Getting the Most out of Hybrid Photon Counting Detectors in the Home Laboratory.
Examples in SAXS and GISAXS

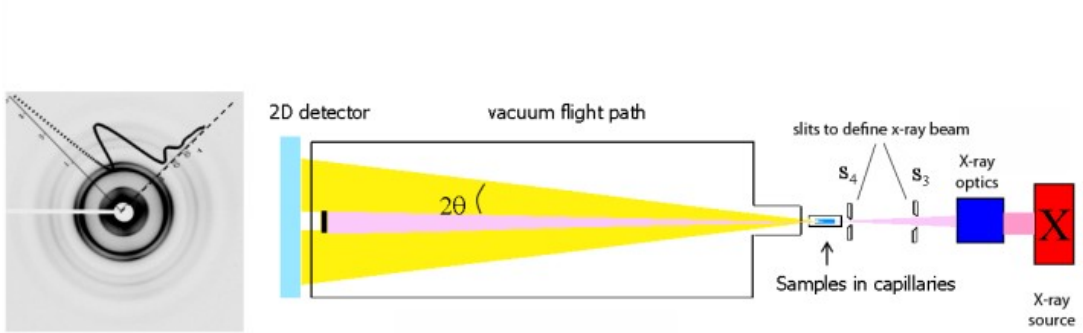
Scott Barton, Molmex Scientific Inc.
Karsten Joensen, SAXSLAB U.S.
Northampton, MA

Soren Skou, SAXLAB DK
Copenhagen, Denmark

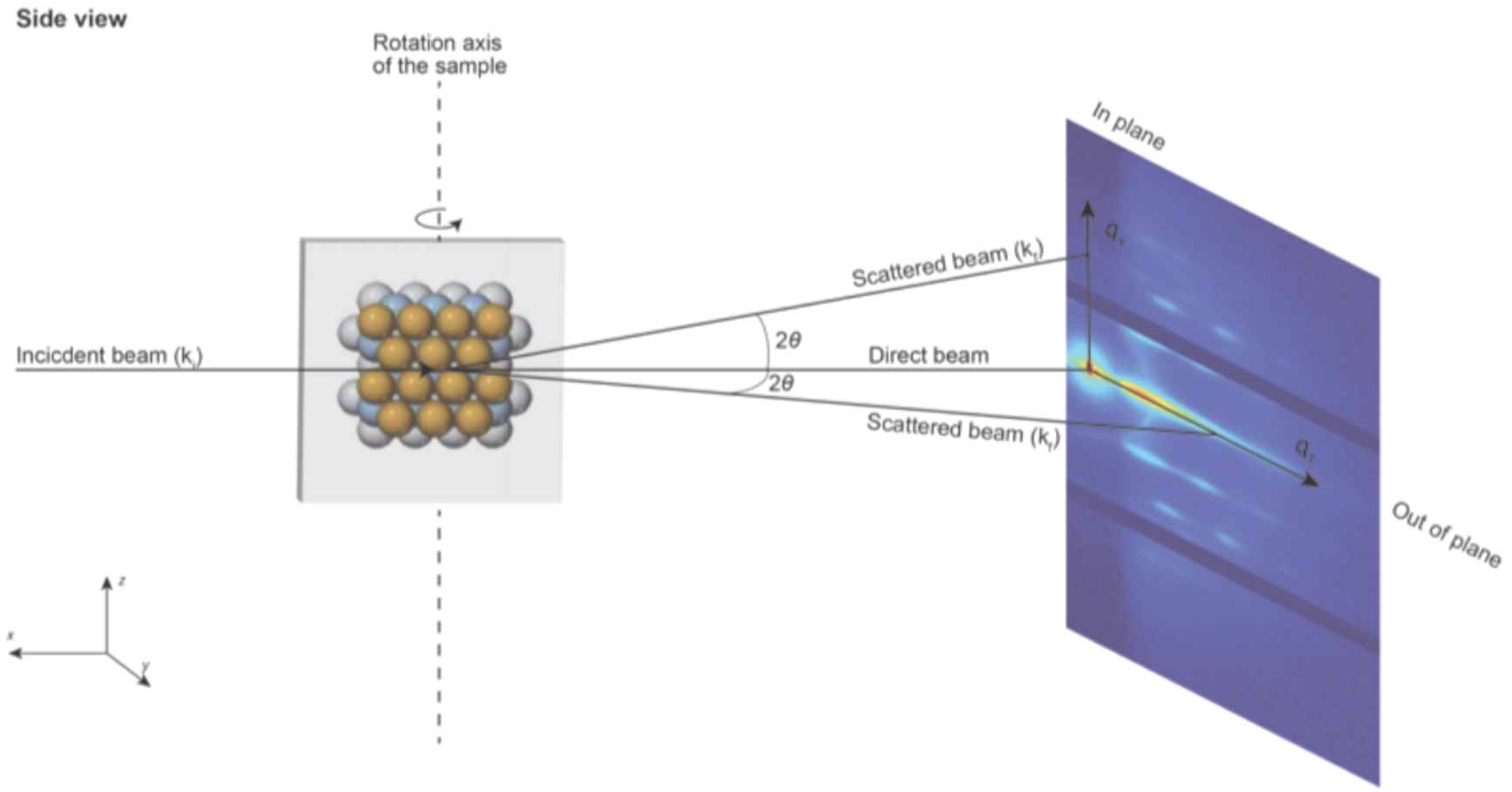
Visit **Booth 42**

Laboratory SAXS/GISAXS





GISAXS


Side view
Rotation axis
of the sample
In plane
Scattered beam (k_f)
Incicdent beam (k_i)
2θ
Direct beam
2θ
Scattered beam (k_f)
q_z
q_r
Out of plane
z
x
y

Pilatus3 R Series (300K)

We take advantage of the following:

