.0003) 10^8	15.6

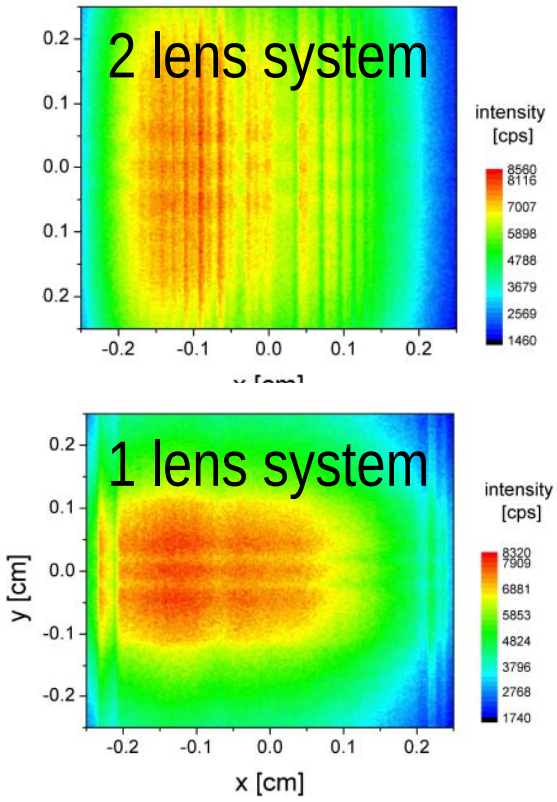
2 lens system



1 lens system

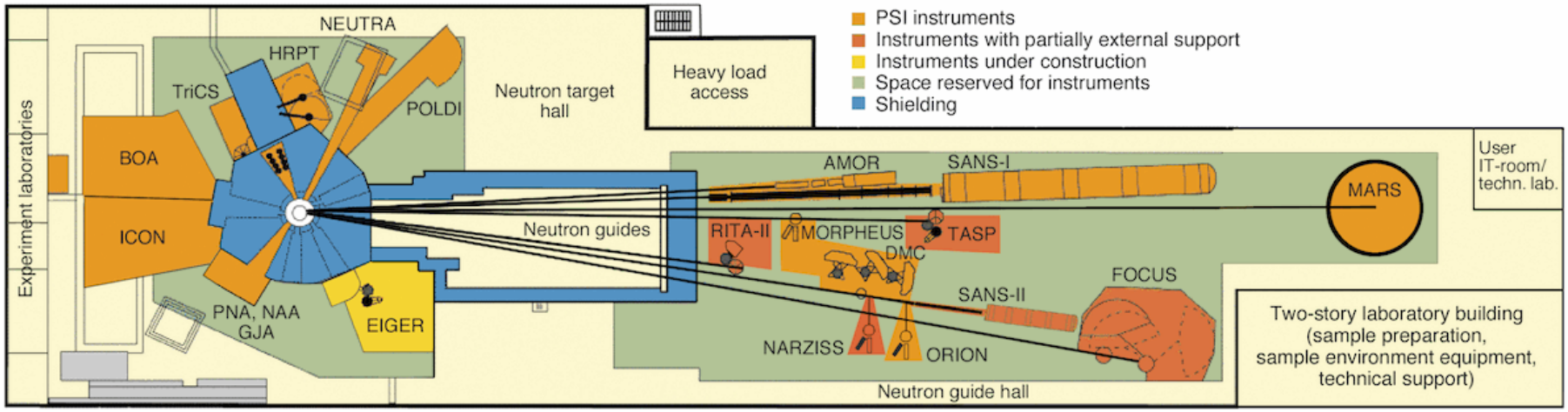


