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### **The Use of Coherent X-Ray Beams to Study the Dynamics of Soft Condensed Matter Systems<sup>1</sup>**

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The study of slow dynamics in soft condensed matter systems has been of interest for many years. One of the most powerful techniques for studying dynamics at these time scales has been Dynamical Light Scattering (DLS). However, it was recognized over twenty years ago that a similar application of X-rays in order to achieve shorter length scales and avoid problems of multiple and stray particle scattering, could open up whole new areas of research. The advent of the high-brilliance third generation synchrotron X-ray sources over a decade ago made it possible for the first time to deliver an intense beam of highly coherent X-rays, enabling many new applications of X-ray scattering, some of which will be discussed. In particular, the technique of X-ray Photon Correlation Spectroscopy (XPCS), the X-ray analog of DLS, has now become an exciting new research area with applications primarily in soft condensed matter. In this talk, we shall trace the development of the use of coherent X-ray beams from the early demonstrations at the NSLS, ESRF and APS synchrotron light sources to current applications which include the study of dynamical fluctuations in colloids and polymers and in particular the study of surface fluctuations in liquid films and membranes. We shall show how XPCS has yielded interesting new results on these systems difficult if not impossible to obtain by other techniques.

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