Constructing a GISANS instrument at a pulsed source
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The GISANS instrument at the HBS

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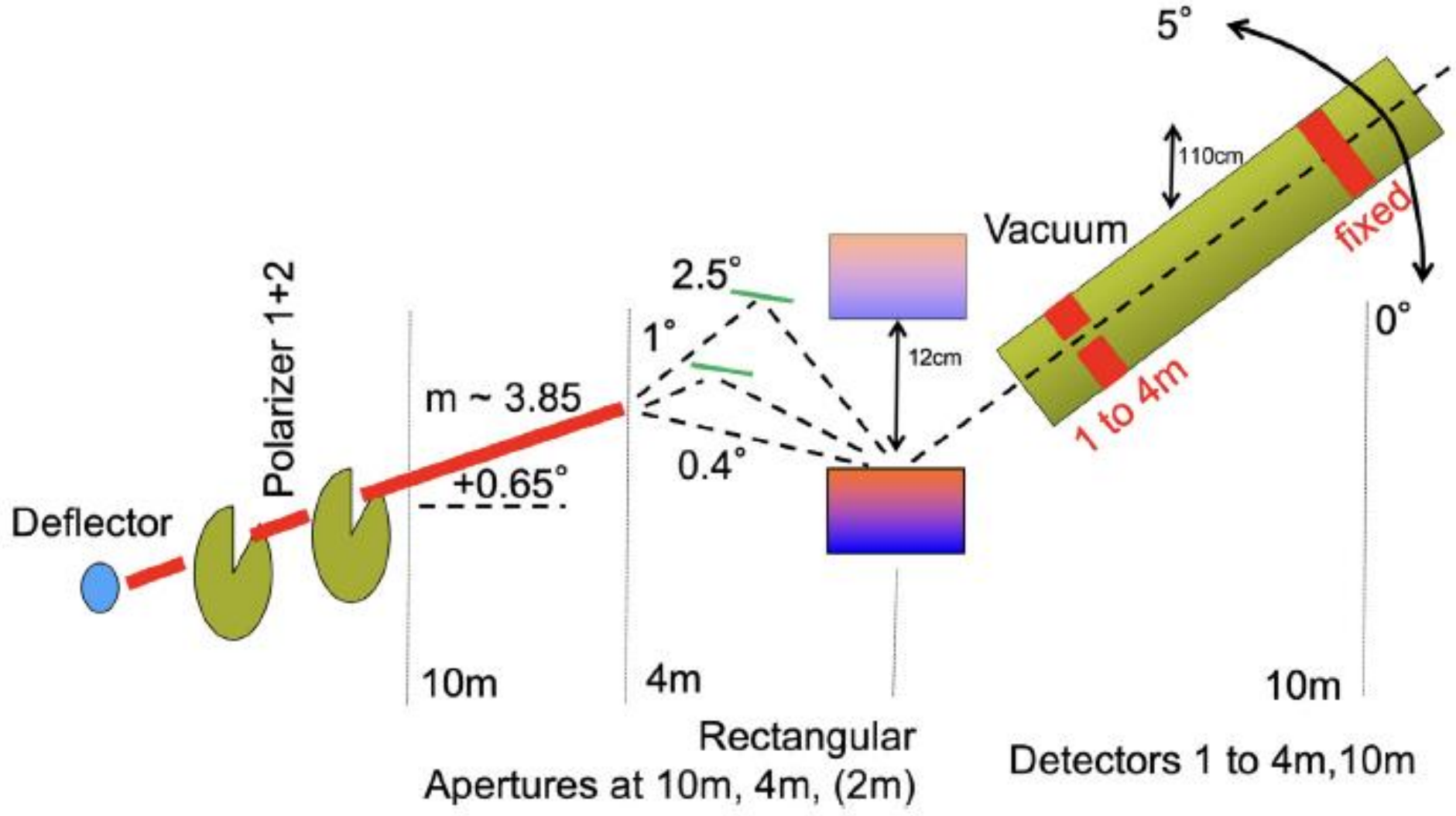
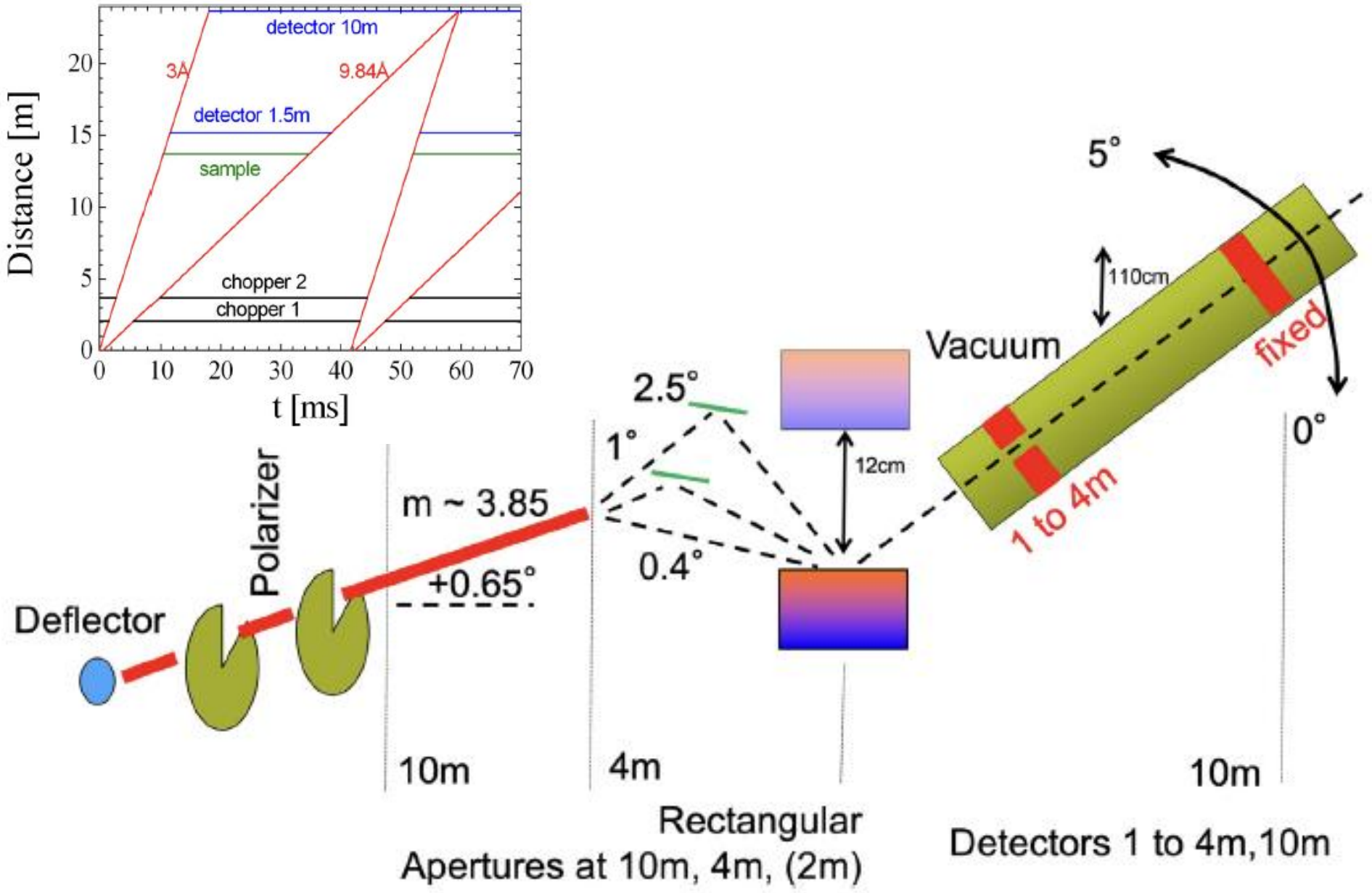
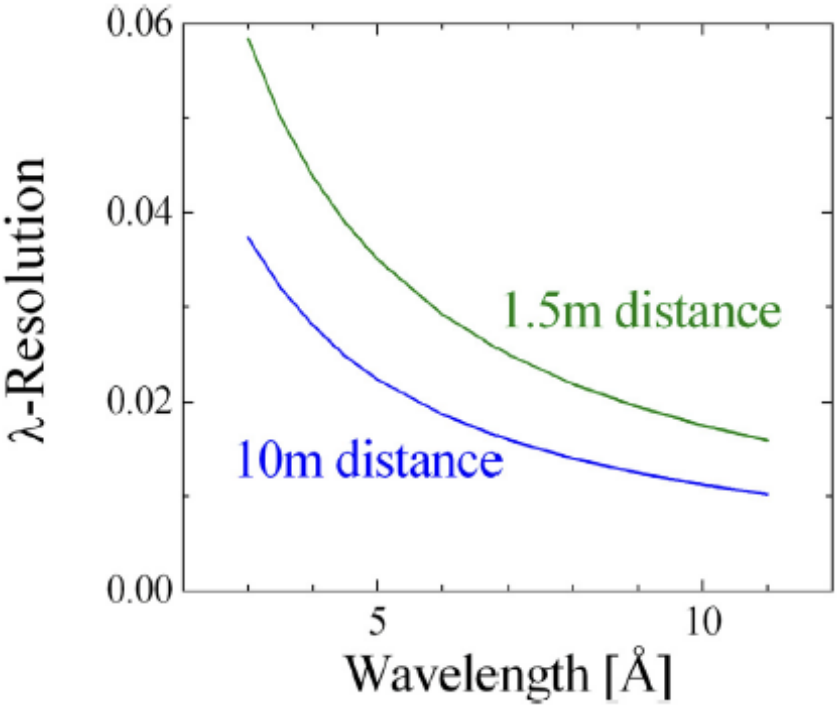
Layout of the instrument