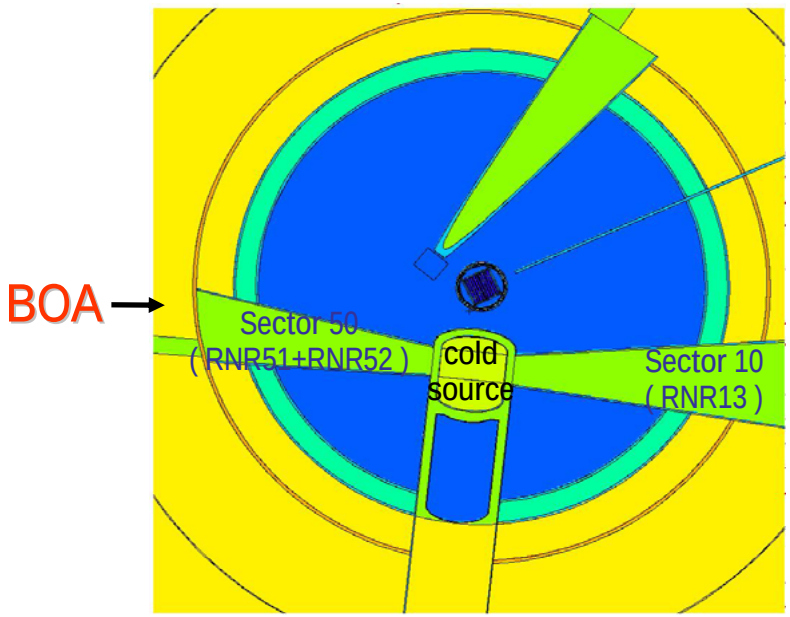
central focus spot



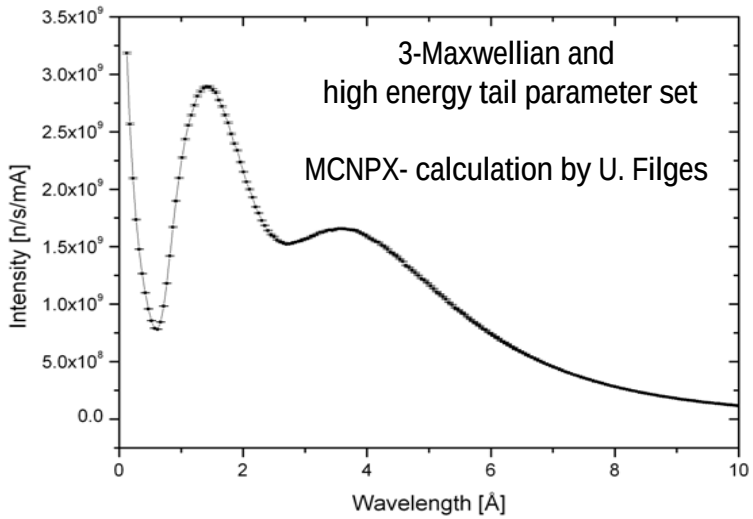
Beamline location and expected source spectrum

