Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Realization of a Bowl-like Potential and Its Confinement of Magnetic Microspheres[1] AARON CHEN, THOMAS HENIGHAN, GREGORY VIEIRA, RATNASINGHAM SOORYAKUMAR — Field-induced self-assembly of fluid-borne superparamagnetic microspheres not only has its importance in nanotechnology, but it also serves as a model for studies of phase transitions at the nano- to micro-meter scale. In this report, we experimentally demonstrate and theoretically account for the dynamics and structural order of a two-dimensional cluster of microspheres in the presence of a bowl-like potential. The potential is derived from magnetic patterns imprinted on the surface together with externally applied magnetic fields. Due to competition between the repulsive dipolar interaction amongst the microspheres and the confining force provided by the bowl-like potential, a cluster of microspheres with characteristic inter-sphere spacing is stabilized within the potential. The role of external magnetic fields which provide a convenient means to tune the strength of the dipolar interactions, and thereby control the relative importance of the two competing interactions, will be presented.

[1]Support from ARO grant W911NF-10-1-0353 is acknowledged.

Aaron Chen

Date submitted: 17 Nov 2010 Electronic form version 1.4