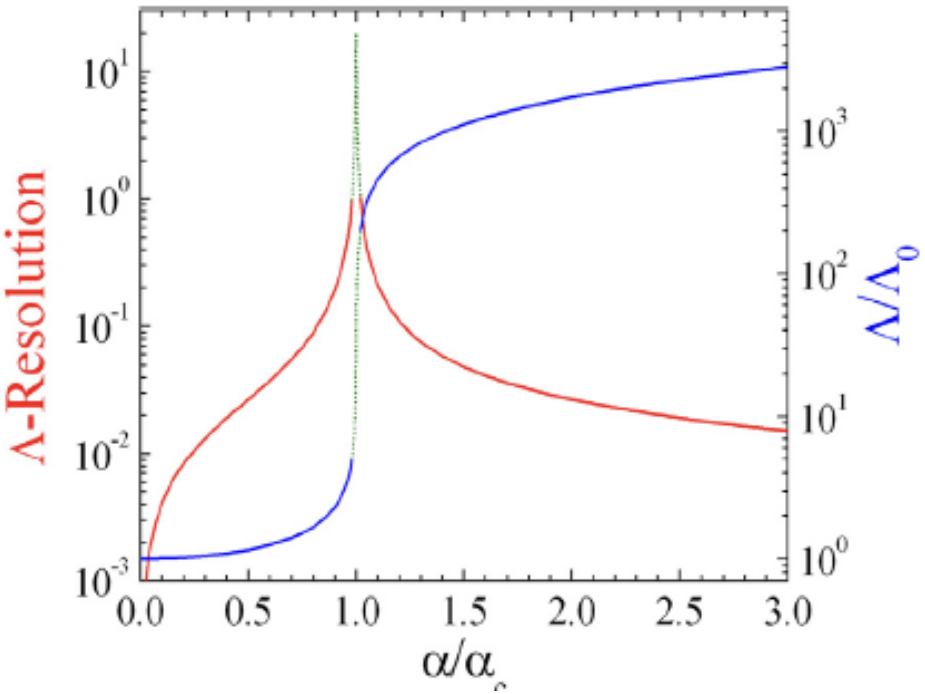


Layout of the instrument

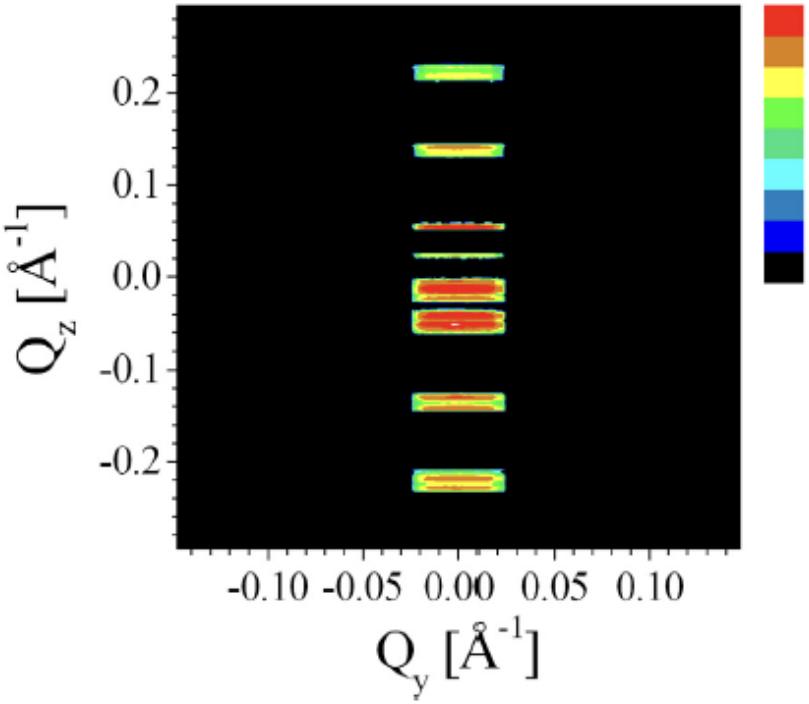


Resolution


λ-Resolution
0.06
0.04
0.02
0.00
5
10
Wavelength [Å]
1.5m distance
10m distance


Λ-Resolution
Λ/Λ0
α/αc
0.0
0.5
1.0
1.5
2.0
2.5
3.0

Reflectivity mode

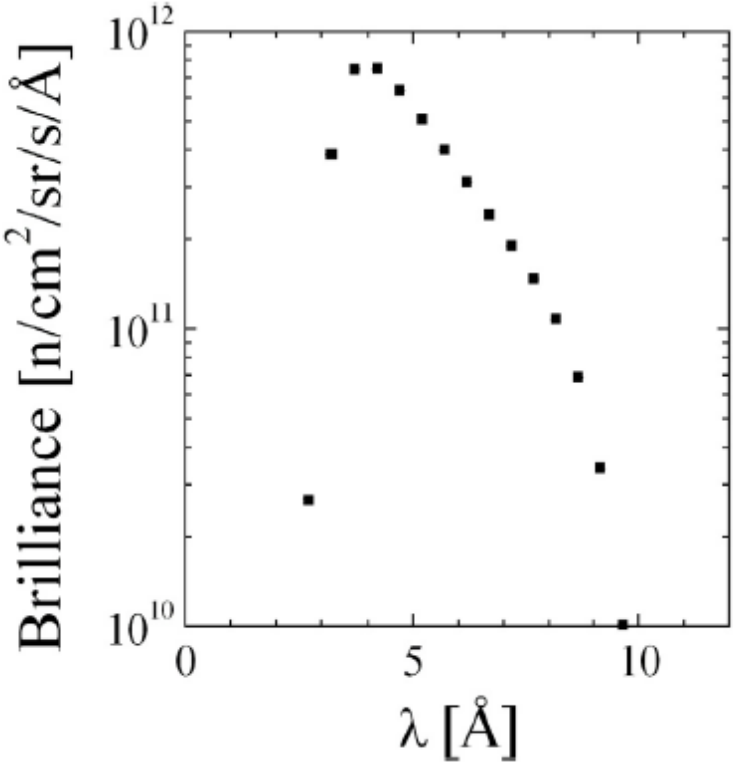


Several mirrors for several incident angles:
m = 4, 4, 7, 9

angles: 0.4°, 1°, 2.5°, 4°

For m = (7) 9:
Leave a gap in reflectivity for the small m-values.

Brilliance



Can be scaled for the particular source.

McStas component

for

GISANS sample

by Henrich Frielinghaus

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Crystalline order of polymer nanoparticles over large areas at solid/liquid interfaces