BOA is a redesign of the old FUNSPIN beamline at sector 50

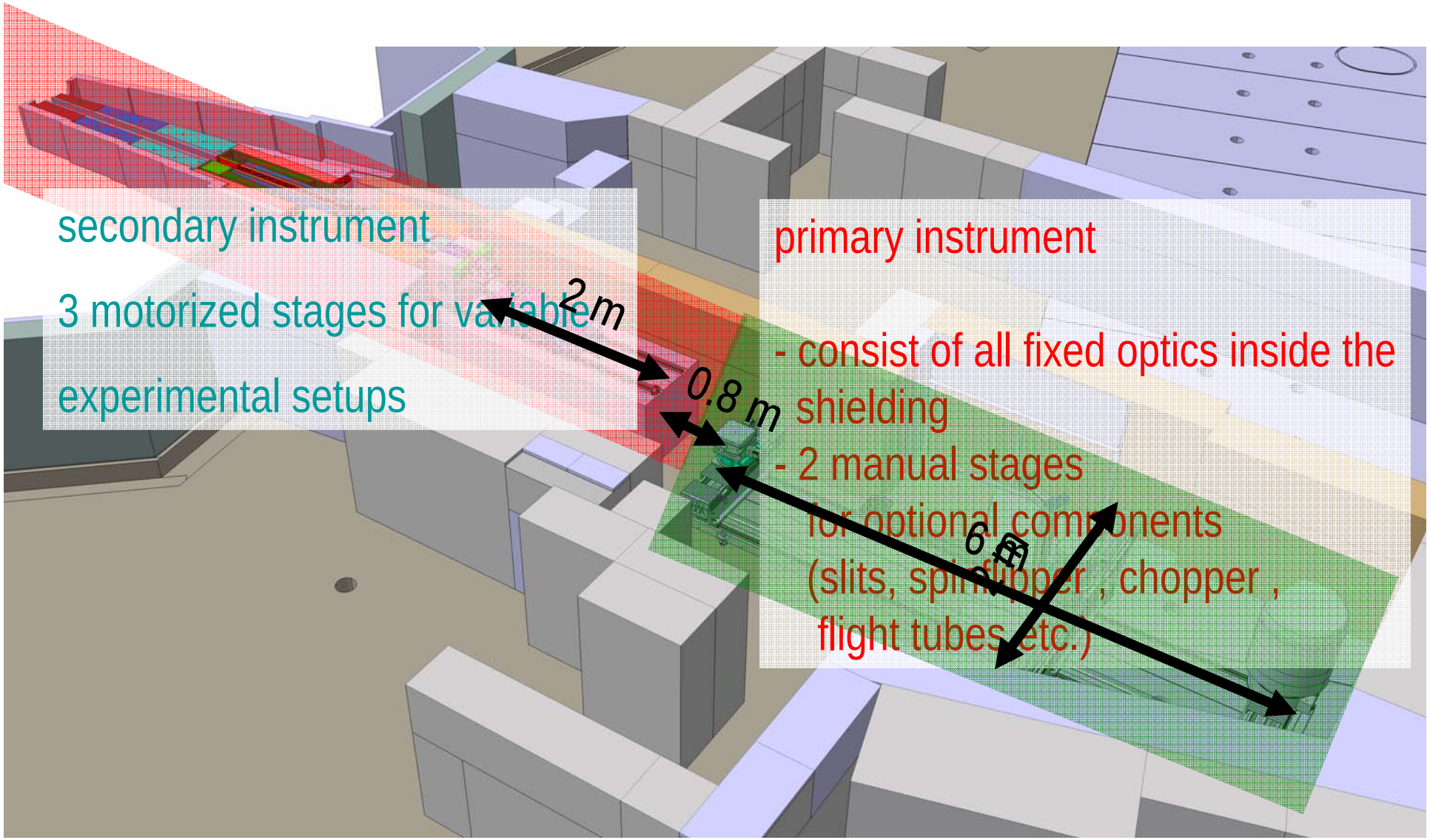




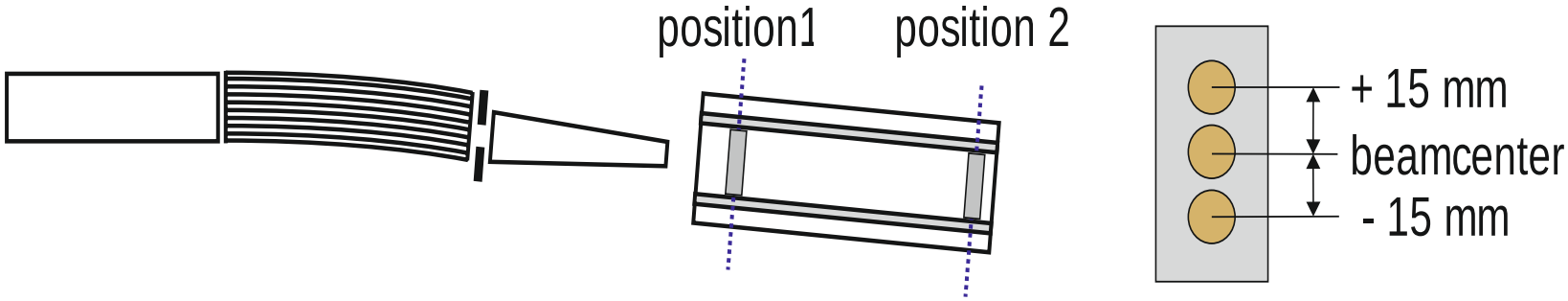
wavelength distribution inside PSI cold source (sector 10 and sector 50)



Beamline layout



Au-folie measurements



position 1 :

0.6 m after focusing guide

shutter slit closed

$\varphi_{av,measured} = 4{,}98 \cdot 10^{7}\, n \cdot cm^{-2} \cdot s^{-1} \cdot mA^{-1}$

$\varphi_{av,simulated} = 7.0 \cdot 10^{7}\, n \cdot cm^{-2} \cdot s^{-1} \cdot mA^{-1}$

shutter slit open

$\varphi_{av,measured} = 1.11 \cdot 10^{8}\, n \cdot cm^{-2} \cdot s^{-1} \cdot mA^{-1}$

$\varphi_{av,simulated} = 1.3 \cdot 10^{8}\, n \cdot cm^{-2} \cdot s^{-1} \cdot mA^{-1}$

position 2 :

2.3 m after focusing guide

shutter slit closed

$\varphi_{av,measured} = 1.57 \cdot 10^{7}\, n \cdot cm^{-2} \cdot s^{-1} \cdot mA^{-1}$