(1) **Vacuum Compatibility**

- Low Noise, Continuous SAXS to WAXS

(2) **175μm x 175μm pixel size and Resolution**

- High Resolution Scattering



(3) **20 Hz Frame Rate**

- Cosmic Ray Correction

(4) **Linearity up to 10^7 photons/second/pixel**

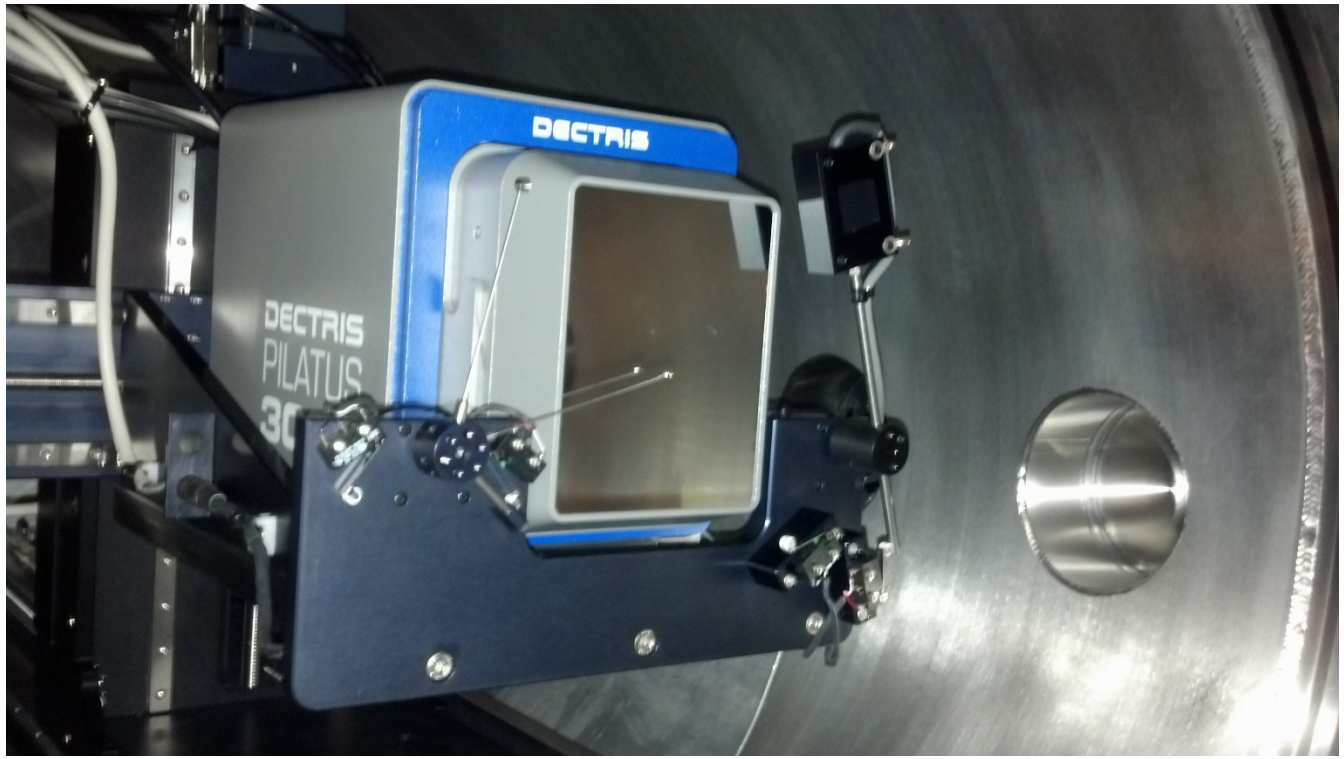
- Beamstop-Free SAXS/GISAXS

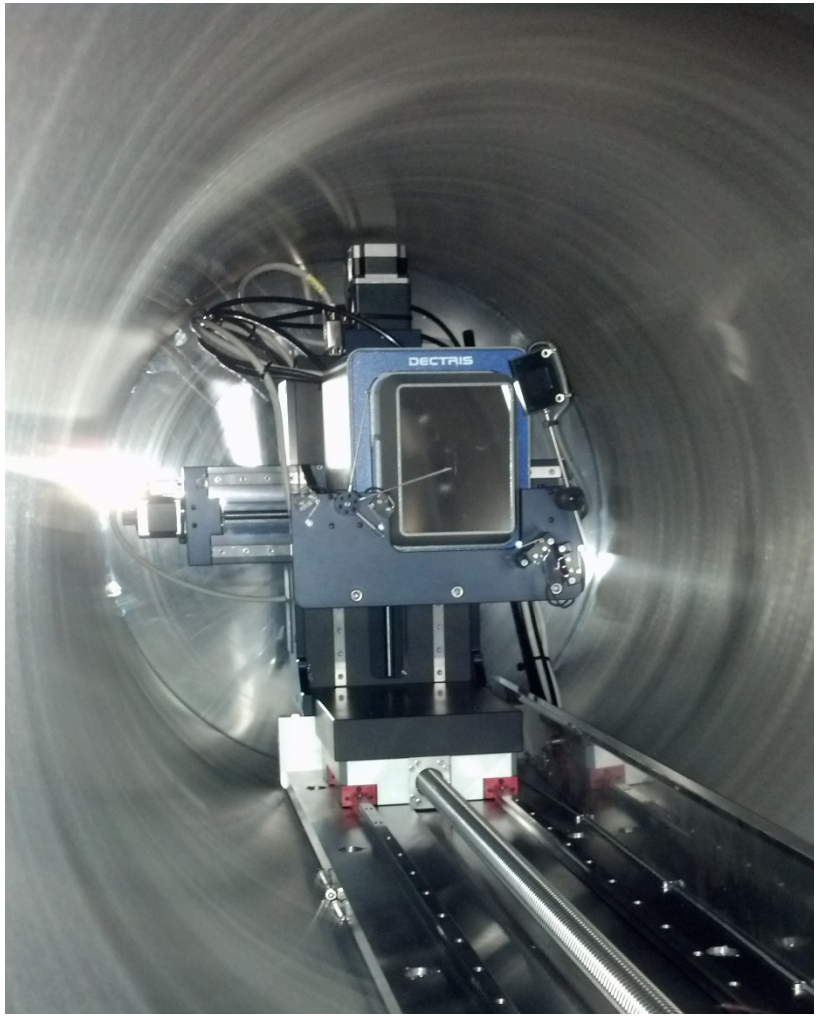
Vacuum Compatibility

With the Detector in the Vacuum Chamber:

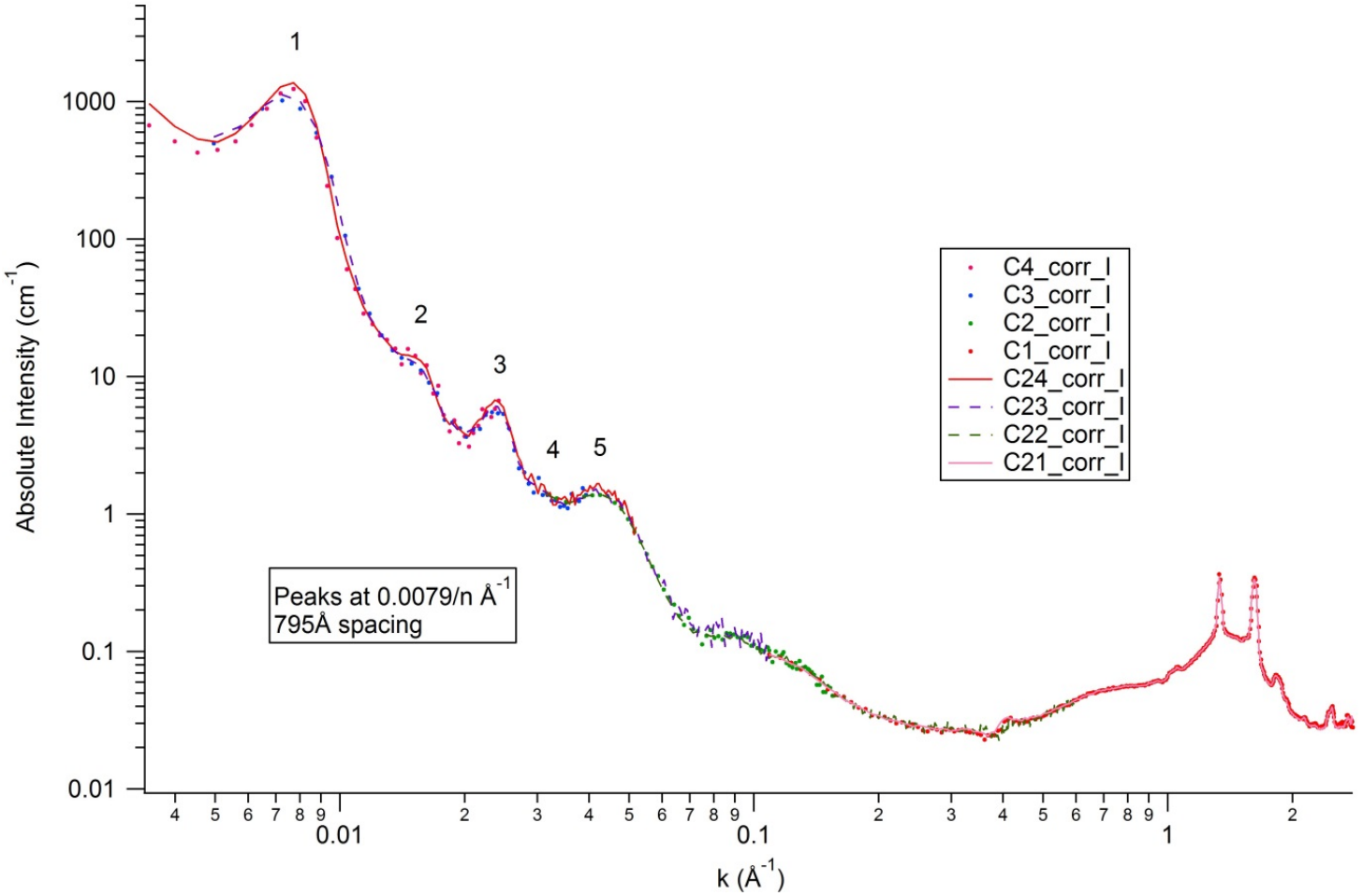
- No Addition Absorption or Background from Window
- Almost 20% Cosmic Ray Reduction from Shielding
- Continuous SAXS to WAXS