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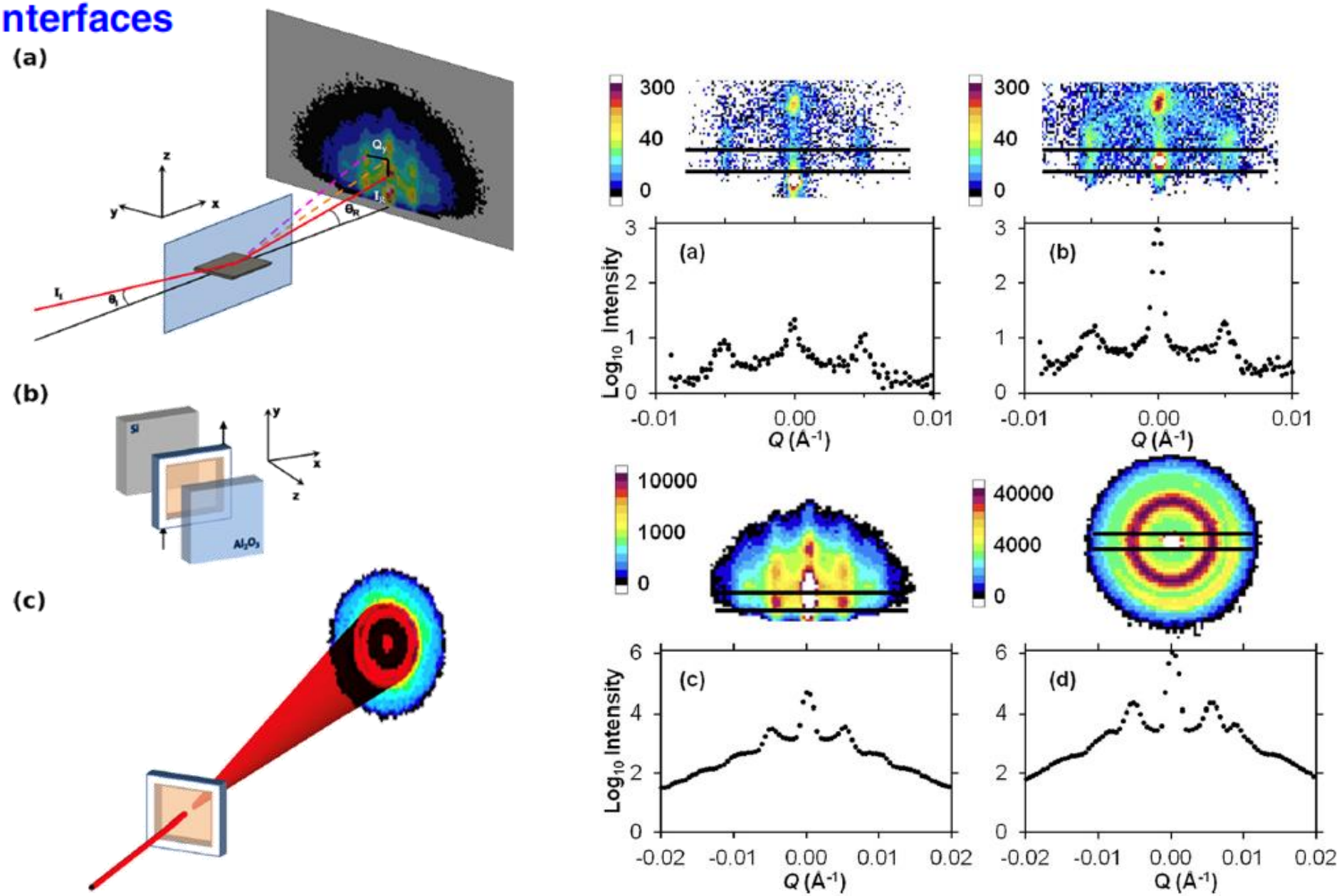
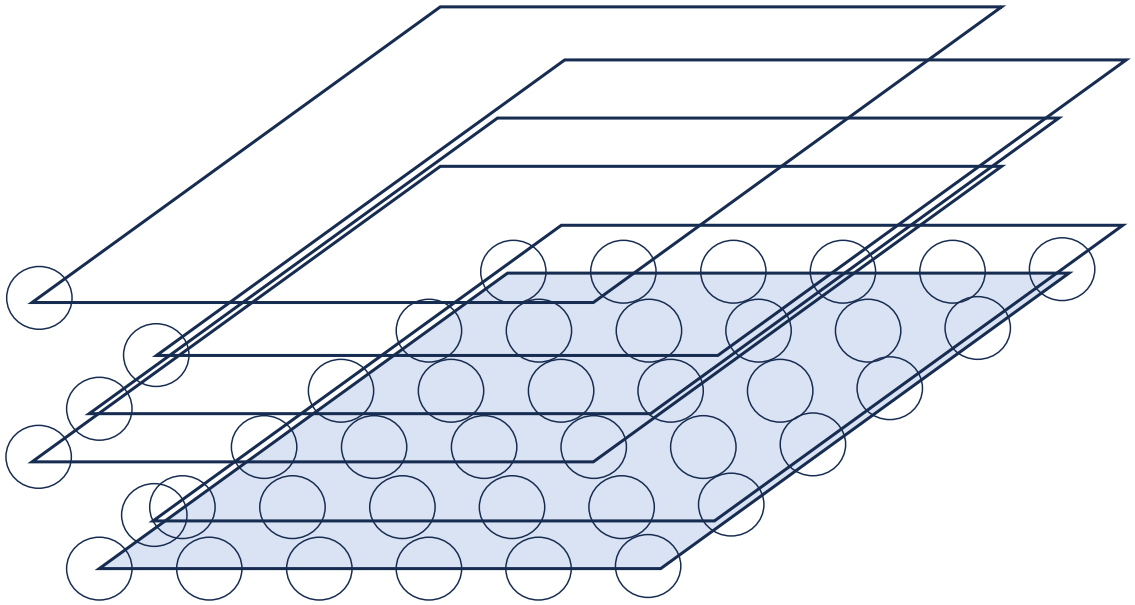
We report on the formation of large two-dimensional domains (about 20 cm^2) of oriented and ordered structures of polystyrene particles dispersed in water at a solid/liquid interface. Gentle flow of the dispersed sample into the holder at a shear strain rate of about 0.1 s^{-1} caused particles at the air/latex meniscus to self-assemble in a regular structure on both solid silica or alumina surfaces. Scattering experiments show that the particle separation at the surface was the same as in the bulk and determined by repulsion arising from the charges on the particles. Close-packed planes formed parallel to the interface. [http://dx.doi.org/10.1063/1.4723634]

Crystalline order of polymer nanoparticles over large areas at solid/liquid interfaces