$\varphi_{av,simulated} = 2.90 \cdot 10^{7}\, n \cdot cm^{-2} \cdot s^{-1} \cdot mA^{-1}$

shutter slit open

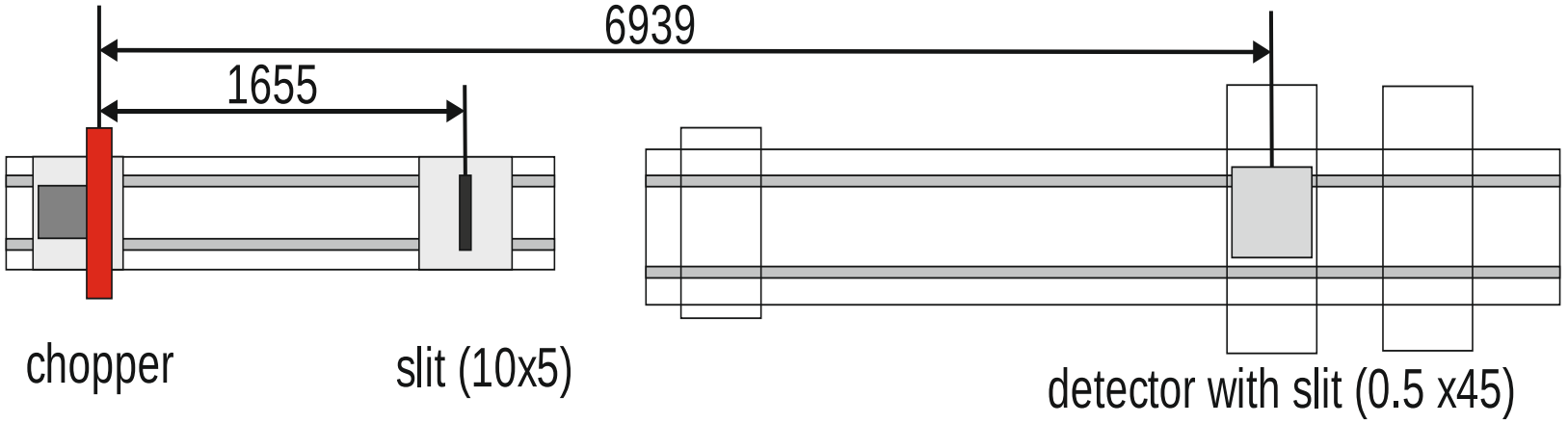
$\varphi_{av,measured} = 3.73 \cdot 10^{7}\, n \cdot cm^{-2} \cdot s^{-1} \cdot mA^{-1}$

