Abstract Submitted
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Magnetic order and fluctuations in Fe_3O_4 nanoparticles via coherent X-ray magnetic scattering KARINE CHESNEL, MATEA TREVINO, YANPING CAI, ANDREW MATTHEW, Physics department, BYU , ROGER HARRISON, Chemistry department, BYU, UT, ANDREAS SCHERZ, SLAC, Stanford, CA — Magnetite (Fe_3O_4) particles exhibit a superparamagnetic behavior when their sizes are in nanometer scale. Such nanoparticles could potentially be used for applications in the medical field. We are interested in investigating the magnetic order and fluctuation dynamics in self-assemblies of such nanoparticles. Our Fe_3O_4nanoparticles are prepared by an organic route and range from 5 nm to 50 nm in size. They are deposited on membrane where they self-assemble. We have been studying the magnetic order using X-ray resonant magnetic scattering (XRMS) at the SSRL synchrotron facility in Stanford. This unique technique, combined with X-ray Magnetic Circular Dichroism (XMCD), provide information about the spatial distribution of the particles and their magnetic order (1). In addition, the use of coherent light at the SSRL beamline, combined with the application of magnetic field in-situ at different temperatures, allows for studying local magnetic disorder (2) and dynamics of fluctuations near the blocking temperature.

1. J.B.Kortright et al., PRB **71**, 012402 (2005)

2. K. Chesnel et al., PRB **83**, 054436 (2011)

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