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Nanoparticles studied by magnetic speckles KARINE CHESNEL, LBNL, Berkeley, STEVE KEVAN, U. of Oregon, JEFFREY KORTRIGHT, LBNL, Berkeley, ERIC FULLERTON, Hitachi, SHOUHENG SUN, IBM, KANNAN KRISHNAN, U. of Washington — Magnetic nanoparticles self assemblies are promising for advanced permanent magnetic applications [1]. The recent development of Soft X-Ray Resonant Magnetic Scattering (SXRMS) provides a very good tool to study magnetic order and reversal processes in such nanostructures. The chemical selectivity and the polarization sensitivity allows to probe the magnetic configuration, as shown by recent studies on superparamagnetic Co particle assemblies [2]. Moreover, by using coherent light and 2D detection one can obtain remarkable speckle patterns that are related to the local magnetic distribution [3,4]. In this work, we present spectroscopy measurments in circular polarization as well as SXRMS measurement performed in transmission geometry (small angle scattering) on Co and Fe3O4 nanoparticles assemblies. We recorded magnetic speckles in linear polarization at specific points tempertaure and magetic field. By studying the cross-correlation between the speckles patterns, we can measure the statistical evolution of the microscopic magnetic distribution through the superparamagnetic transition. [1] H. Zeng et al. Nature **240**, 395 (2002) [2] J.B. Kortright *et al.*, Phys. Rev. B **70**, (2004) in press. [3] K.Chesnel *et al.*, Phys. Rev. B **66**, 172404 (2002) [4] M. S. Pierce *et al.*, Phys. Rev. Lett. **90**, 175502 (2003).

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