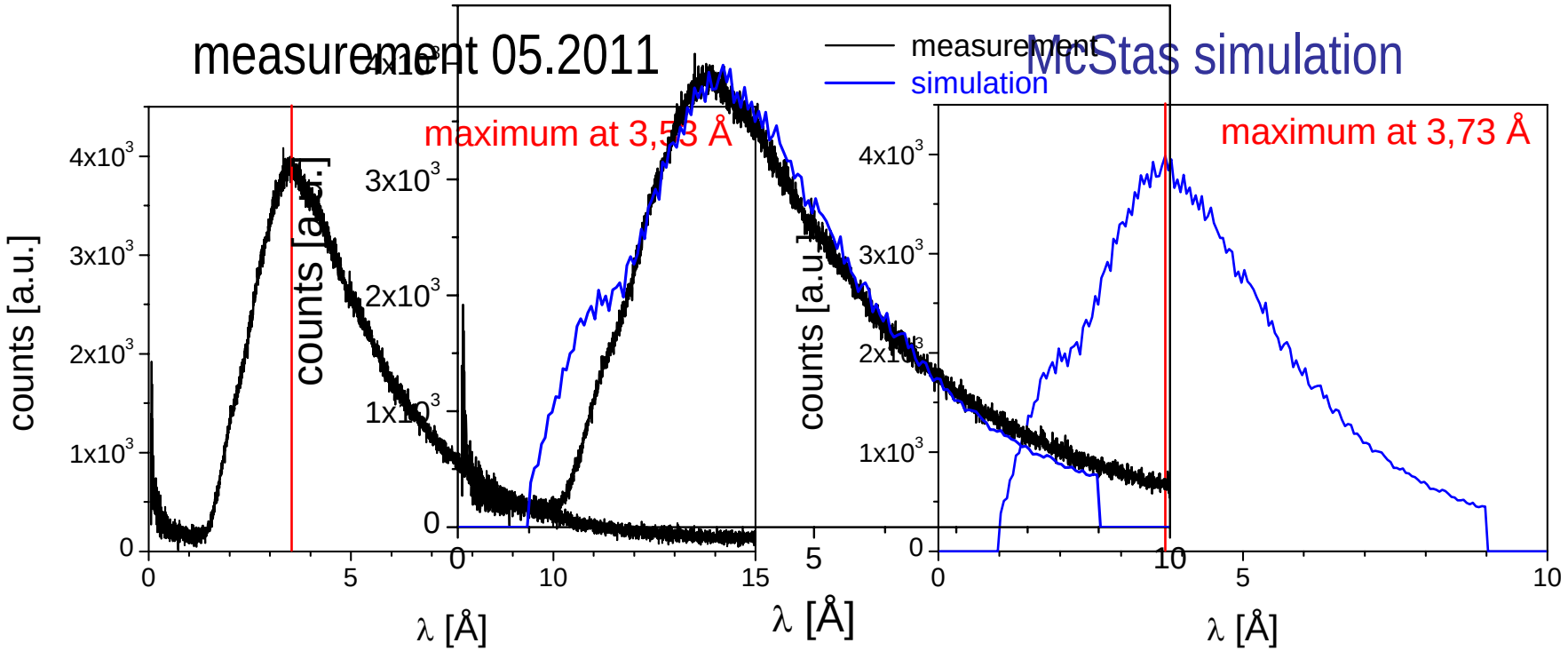
$\varphi_{av,simulated} = 6.60 \cdot 10^{7}\, n \cdot cm^{-2} \cdot s^{-1} \cdot mA^{-1}$

total flux increase by a factor of ~2.3 using the focusing guide

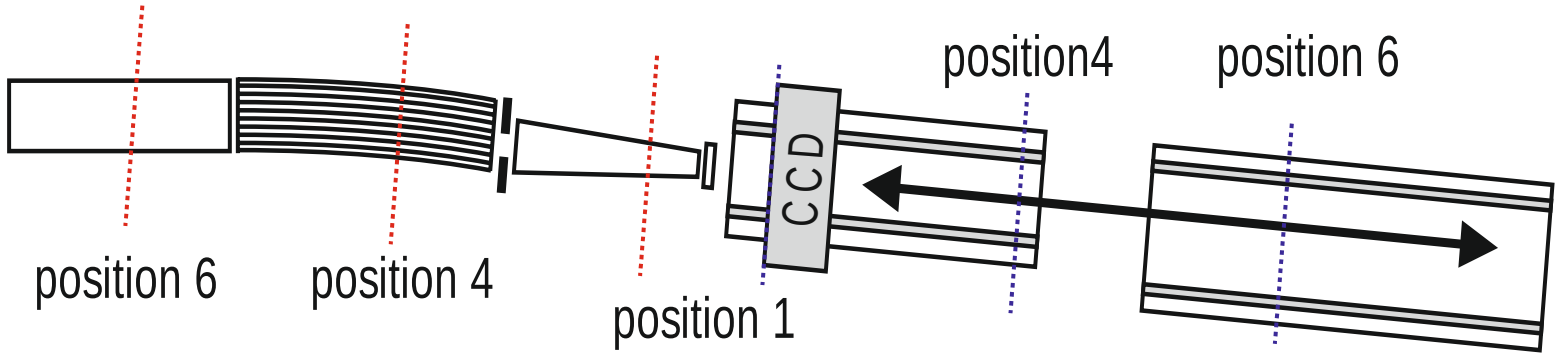
total flux decrease by a factor of ~1.8 having 1 m longer distance to the source