Moving Vacuum Detector





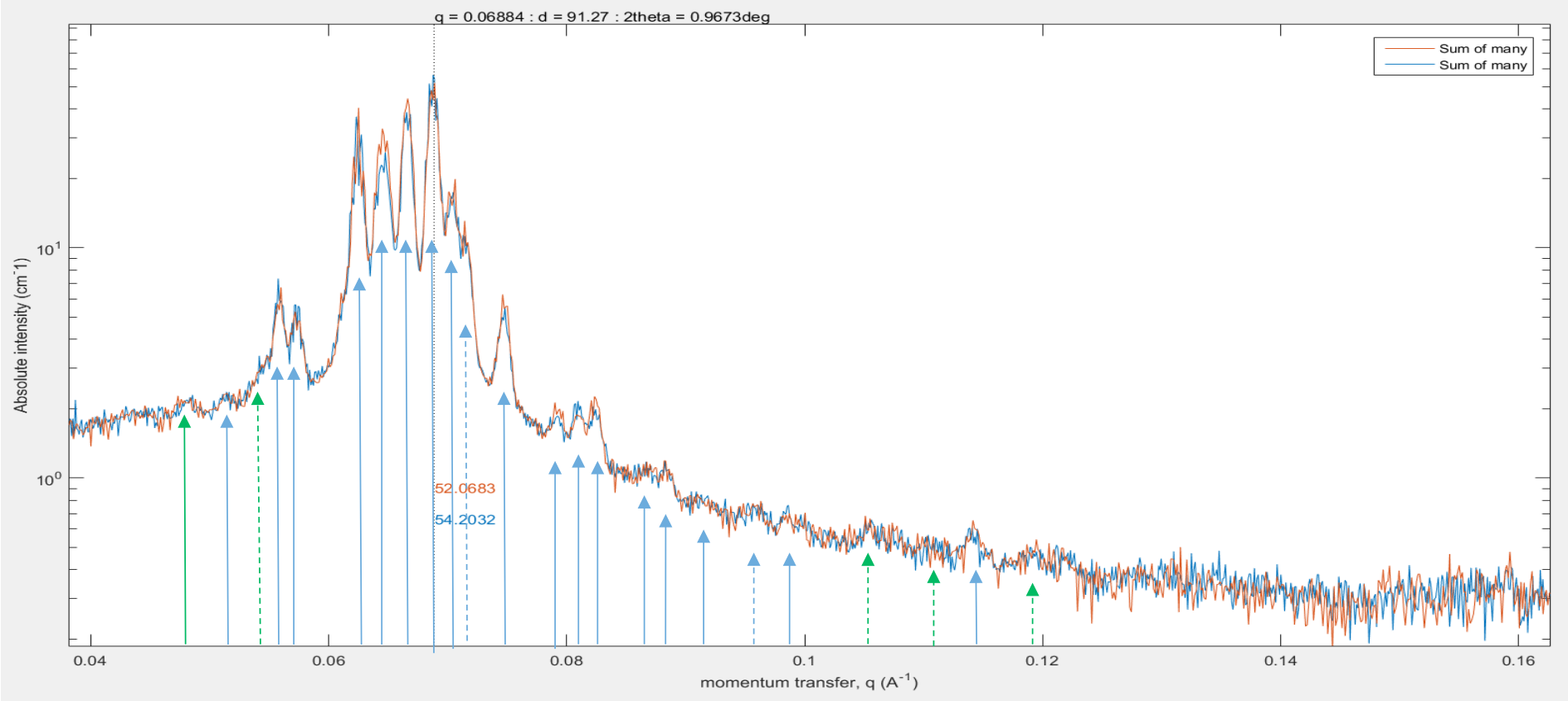
Copolymer SAXS to WAXS



- No Additional Scaling
- Subtracted Kapton Film
- Can see the effect of Resolution
- 2 and 3 Pinhole Configurations