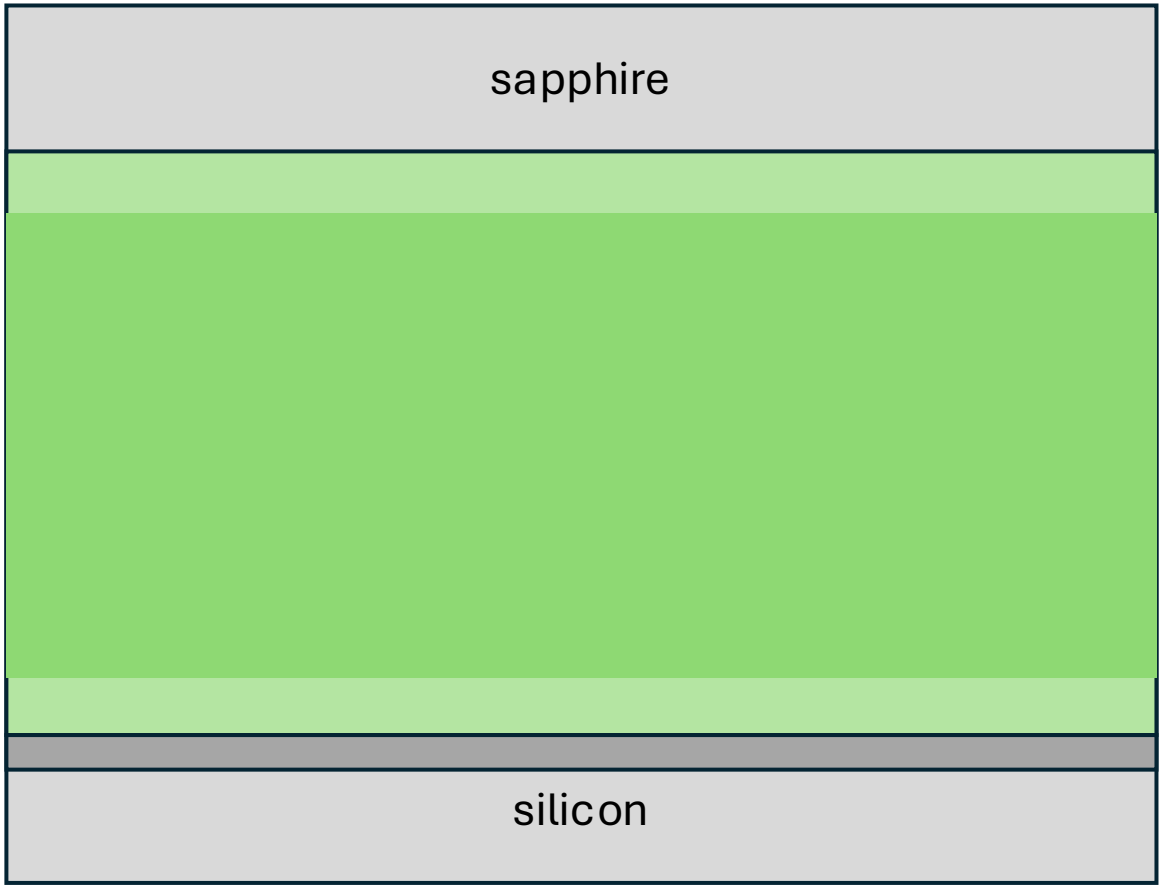


The structure assumed



hexagonal

ABC or AB layering possible



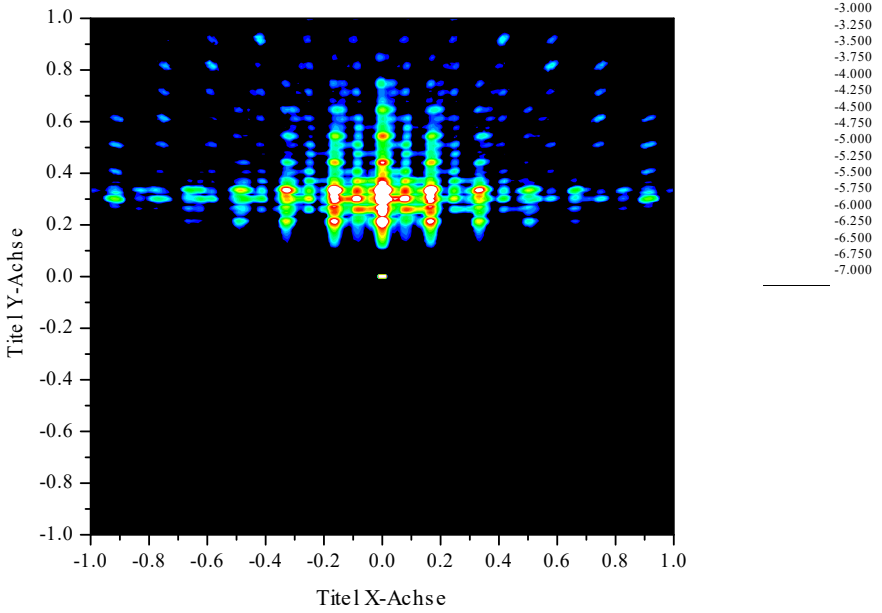
Crystals of µm to mm tickness considered.
Absorption and scattering weakens the „primary“ beam along z-direction.
Reflectivity: standard Parratt

