Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Jamming in Quasi-2D Self-Assembled Nanoparticle Monolayers
LEANDRA BOUCHERON, JACOB STANLEY, YELING DAI, Univ of California - San Diego, SEAN YOU, University of Chicago, SURESH NARAYANAN, ALEC SANDY, ZHANG JIANG, Advanced Photon Source, Argonne National Lab, MATI MERON, BINHUA LIN, Center for Advanced Radiation Sciences, University of Chicago, OLEG SHPYRKO, Univ of California - San Diego — In this work, we experimentally probed the interparticle dynamics of iron oxide nanoparticle thin films self-assembled at the liquid-air interface. Upon deposition on a water surface in a Langmuir-Blodgett trough by the drop-casting technique and subsequent lateral compression, iron oxide nanocrystals coated in oleic acid ligands self-assembled into a relatively uniform quasi-2D monolayer. Utilizing X-Ray Photon Correlation Spectroscopy (XPCS) at beamline 8-ID-I of the Advanced Photon Source at Argonne National Lab, we measured the characteristic timescale of in-plane interparticle dynamics. We quantified the aging behavior of the film utilizing both second-order and two-time autocorrelation analysis. We also determined the degree of jamming in the system by a stretched exponential model, yielding exponents varying between a value of 1.5 and 2. We have concluded that despite the quasi-2D nature of our system, verified by x-ray reflectivity, interparticle diffusion in our nanoparticle monolayers bears the signature of a largely three-dimensional jammed system.

Leandra Boucheron
Univ of California - San Diego

Date submitted: 14 Nov 2014 Electronic form version 1.4