energy spectrum





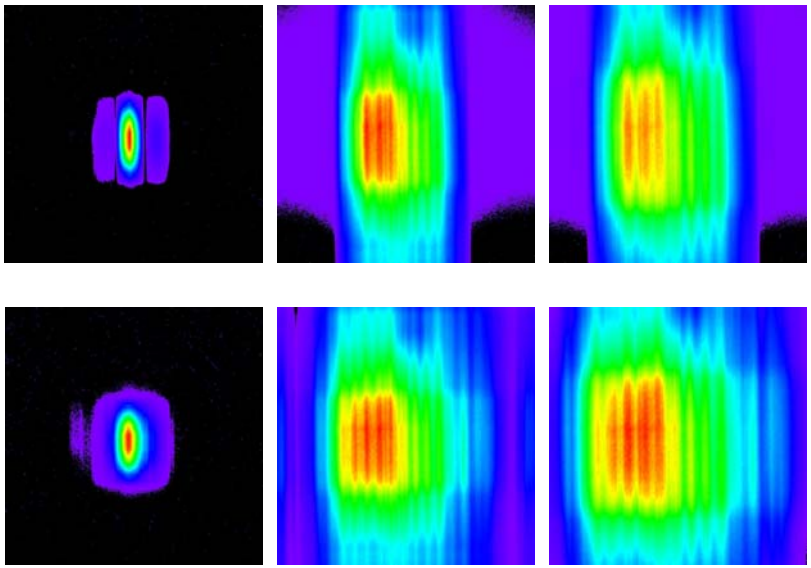
beam profils

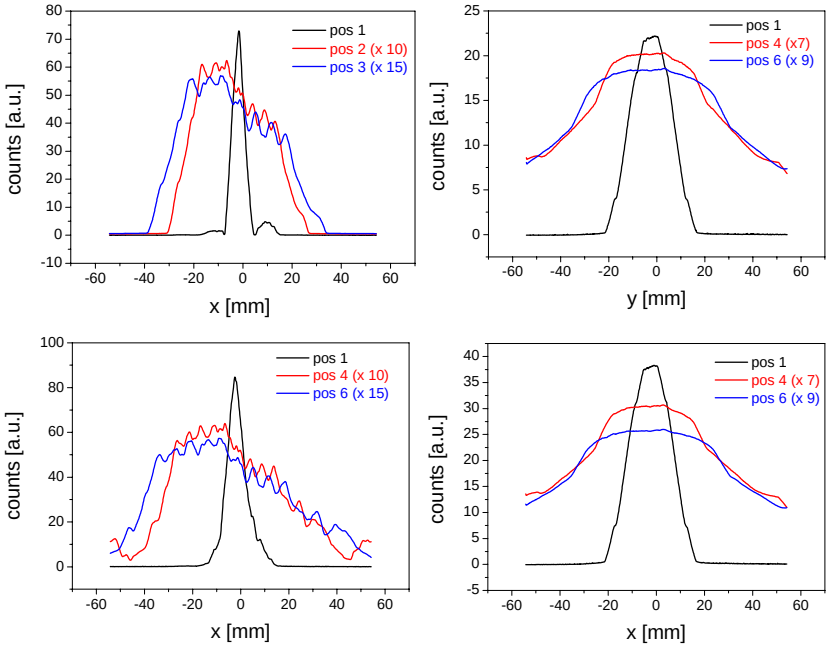


slit 5mm x 20mm

shutter slit closed

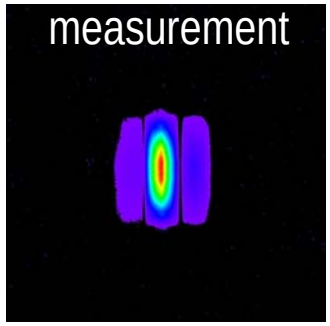
shutter slit open

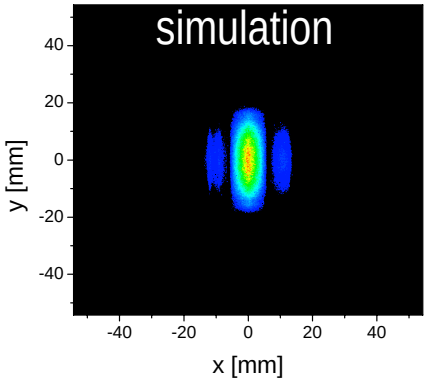


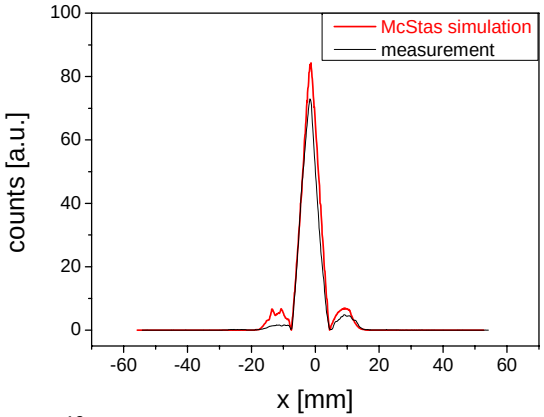


McStas simulations (example : 5 x 20 mm slit)