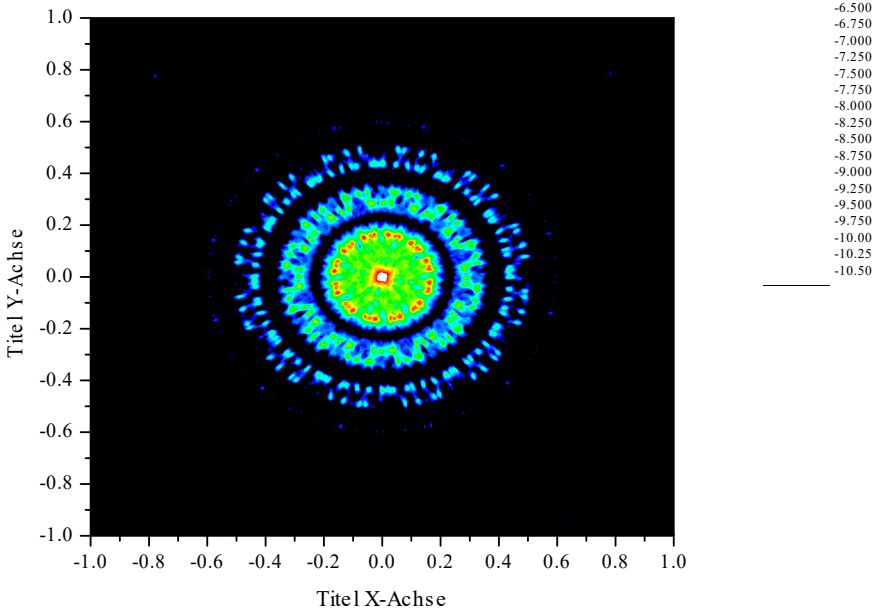
McStas simulations

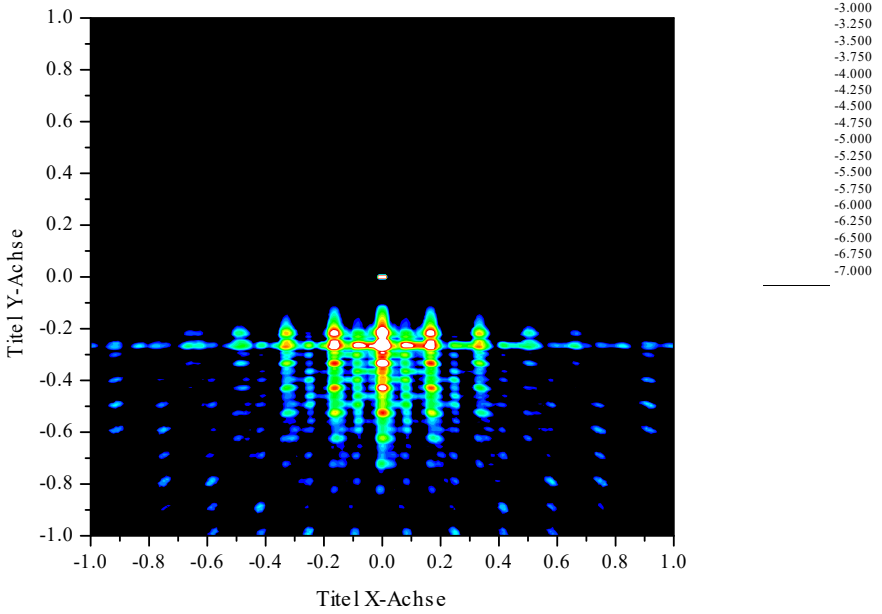
upper side,

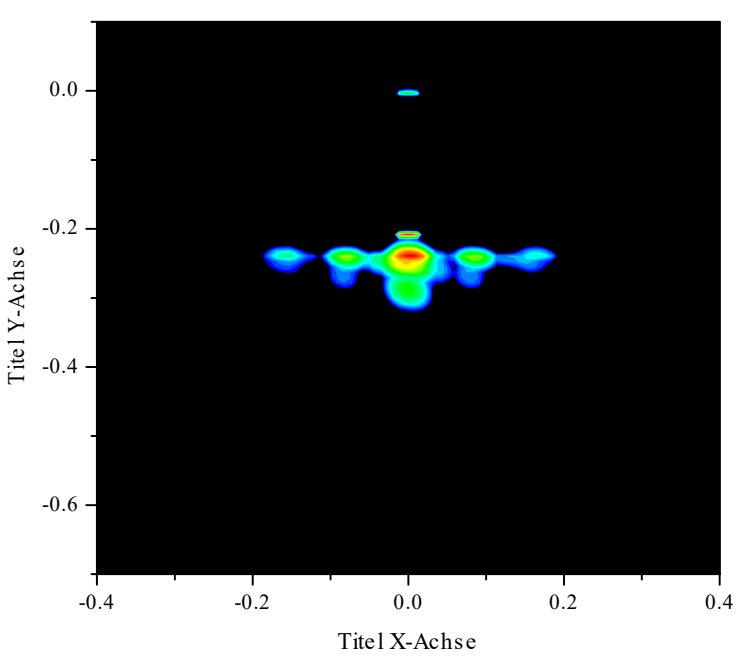
lower side

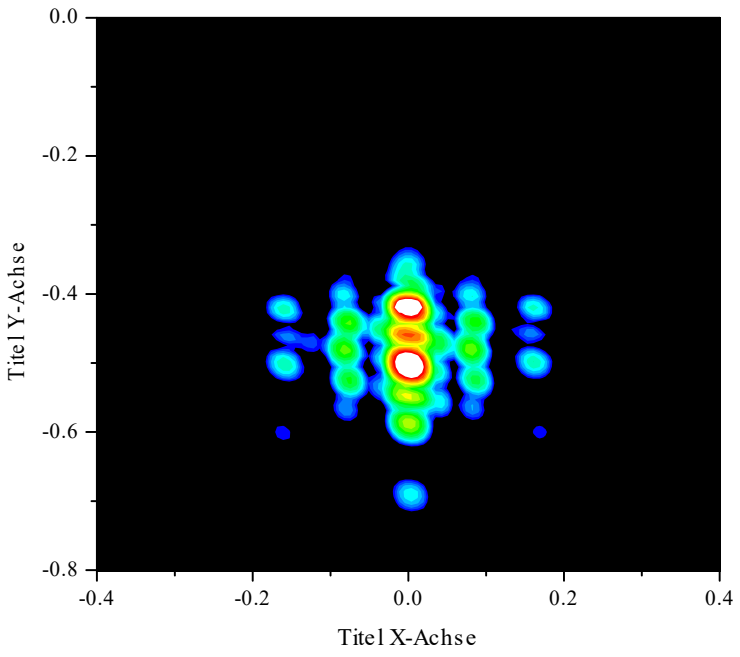
& transmission

