ESRF	**Experiment title:** Anisotropic Dynamics of Colloidal Ellipsoids	**Experiment number:** **SC-4821**
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Shifts: 9	**Local contact(s):** Thomas Zinn (email: thomas.zinn@esrf.fr)	*Received at ESRF:*

Names and affiliations of applicants (* indicates experimentalists):

A. Pal*, Md. Arif Kamal*, P. Holmqvist* and P. Schurtenberger*
Division of Physical Chemistry, Lund University, PO Box 124, 22100 Lund, Sweden

Report:

In this experiment we have measured the anisotropic dynamics of colloidal ellipsoids of aspect ratio ρ=2.8 over a wide concentration range (φ=0.17 to φ=0.42) at the nearest neighbour length scale. Since these particles had magnetic cores coated with silica shells, we had also applied external magnetic fields to tune their interactions. At zero field we have observed de Gennes narrowing at all concentrations. We have calculated the hydrodynamics function H(q) following $D/D0 = H(q)/S(q)$ [Fig. 1 (a), (b), (c)].

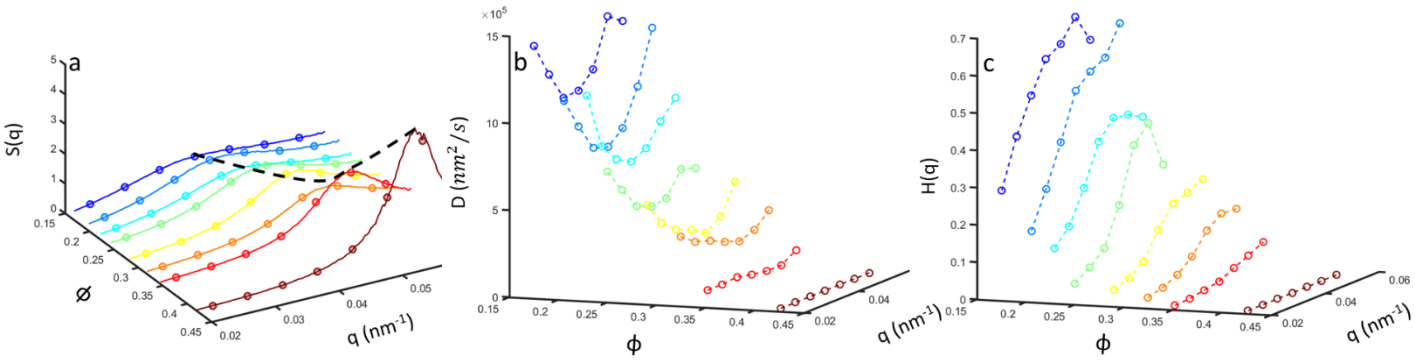

Figure 1: a) Variation of a) structure factor S(q), b) diffusion coefficients D(q), c) hydrodynamic function H(q) as a function of volume fraction φ. For dynamics we have considered the q- values marked by open symbols in (a). Different colour corresponds to different φ.

In presence of the external field, not only the diffraction pattern became anisotropic but also the dynamics. However, both along and perpendicular to the direction of the external field, inverse of diffusion coefficients follows I(q) as can be seen from Fig. 2.