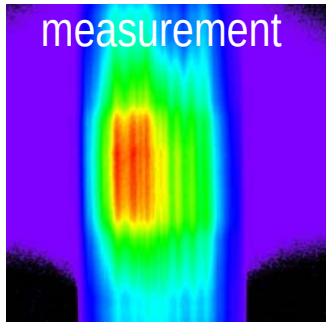
position 1

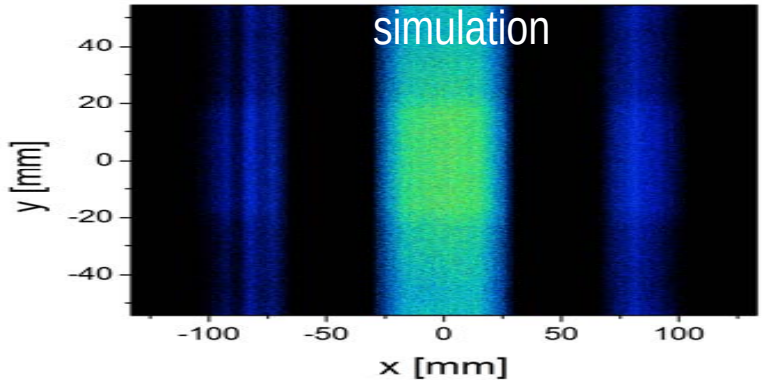


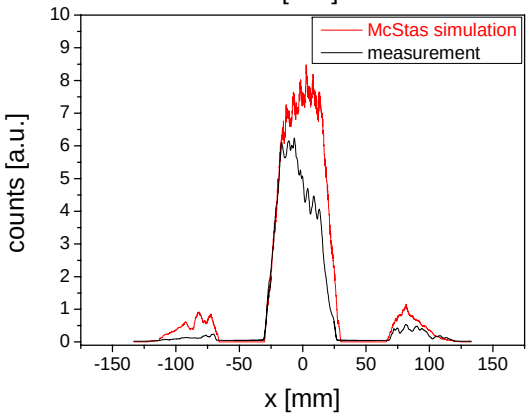




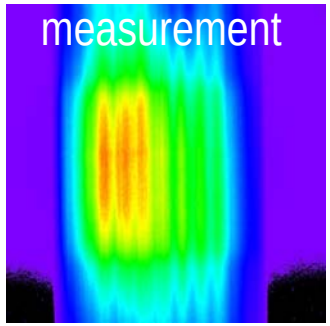
position 2

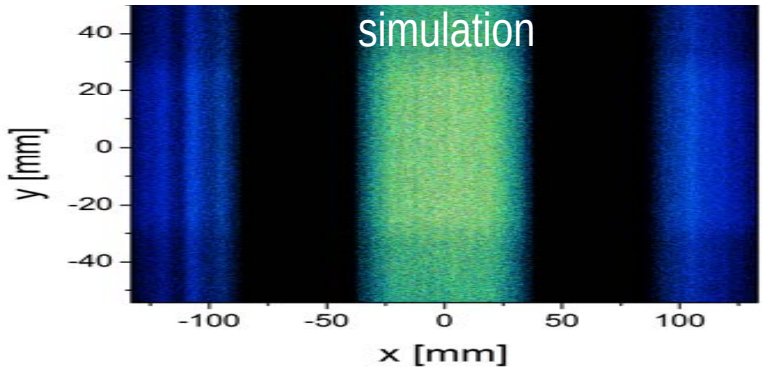


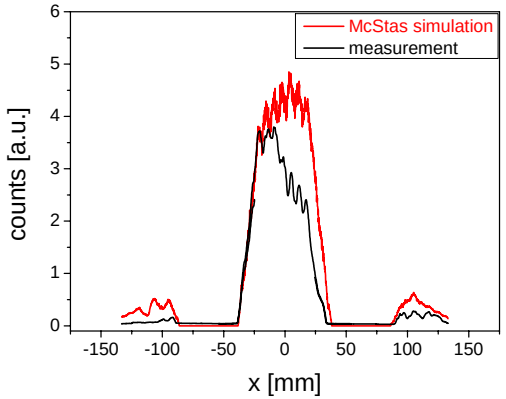




position 3







Mein Dank geht an