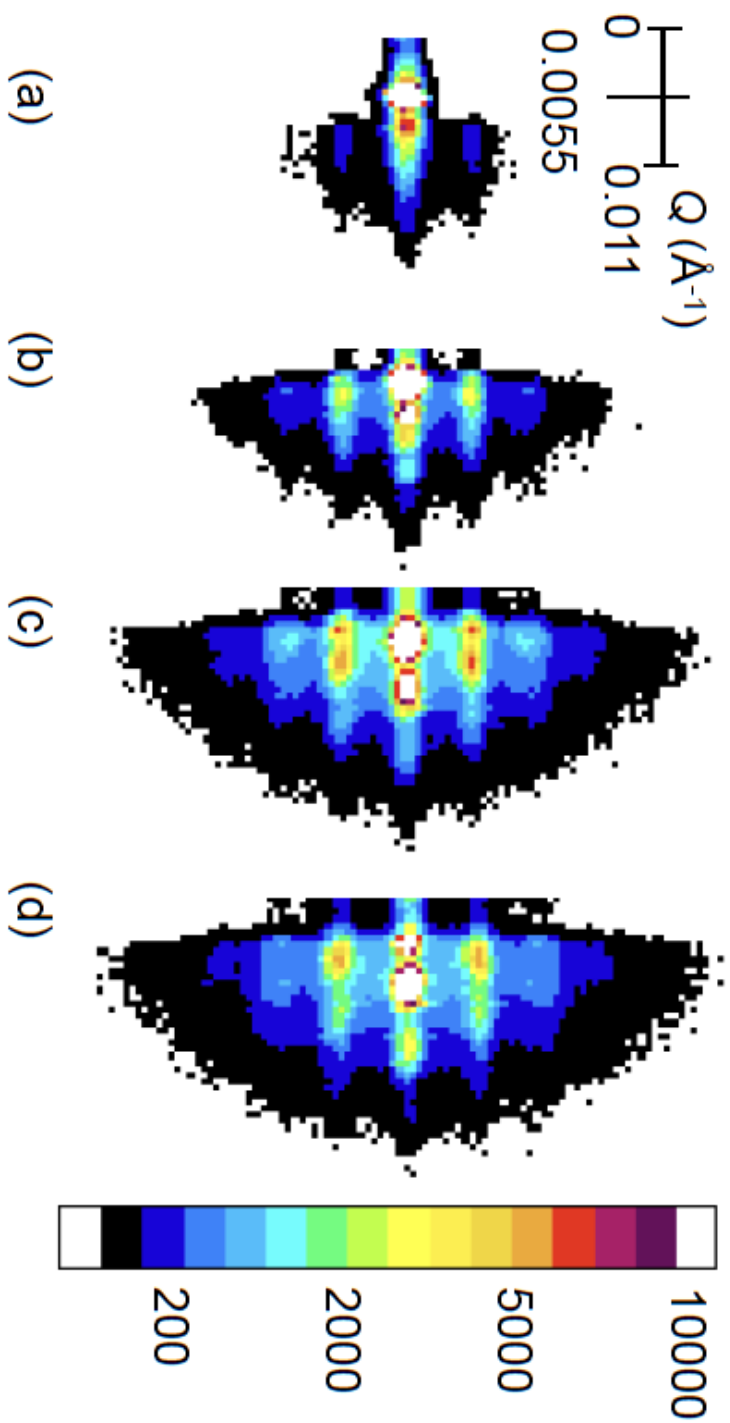







Titel Y-Achse
Titel X-Achse
0.0
-0.2
-0.4
-0.6
-0.4
-0.2
0.0
0.2
0.4
2.300
2.075
1.850
1.625
1.400
1.175
0.9500
0.7250
0.5000
0.2750
0.05000
-0.1750
-0.4000
-0.6250
-0.8500
-1.075
-1.300

