

# Hydrodynamics of concentrated fluid hard-sphere colloids probed by X-ray Photon Correlation Spectroscopy

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We present an extensive X-ray scattering study of the static and dynamical properties of hard-sphere suspensions of PMMA particles at increasing volume concentrations close to the freezing limit ( $\phi=49\%$ ). The static structure factors have been extracted via Small-Angle X-ray Scattering measurements while the dynamic behavior has been probed by X-ray Photon Correlation Spectroscopy (XPCS), the X-ray analog of Dynamic Light Scattering (DLS) that quantifies temporal correlations in dynamic systems by looking at the fluctuations of the scattered intensity under coherent illumination. The hydrodynamic functions resulting from the short-times diffusion coefficients are discussed in the frame of the  $\delta$ - $\gamma$  expansion model of Beenakker and Mazur[1] by using the ideal hard-sphere potential and by using the measured structure factor. In addition, the functional forms for the dynamic structure factors are discussed and compared to previous DLS work[2,3] and another XPCS study that does not agree about a common scaling behavior at the long times when approaching the freezing concentration [4].

1 - Physica A 126(1984)349

2 - PRL 77(1996)771

3 - PRE 72(2005)031402

4 - PRL 84(2000)785