Resolution

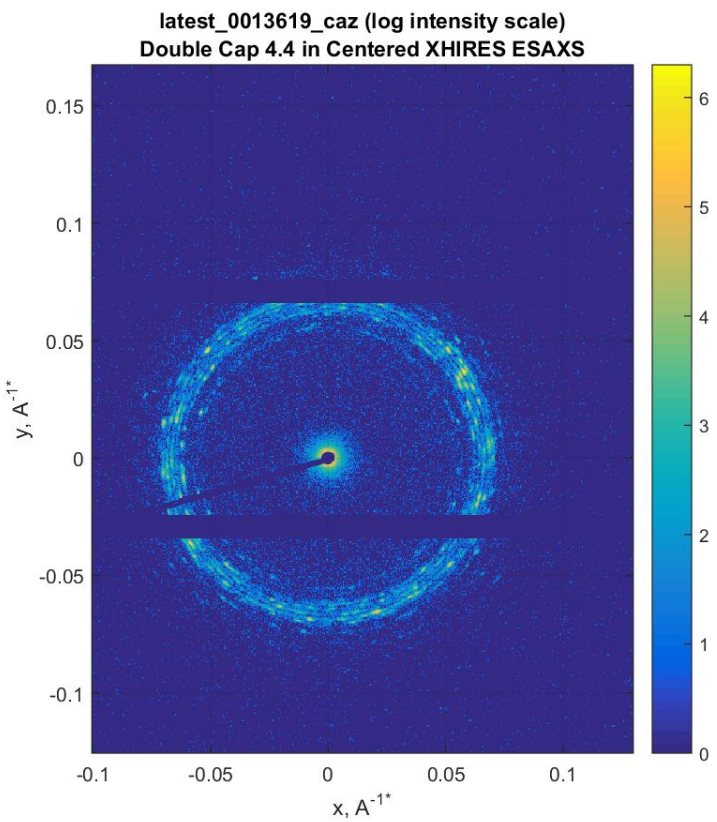
Copolymer Frank-Kasper Phase



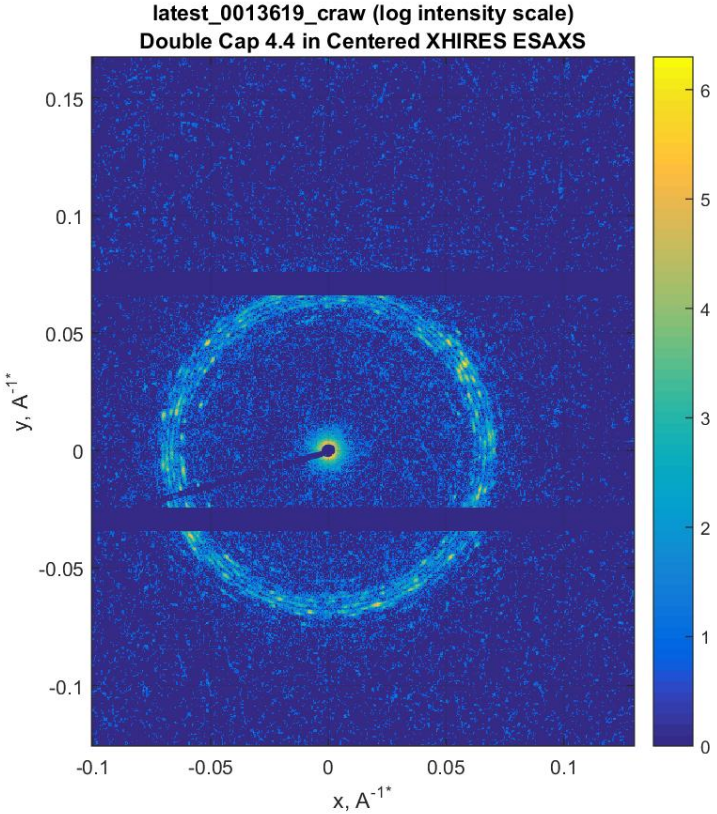
Frame Collection – Cosmic Ray Correction