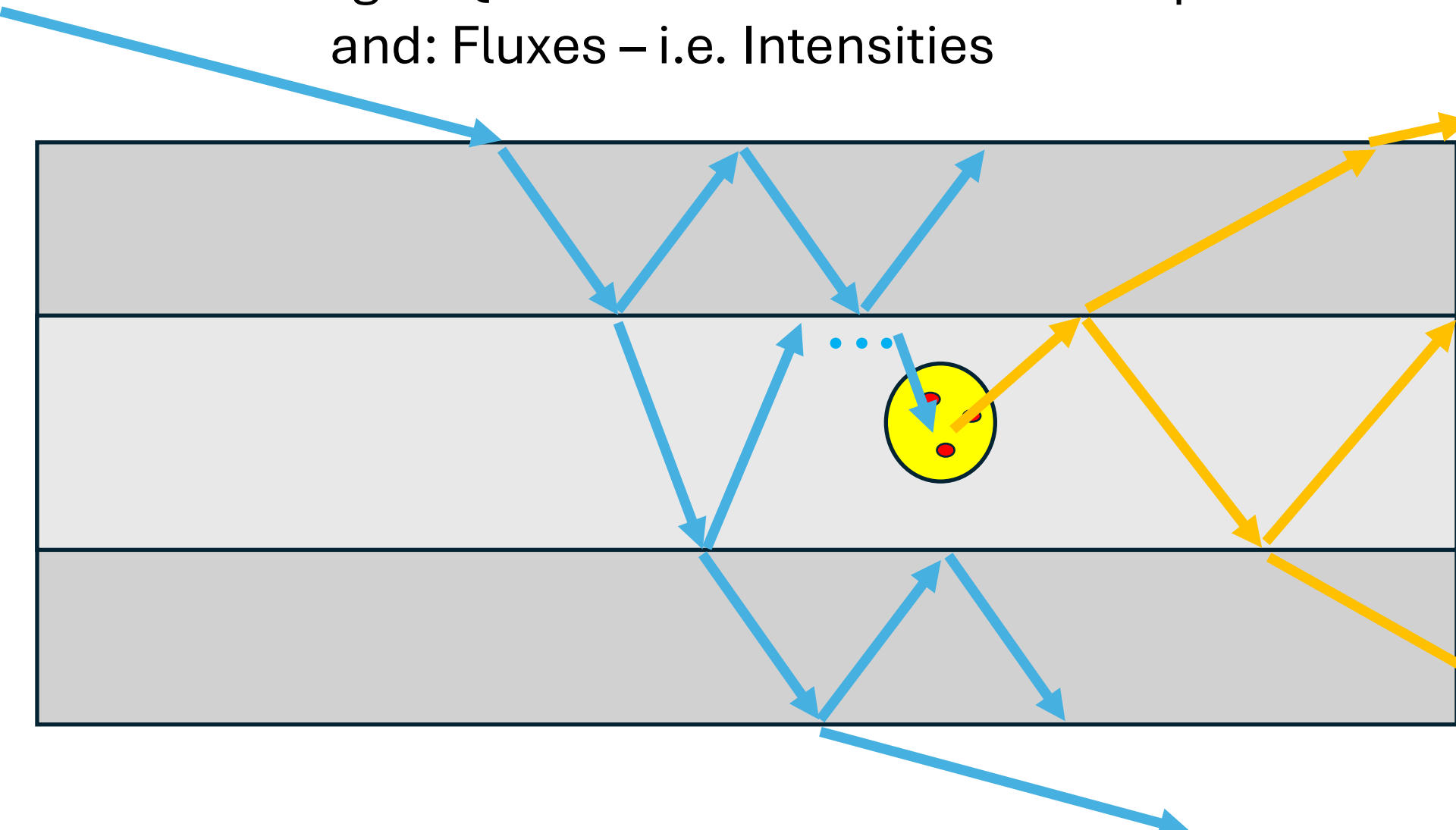

Titel Y-Achse
Titel X-Achse
0.0
-0.2
-0.4
-0.6
-0.8
-0.4
-0.2
0.0
0.2
0.4
-1.700
-1.875
-2.050
-2.225
-2.400
-2.575
-2.750
-2.925
-3.100
-3.275
-3.450
-3.625
-3.800
-3.975
-4.150
-4.325
-4.500


(a)
(b)
(c)
(d)
0
0.0055
0.011
Q (Å-1)
200
2000
5000
10000

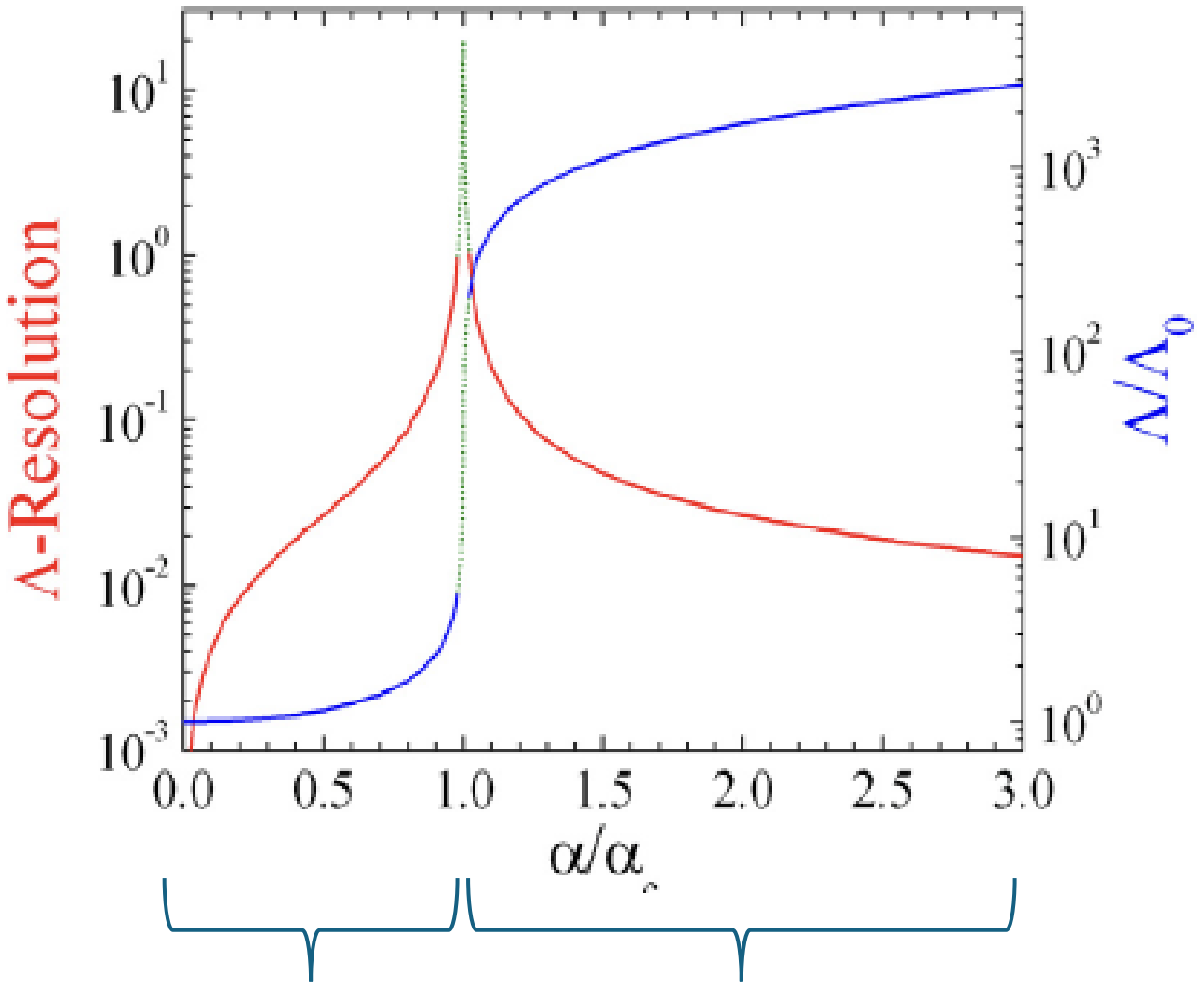
Simulations for GISANS

Disentangle: Quantum Mechanics - i.e. Amplitudes

and: Fluxes – i.e. Intensities



Simulations for GISANS



That‘s it

Questions ?