



## Unique Signal-to-Noise ratio

The Xeuss 2.0 SAXS/WAXS system provides a high signal-to-noise ratio, allowing reliable data analysis of highly diluted systems.

### Introduction

Investigation of weak scattering systems such as diluted proteins or surfactant solutions requires high signal-to-noise ratio ( $I/\sigma$ ) at every  $q$  values. Combination of Scatterless slits 2.0 technology with a low noise camera in the new generation Xeuss 2.0 SAXS/WAXS system ensures high data quality collection and accurate analysis.

### Measurements & results

As displayed in Figure 1, a 10 min measurement of “empty camera” demonstrates the Xeuss 2.0 ultra low background level.

Figure 2 shows the following data in absolute intensity scale ( $\text{mm}^{-1}$ ):

- Xeuss 2.0 typical beam profile as measured on the detector,
- A typical scattering curve of a protein solution (10 mg/ml subF) not subtracted from buffer,
- Level of intensity of water,
- Level of intensity of a typical polymer.

The beam profile measurement demonstrates the ability of the Xeuss 2.0 to define a clean beam. A clean beam means that very low level of parasitic scattering propagates in the  $q$ -space i.e. the background signal remains low even at small  $q$ -values.

Therefore, measurement of weakly scattering samples is possible even at small  $q$ -values. The noise level is shown to be significantly lower than the water scattering intensity allowing reliable water measurement. The scattering curve of the diluted protein shows a higher scattering than the noise signal, especially at high  $q$  values, demonstrating the ability to perform faithful buffer subtraction on the collected data.

Moreover, considering the incident beam of the Xeuss 2.0 SAXS/WAXS system, the signal-to-noise ratio is higher than  $4 \cdot 10^9$ .

This high signal-to-noise ratio capacity results from the integration of the Low Noise technologies developed by Xenocs in the Xeuss 2.0 SAXS/WAXS system, such as the Scatterless slits 2.0. The use of a Dectris detector allows you to take full benefit of these features.

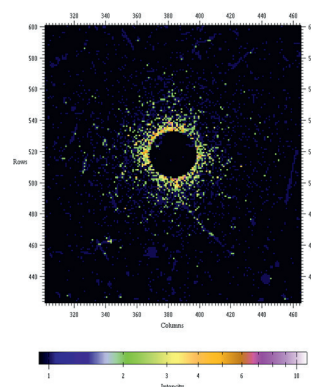


Fig. 1 - Zoom on the beamstop region at lowest  $q_{\min}$  configuration. No sample data. Exposure time 10 min.

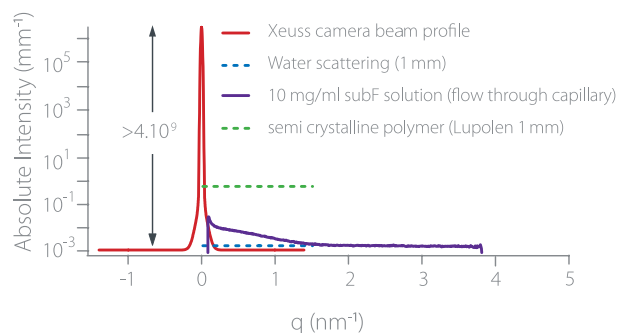


Fig. 2 - Rebuilt 1D scattering curves from Xeuss camera beam profile and typical samples.

### To go further

The Xeuss 2.0 SAXS/WAXS system displays a high signal-to-noise ratio that enables SAXS measurements of proteins. Measurements performed on protein sub-F shows that consistent data is obtained compared to synchrotron results<sup>1</sup> and enables the protein structure resolution.

<sup>1</sup>AN-XE03-Structure resolution of a protein