MOLMEX SCIENTIFIC INC

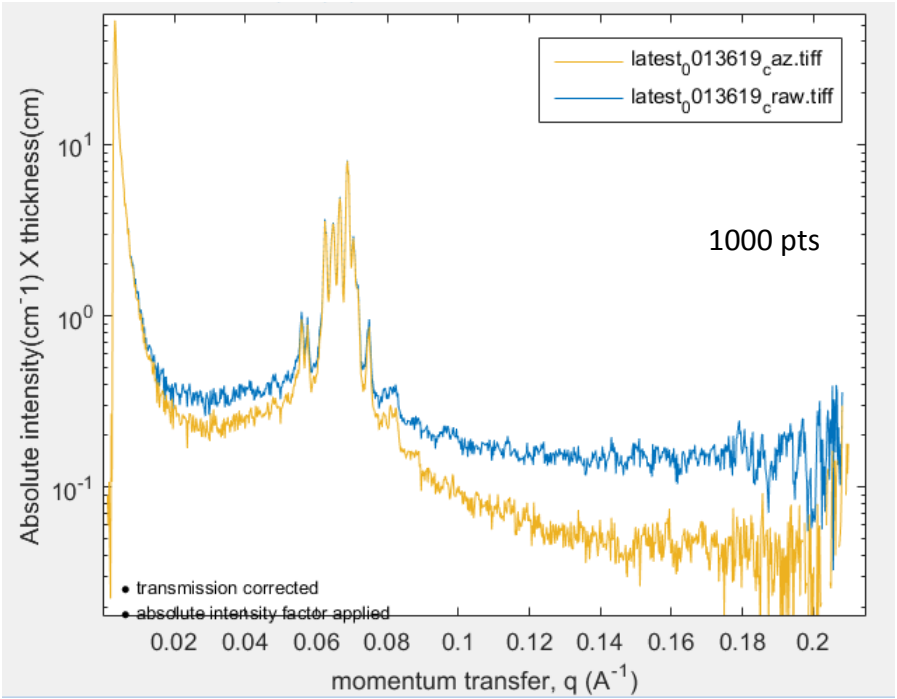
Background Subtracted



Including Background



Averaged

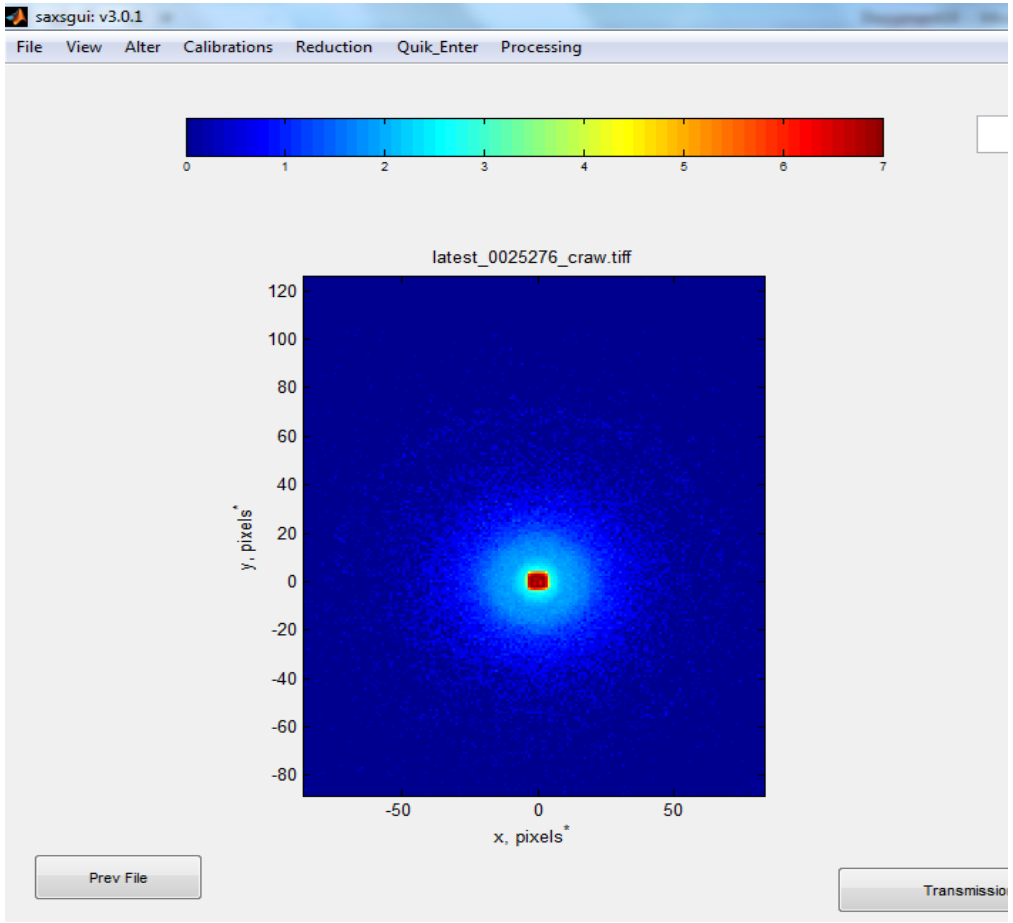


K_Sam_Background_Subtracted.grad

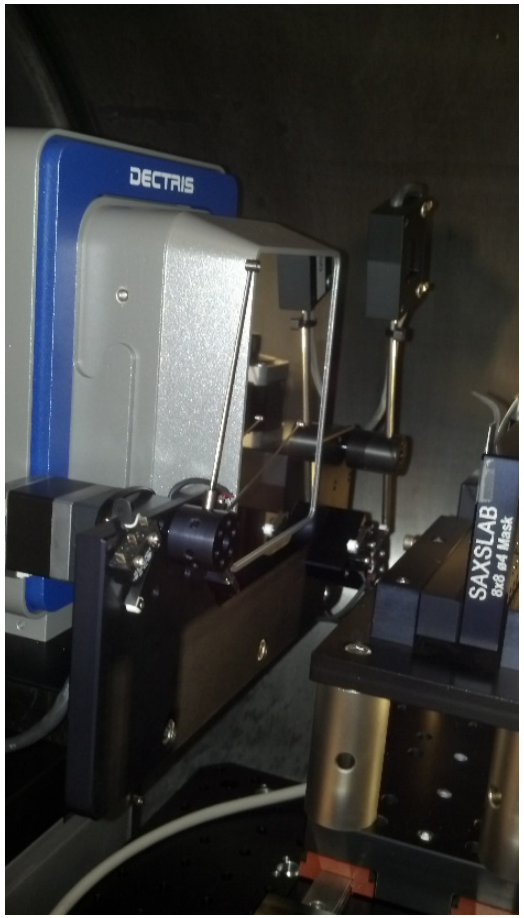
5400 Seconds – Significant reduction of Background in SAXS

Do we need a Beamstop?

