Signal to Noise Ratio of XPCS using High Efficiency Area Detectors

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X-ray Photon Correlation Spectroscopy [1,2] is a novel measurement method which allows us to explore dynamics in new regions of time wave-number space. Although XPCS is a powerful technique, the selection of systems we can study, and the length- and timescales we can achieve are limited by the signal to noise ratio (SNR). In this talk a simple study of SNR is presented, which shows, that apart from the trivial compromises (limiting ourselves to large length scales, slow dynamics or strongly scattering samples) we have plenty of room for improvement in our detectors. Inspired by this calculation we developed a new area detector optimized for XPCS[3], which proved to be useful at many experiments at the 8-ID beam line of APS. The new camera improved our SNR by a factor of 100. The utility of the new detector is demonstrated by presenting the first XPCS measurements on the dynamics of block copolymer lamellae [1].

References

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