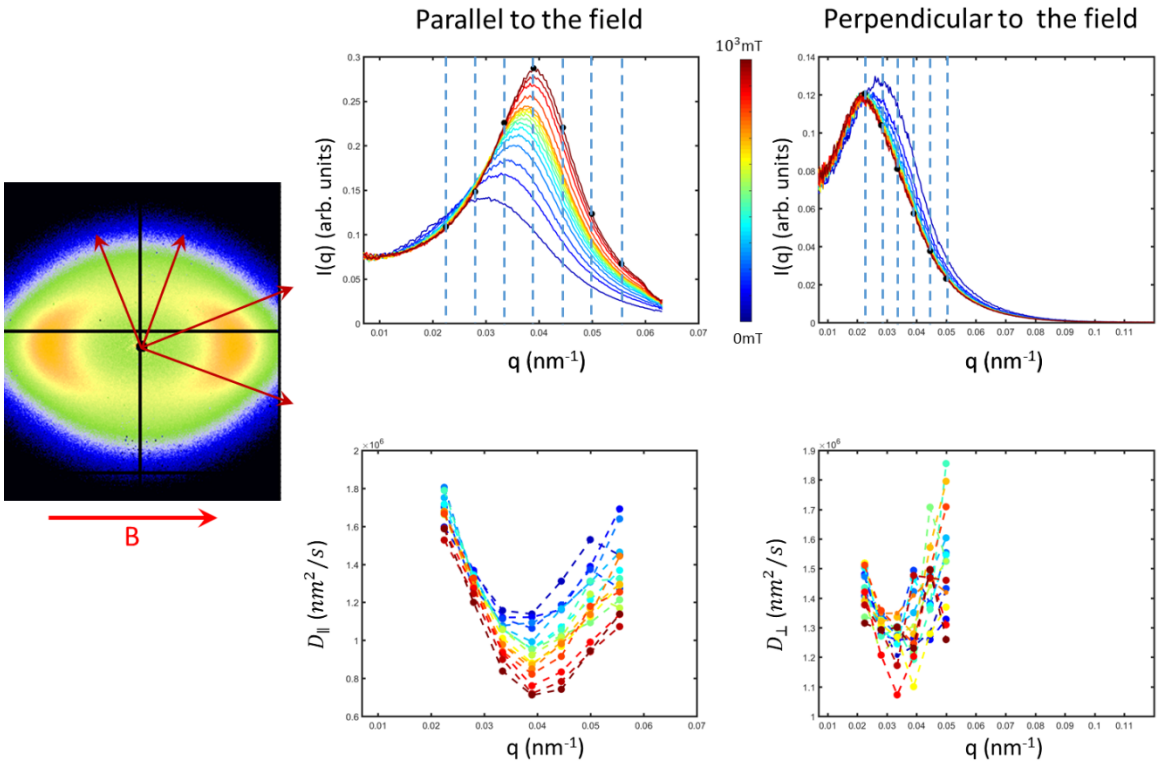

Fig.2 Left panel shows the diffraction pattern at 1000mT, at φ=0.17. Middle and right columns represent the data parallel and perpendicular to the direction of the external fields. Top panel indicates the structural correlation while the bottom one shows the dynamic behaviour as a function of q. Different colour represents different magnetic fields.

Finally, we have compared the "cage dynamics" (the dynamics corresponds to a q- value which corresponds to the structure factor peak as indicated by the black dashed line in Fig. 1(a)) at zero field (D), at 1000 mT ($D_{\parallel}$ and $D_{\perp}$) with hard sphere system. We have found that there is a significant difference in arrest transition for ellipsoids compared to hard sphere as can be seen in Fig.3.

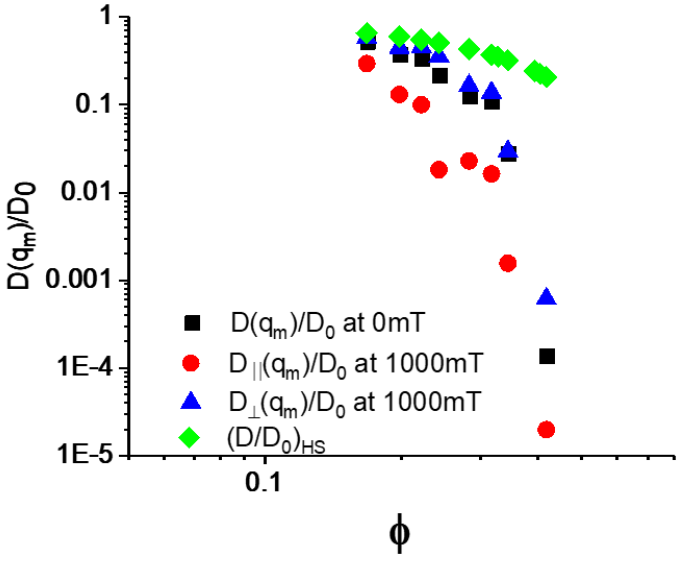

Fig.3. Comparison of normalized cage diffusion coefficients of ellipsoids with hard spheres.