Scattering from the Mylar Window in front of the Pilatus



Windowless Detector

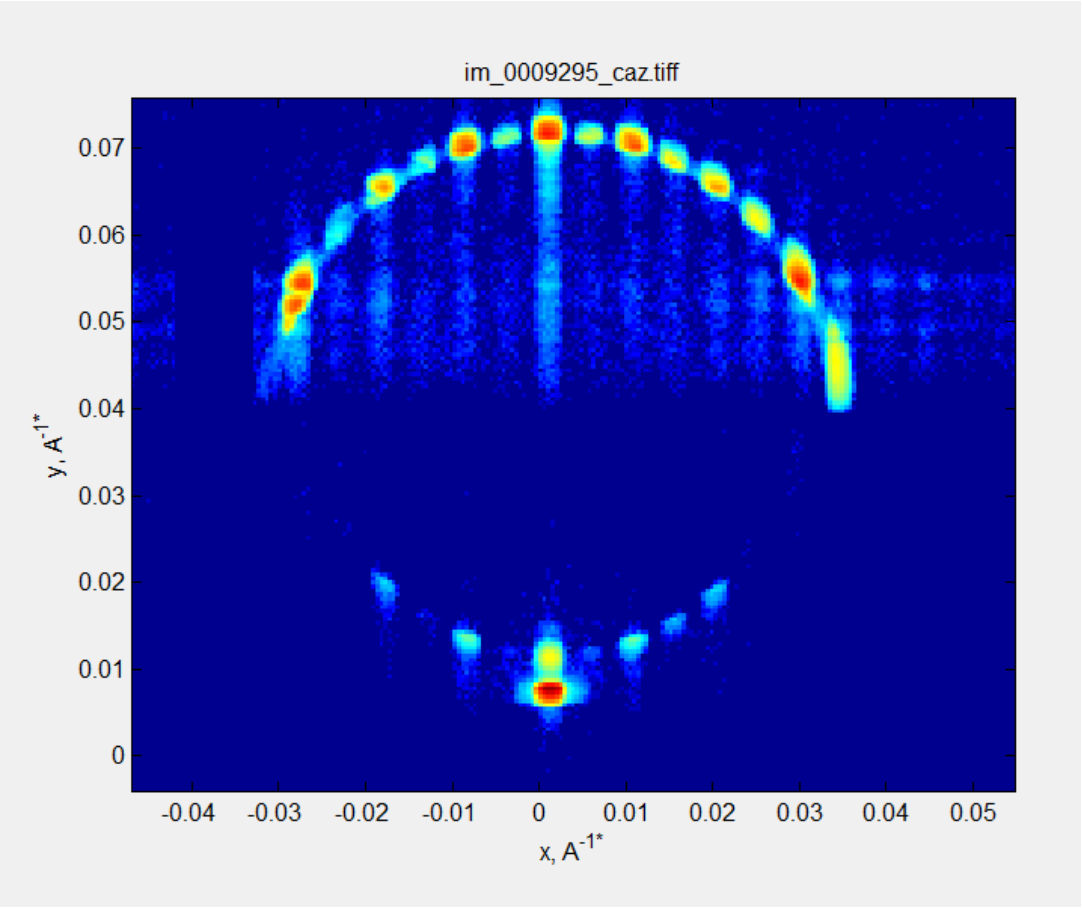




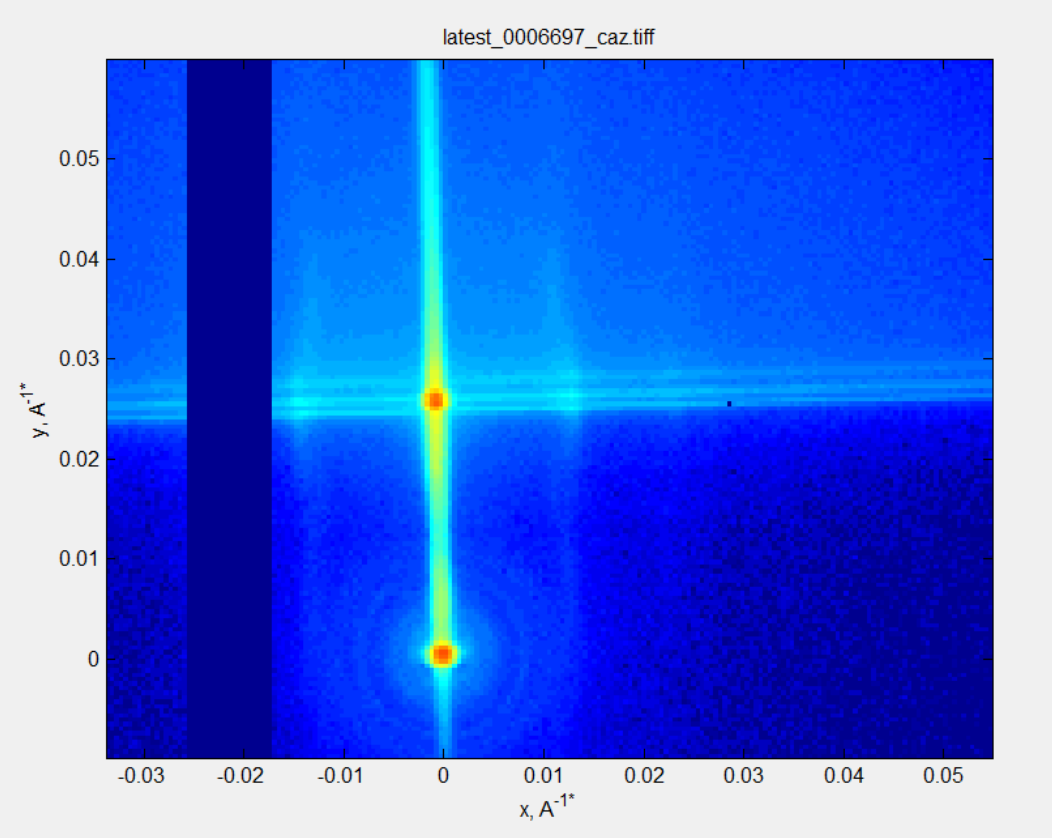


GISAXS – No Beamstop

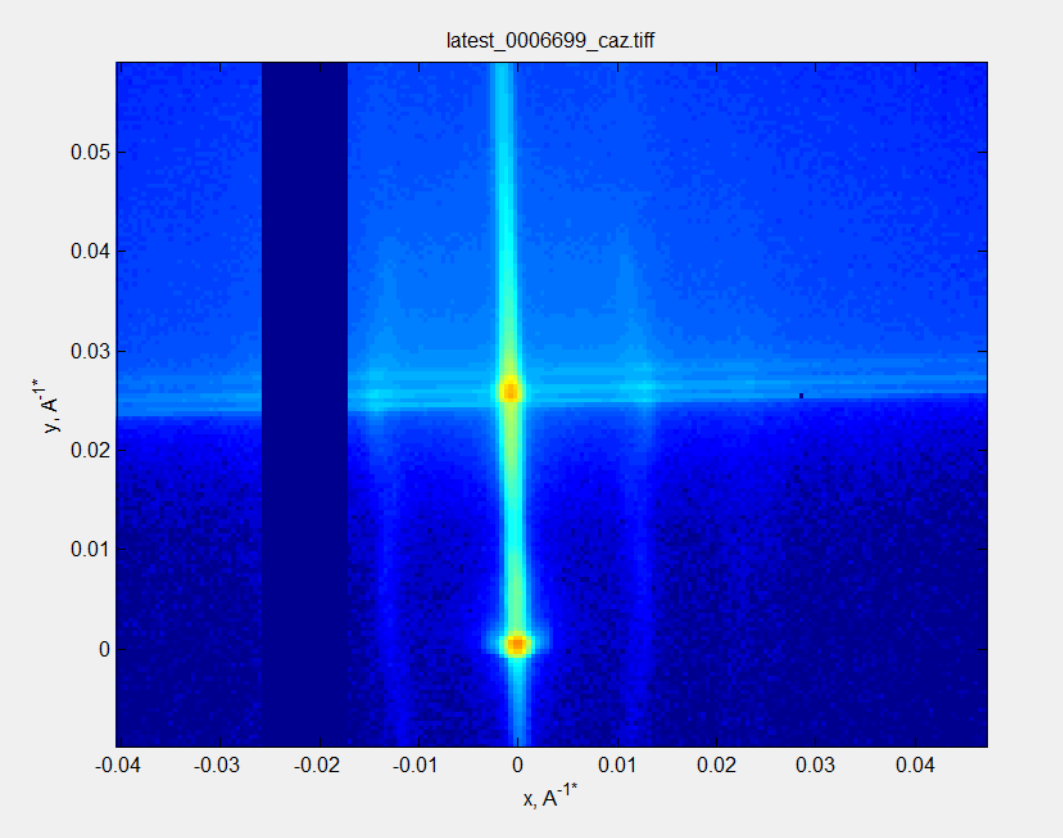
- Direct Beam
- Specular Beam
- See Off-Specular
- Low intensity region



Direct-Beam GI-studies

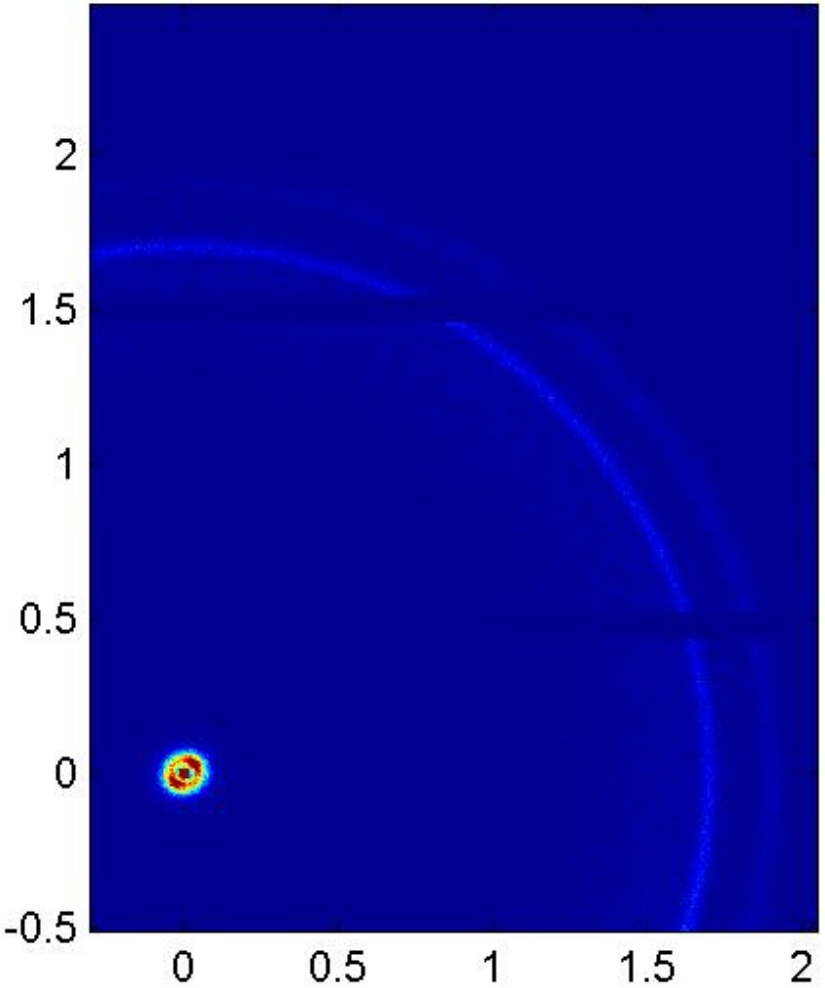


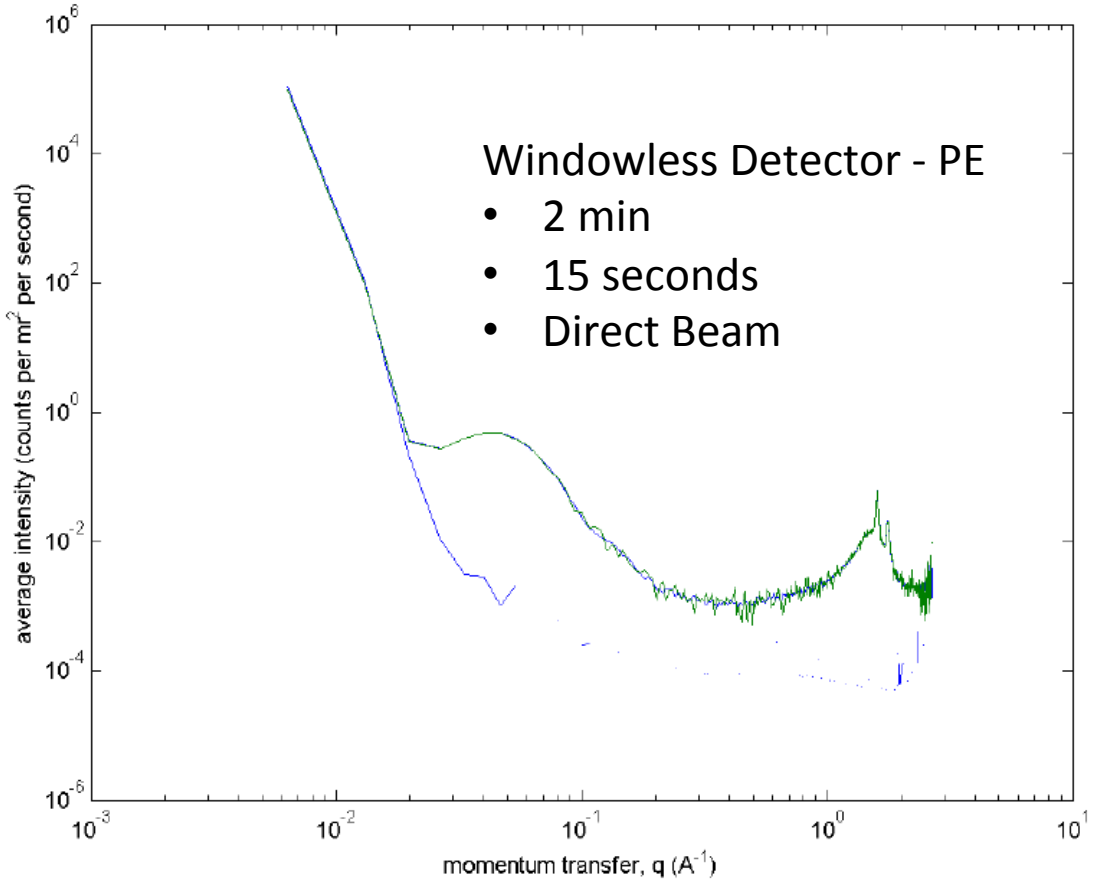
Direct-Beam Mode



Windowless Direct Beam –mode

OFFSET WAXS and SAXS





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THANK YOU!